



Effective Educational Technology and its Application in 21st Century Education

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Abstract:

In 21st Century Learning, students use educational technologies to apply knowledge to new situations, analyze information, collaborate, solve problems, and make decisions. Utilizing emerging technologies to provide expanded learning opportunities is critical to the success of future generations. Improved options and choice for students will help improve student completion and achievement. In its 10th Report in 2007, the Premier's Technology Council (PTC) identified technology and e-learning as central to addressing future skill shortages in the work force, particularly in rural areas of the province. The PTC described "blended learning" – technology-enhanced learning that is both online and in the classroom– as an effective approach to enhance education. The PTC recommendations are consistent with international initiatives that promote 21st Century Learning and the use of technologies to support student choice and flexibility. The Premier's Technology Council December 2010 Report, a Vision for 21st Century Education, describes what an educational system might look like should it be transformed. In this way we must do maximum use of Educational Technology in Education. Here the researcher highlights the key points of application of Education Technology in 21st century Education.

Keywords: 21st Century, Education, Education Technology, ICT, Learning, Formal-Non formal education

1. Introduction

E-learning, Educational Technology, Information and Communication Technology, Computer Aided Learning, Computer Aided Assessment, Computer Mediated Communication - these terms and others are bandied about in recent years but what do they mean and why should you invest any time in getting to know more about them?

'Technology' in its broadest terms could include overhead projectors and even pen and paper but, in the context of Learning Technology, it is generally understood that we are talking about technologies that have arrived with the 'Information Revolution' i.e. those associated with computers.

For those of us who have been around for a bit, this seems to be the promise that is never fulfilled. There has been talk about how computers and other technologies would revolutionize the nature of learning for several decades now. We can all point to isolated examples of success but probably also point to numerous examples of wasted effort.

2. Educational Technology

Technology refers to the techniques as also the technical contrivances. A systematic way of applying the techniques to achieve an objective is as important as the use of technical equipment for the same. As a matter of fact, techniques are reckoned as the software and the equipment as the hardware of technology. Technology results in new designs and devices as also new ideas and processes. Each new physical device is accompanied by a new set of procedures and techniques. For example, the development of telephone has led to phone books, answering machines, fax, telephone shopping, etc. the 'hard' component (physical device) for the purpose of study.

Educate the act or process of acquiring and imparting knowledge is crucial to the development of a learner with a view to his/her participation in the transformation of the world for a better tomorrow. Learning and understanding are basic to the definition of education.

Educational technology is not a simple combination of these two words as shown in fig. it is usually thought of even more than the sum of the following two interpretation;

1. Technology in education
2. Technology of education

Early developments referred to the role of technology in education which signifies the use of audiovisual equipment, i.e., hardware in educational processes. Later developments recognize the concept of technology of education, i.e., techniques and methodologies of the teaching learning process. This is indeed the software aspect of educational technology. The origin of software is closely associated with the courseware, i.e., instructional design and development of a subject.

Use of technology in education results in increased effectiveness of the educational process. Use of technology in training results in increased productivity through enhanced human capability. For example, telephone extends our capability to talk and listen over long distance and automobile extends our capability to travel large distance over short period of time. Overhead projectors extend our capabilities to project a large image of a visual on a screen and slides enable us to capture real-life events and bring them into the classroom.

2.1 Formal Education

The hierarchically structured, chronologically graded 'education system', running from primary school through the university and including, in addition to general academic studies, a variety of specialized programmes and institutions for full-time technical and professional training.

2.1.1 Application of Educational technology in the Formal Education

Teachers use technology to display information, create charts, monitor students, to engage students. Students use technology for learning, practicing and expanding what they have learned. In order to be competitive in the world, students must have access to technology.

2.1.1.1 Function

Technology is used to aid in visual representation in the classroom and can be used as a teaching tool in conjunction with software programs and the Internet. Technology can be used to test student skills and aid in their writing.

2.1.1.2 Visual Technology Aid

Smart Boards are a technologically-advanced type of chalkboard. Special "markers" are used to write on the boards to display. Interactive media can display website pages and software programs so the class can see the program's applications.

2.1.1.3 Computer Technology Aid

Many students need more than just the traditional direct teaching method in order to be successful in the classroom. Computer technology allows students to work on programs that enhance learning. Word processing help students with typing and publishing papers. There are a variety of programs that help students practice skills, review material and test specific skills.

