

Electronic learning

Electronic learning or **E-learning** is a general term used to refer to computer-enhanced learning. It is used interchangeably in so many contexts that it is critical to be clear what one means when one speaks of 'eLearning'. In many respects, it is commonly associated with the field of advanced learning technology (ALT), which deals with both the technologies and associated methodologies in learning using networked and/or multimedia technologies.

Market

The worldwide e-learning industry is estimated to be worth over 38 billion euros according to conservative estimates, although in the European Union only about 20% of e-learning products are produced within the common market. Developments in Internet and multimedia technologies are the basic enabler of e-learning, with content, technologies and services being identified as the three key sectors of the e-learning industry, although it can be seen that there are two additional sectors, those being the consulting and support sectors.

There are many organisations in this market, including companies such as New Horizons, SkillSoft, Knowledge Anywhere, EPIC, LearnKey, TATA Interactive Systems, TransversaleNetwork-TeN, TutorVista, Semanoor, BlueU and LearningSteps.com are leading innovators in the design and development of e-learning in the commercial world. SkillSoft is by far the largest company in the global market since their 2006 acquisition of Thomson NETg^[1], whilst Epic is one of the largest bespoke e-learning content providers.^[1]

History

The first general-purpose system for computer-assisted instruction from which e-learning evolved, was the PLATO System developed at The University of Illinois at Urbana-Champaign. The Plato system evolved with the involvement of Control Data who created the first authoring software used to create learning content. The authoring software was called Plato. The Science Research Council then wrote the first CAI system of Math for K-6. Wicat Systems then created WISE as their authoring tool using Pascal and developed English and Math curriculum for K-6. The very first complete CAI classroom for K-6 students was set up at the Waterford Elementary School in Utah using the Wicat system. The first public CAI classroom with its own layout and design was implemented with the Wicat System by Baal Systems (later known as Virtual Systems) in Singapore as a joint operation between Wicat and Baal. It is from this design that all the computer learning centers globally evolved and which were the forerunners of eLearning.^[1]

Growth of e-learning

Among the early institutions of on-line learning in the mid-1980s were the Western Behavioural Sciences Institute, the New York Institute of Technology, the Electronic Information Exchange System - EIES - of the New Jersey Institute of Technology, Connected Education and the Center for Computer-Assisted Legal Instruction which developed interactive tutorials on the University of Minnesota's mainframe in the late 1970's. More recently the organization Independent Student Media has developed a working curriculum that instructs students through an Interactive On-line Textbook. The term 'e-Learning' itself originated in the corporate literature of CBT Systems (now SkillSoft) in the mid-1990s.^[]

By 2003, more than 1.9 million students were participating in on-line learning at institutions of higher education in the United States, according to a report from the "Sloan Consortium", an authoritative source of information about on-line higher education. The explosive rate of growth -- now about 25 percent a year -- has made hard numbers a moving target. But according to Sloan, virtually all public higher education institutions, as well as a vast majority of private, for-profit institutions, now offer on-line classes. By contrast, only about half of private, non-profit schools offer them. The Sloan report, based on a poll of academic leaders, says that students generally appear to be at least as satisfied with their on-line classes as they are with traditional ones. Private Institutions may become more involved with on-line presentations as the cost of instituting such a system decreases. Properly trained staff must also be hired to work with students on-line. These staff members must be able to not only understand the content area, but also be highly trained in the use of the computer and Internet.

The concept of a Digital native has also become popular, and there are certainly likely to be generational influences on the future of e-learning. As more and more adult learners enter into this field the gap will begin to close.

In addition, e-Learning takes advantage of the versatility provided by asynchronous capabilities of internet delivered education.

Technology

Many technologies can be, and are, used in eLearning:

- screencasts
- ePortfolios
- EPSS (electronic performance support system)
- PDA's (e.g. Palm pilots)
- MP3 Players with multimedia capabilities
- the use of web-based teaching materials
- hypermedia in general
- multimedia CD-ROMs
- web sites and web 2.0 communities
- discussion boards
- collaborative software

- e-mail
- blogs
- wiki
- text chat
- computer aided assessment
- educational animation
- simulations
- games
- learning management software
- electronic voting systems
- virtual classrooms - <http://www.bilgikurdu.net/perculus.asp>

Most eLearning situations use combination of the above techniques.

An example of this is moodle which use: discussion board threading, wiki and real time textual chat. However, moodle is referred to a CMS, this is because course material if often video, mp3, text documents, scanned images or links to other web sites.

Along with the terms *learning technology* and Educational Technology, the term is generally used to refer to the use of technology in learning in a much broader sense than the computer-based training or *Computer Aided Instruction* of the 1980s. It is also broader than the terms On-line Learning or *Online Education* which generally refer to purely web-based learning. In cases where mobile technologies are used, the term M-learning has become more common.

E-learning is naturally suited to distance learning and flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term Blended learning is commonly used.



Typical Managed Learning Environment with a navigation menu and icons giving access to automated tools and content pages.

In higher education especially, the increasing tendency is to create a Virtual Learning Environment (VLE) (which is sometimes combined with a Management Information System (MIS) to create a Managed Learning Environment) in which all aspects of a course are handled through a consistent user interface standard throughout the institution. A growing number of physical universities, as well as newer online-only colleges, have begun to offer

a select set of academic degree and certificate programs via the Internet at a wide range of levels and in a wide range of disciplines. While some programs require students to attend some campus classes or orientations, many are delivered completely online. In

addition, several universities offer online student support services, such as online advising and registration, e-counselling, online textbook purchase, student governments and student newspapers.

e-Learning can also refer to educational web sites such as those offering learning scenarios, worksheets and interactive exercises for children. The term is also used extensively in the business sector where it generally refers to cost-effective online training.

Advantages and Disadvantages

Key advantages of E-learning are flexibility, convenience and the ability to work at any place where an internet connection is available and at one's own pace. E-classes are asynchronous which allows learners to participate and complete coursework in accordance with their daily commitments. This makes an E-learning education a viable option for those that have other commitments such as family or work or cannot participate easily e.g. depending on a disability. There are also transportation cost (and time) benefits