2.1.1.4 Internet Technology Aid

The Internet can provide resources and websites for practicing skills and monitoring student progress. It also has resources for teachers pertaining to student management, lesson plans and other teaching matters.

2.1.1.5 Considerations

The Internet is a valuable technology tool, but must be used with caution. Student computer use should be closely monitored. Teachers should search for specific websites aimed at students that are safe.

3. Types of Technology Used in the Classroom

Gone are the days when the teacher stood in the front of the classroom and lectured while students simply took notes. Today the classroom is an interactive world where the teacher as well as the student is engaged with technology. Because today's young people are hooked up and plugged in all of the time, whether it is with text messaging, iPods, social networking websites and more, it is important that teachers find a way to engage them on a technology level. Technology in the classroom is doing just that--keeping students stimulated by using the latest and greatest inventions in computers and digital media.

3.1 Projectors

Projectors are a basic way to introduce technology to students in the classroom. The projector is hooked up to the teacher's laptop and projects the screen from the laptop to the white board in the front of the room. This enables students to see a larger version of what is on the laptop screen. A teacher can project a word document and show students' note-taking strategies. The teacher can also show PowerPoint presentations to students using the projector. Students can follow the teacher as he or she goes onto educational websites as well. A projector in the classroom is a remarkable tool in engaging the student with technology.

For different uses, different types of projectors available which are as follows.

1. Video Projectors
2. Slide Projectors
3. Overhead Projectors
4. Opaque Projector (book reader)
5. LCD / DLP Projectors

4. SMART Technologies

SMART Technologies are leading the way in classroom interaction between students and teachers using computers. SMART boards are a fantastic way for students to stay engaged in lessons. A SMART board is an interactive white board that allows the teacher to project an image from a laptop to the front of the room. The amazing part is that the teacher can then digitally draw on that image. Graphs and tables are available templates in SMART boards. SMART boards can store lessons and digitally enhance plain templates into customized learning tools. Hundreds of applications are possible with this technology, and students are benefiting immensely from it.

5. Mimio Boards (Interactive-white boards)

Mimio boards are similar to SMART boards. They are **interactive white boards** that allow the teacher to manipulate computer functions on the white board in the front of the room. Sensors are in place in the board that allows the teacher to use a special pen that acts like a mouse. Teachers maneuver through websites, graphs and other lessons using this technology. Students can even participate by using the board for PowerPoint presentations. This is a fantastic tool in interactive classroom lessons.

6. Classroom PCs

Some educators are lucky enough to have individual PCs for every student in the class. When every student has his or her own laptop, learning takes on a whole different dynamic. For example, a teacher can allow students to follow along during a writing lesson on Word programs. In addition, students can research and explore on their own. PCs can store a student's work more efficiently than folders. Bulky encyclopaedias and dictionaries are unnecessary if every student can access the Internet on his or her own time using a personal computer. A paperless world in the classroom can be organized as well as environmentally friendly. Finally, students become empowered in their education by having their own personal tool to better their academic outcomes.

7. Technology Education for Teachers

Students have surpassed many teachers in technology use. Because of this, to effectively utilize technology in the classroom, teachers should be properly trained. In addition, it is more academically supported if all teachers use the technology together. It is insufficient for a student to receive an interactive education in only a few classes while in others he or she is receiving outdated instructional strategies. Explicit, interactive instruction is the most useful and engaging way to reach a student and enhance his or her learning potential. Technology can enhance that potential even more.

8. Non-formal Education

Any organized educational activity outside the established formal system - whether operating separately or as an important feature of some broader activity - that is intended to serve identifiable learning clientele and learning objectives.

9. Informal Education

The truly lifelong process whereby every individual acquires attitudes, values, skills and knowledge from daily experience and the educative influences and resources in his or her

environment - from family and neighbours, from work and play, from the market place, the library and the mass media.

10. Application of Educational Technology in the Non-Formal Education

10.1 Computer Assisted Learning (CAL)

The term Computer Assisted Learning (CAL) covers a range of computer-based packages, which aim to provide interactive instruction usually in a specific subject area, and many predate the Internet. These can range from sophisticated and expensive commercial packages to applications developed by projects in other educational institutions or national initiatives to simple solutions developed by individuals with no funding or support to tackle a very local problem. The amount of time and money invested in development is high and partly because of the very subject specific nature of the education market as well as the very personalized nature of the teaching process - particularly at FE and HE level - means that commercial success is difficult to achieve and work done in one subject area rarely transfers to others subject areas.

In general, the use of computers in education through CAL has been sporadic a great deal of effort was expended with little general impact. Many of those academics that took part in that earlier crusade are now cynical about the effectiveness of computers in teaching.

There are still good reasons to use CAL rather than Internet based technologies. CAL is run either straight from a CD or floppy disk drive or over a local network so the constraint of the internet - slow download times for multimedia materials may not apply. This, coupled with the fact that CAL technology has been around a bit longer, means that CAL packages have the potential to offer more advanced, interactive, multimedia learning experiences than it is currently reasonable to expect from the Web. This has been changing as Web technologies develop and bandwidths improve but there are currently many things that can only be achieved with CAL rather than the Web and CAL has been an integral part of the curriculum in many departments at Warwick for some time

10.2 Introduction to Internet Technologies

The principle difference - 'What has changed?' is that when we talk about interaction in CAL (Computer Aided Learning) packages, we are usually talking about interacting with computer programs. Internet based technologies are more about interaction between people and in our Postmodernist world, we know that learning is largely a social activity and even the most well thought out multimedia interactive materials lack the flexibility of human interaction.

The use of the term Information and Communication Technology (ICT) rather than Information Technology (IT) emphasizes this change. Computers now facilitate communication between people as well as between people and programs or people and data.

Those who were involved in developing CAL packages in earlier decades usually point out that there is nothing new under the sun - which the lessons we are learning today about using the Internet for teaching were learnt before. Others would go further and point out that distance education with print has also covered a lot of the ground before and it is only because most lecturers are only accustomed to the face to face setting that they stumble into well mapped pitfalls when beginning to use internet technologies to teach. All of this is true but it is also true

that using the Internet for teaching brings new challenges and necessitates the development of additional teaching skills.

The arrival of the Internet made communication between machines much easier and a number of open protocols and applications were developed to make use of this. Of these, Email was the forerunner and there can be few academics and students that do not have access to this now. Email has its limitations and it was the World Wide Web that really brought the world of networked computers to the general public. The open standards of many of the technologies and the ease with which anyone could publish information encouraged participation by all and we need to remember what is about these technologies that makes them attractive when we try to deploy them for education. However, initially, a relatively small number of University lecturers adopted it for a range of teaching purposes but even fewer did more than post information about their courses or actual lecture notes - usually not modified in any way to take advantage of the strengths of the media such as hypertext.

One of the strengths and principle attractions of the Web is that it can provide authoring access to anybody and this is quite different from the one-way nature of education through CAL or any other media that predated it. The fact that the technology facilitates this does not of course mean that it will take place but then this is true of any educational forum.

While far from needing programming skills, it still takes a certain amount of technophilia to publish a Web page. Creating them is trivial but actually publishing them can be tedious if the institution has not provided a simple means to do so.

This is all about information rather than teaching and learning and it soon becomes obvious to any treading this path that you cannot take the people out of the learning equation entirely. Learning is about interaction and interaction with information alone is not enough.

We can group the Web technologies available for education roughly into 3 areas, outlined below.

1. Digital Learning Resources
2. Computer Mediated Communication (CMC)
3. Computer Aided Assessment (CAA)

They tend to be adopted in that order with novice online tutors first placing their lecture notes online 'as is' then restructuring the materials to take better advantage of the media and perhaps augmenting it with resources not possible in print such as video or creating interactive materials.

10.2.1 Digital Resources

This could range from simply placing Word documents on the Web for your students to download and print or making your PowerPoint presentations available after a lecture to creating Web pages that make better use of the media to streamed digital video and simple interactive CAL-like programs.

10.2.2 Computer Mediated Communication (CMC)

CMC can include any means by which individuals and groups use the Internet to 'talk' to each other.

CMC can either be synchronous (exchanges take place in 'real time') or asynchronous (messages are posted up at any time, and read and responded to by other users also at times which suit them; in other words, users do not have to be online at the same time, as they do with synchronous exchanges). Email, mailing lists, Usenet and computer conferencing are all asynchronous, while IRC, Internet telephony and videoconferencing all take place synchronously. All of these types of CMC are now available through the Web i.e. through a standard Web browser.

Which type of CMC you use will depend on what kind of discussion you want to take place? Each has their strengths and weaknesses both in terms of technical constraints and the type of interaction that they encourage.

11. The Main Technologies Include

1. **Email** - the most popular Internet tool, used to exchange messages between individuals
2. **Mailing lists** - which use email to enable communication among groups of people. Individuals send emails to the list email address and receive a copy of all emails sent to that address
3. **Usenet Newsgroup** - a separate Internet system which allows users to read and contribute to global special-interest 'newsgroups'; the number of newsgroup topics is vast, and subjects range from the very dry to the totally bizarre
4. **Computer conferencing** - (sometimes also known as 'discussion boards' or more accurately 'threaded discussion lists') which enables groups of people to hold discussions by reading and posting text messages on a computer system. The advantages over mailing lists are that the messages are archived and the structure of the discussion is also recorded. Computer conferencing is widely used to support learning, and within the educational context is generally what people mean when they talk about 'CMC'
5. **Internet Relay Chat (IRC)** - an Internet system which allows users to chat 'live' (in real time) using text or audio Internet telephony, a way of using the Internet as an alternative to the main telephone network; currently in its teething phase, though exciting in that it has the potential to reduce the cost of calling long-distance to that of a local call
6. **Videoconferencing** - a means by which small groups of geographically distant people can hold discussions in real time, during which they are able to hear and see each other and share various other types of data. Working with remote experts via distance technologies word pdf html.
7. **Hybrid Systems** - systems such as Web Board combine threaded discussion lists, IRC and email lists allowing users to switch easily between the two depending on the nature of the discussion. See also Yahoo Groups which is a free online service allowing you to set up a Web based email discussion list with optional forwarding to and replies from your normal email account. It also offers a facility to share documents and images.

12. Computer Aided Assessment (CAA)

The next step is to provide a way for students to assess their own progress and understanding of the material. Without human feedback or very sophisticated artificial intelligence, this usually means some form of objective test delivered as an online quiz. Because it is objective and the possible responses are known, the feedback can also be automated. Students can therefore receive immediate feedback. This use of CAA for self-diagnosis / formative assessment can be

quick to set up and if used wisely can provide valuable feedback on the effectiveness of the course to the course tutor.

13. Integrating Educational Technologies

While each of these technologies has its strengths and weaknesses, it is when they are combined that we start to see their true potential. This was one of the driving forces behind the arrival of Virtual Learning Environments (VLEs) although it has to be said that few of the commercial products make serious efforts to enable this, focusing more on the administration of learning rather than on the learning itself. VLEs attempt to 'wrap up' the three technologies discussed above into online course objects that are password protected. Usually, the sophistication of the tools within a VLE is less than that of an equivalent stand-alone tool; the trade off is in the ease of use, integration of technologies and single point of authentication. Whether you use a VLE or a combination of stand-alone tools really depends on what you are trying to achieve.

14. Classroom eLearning Technologies

The changes have not all been happening on the Internet or with students sitting in computer labs using CAL packages. Out in the classrooms and lecture theatres, data projectors have been introduced and packages like Power Point are being used to present directly through a computer rather than to create and print overhead projector transparencies. The setups have often been unreliable and under supported and there has been a lack of technical confidence among lecturers and it is only within the last few years that this has started to change. Other presentation technologies such as electronic whiteboards, audience feedback systems and videoconferencing facilities are beginning to appear in teaching spaces and these will all require careful thought in integrating them into teaching practice.

References

1. Forehand, M. (2010). Bloom's Taxonomy. From Emerging Perspectives on Learning, Teaching and Technology. Retrieved October 15, 2012, from <http://projects.coe.uga.edu/epltt>
2. Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' Technological Pedagogical Integration Reframed. *Journal of Research on Technology in Education*, 41 (4), 393-416.
3. Mangal, (2009). "Essentials of Educational Technology" ISBN 978-81-203-3723-7.
4. Rather, A. R. (2004). "Essentials of Instructional Technology" ISBN 81-7141-818-X.
5. Skinner, B.F. (1965). "The technology of teaching". *Proc R Soc Lond B Biol Sci* 162 (989): 427-43.
6. <http://www.warwick.ac.uk/ETS/Publications/Guides/internet.html>
7. http://www.ehow.com/about_5437063_types-technology-used-classroom.html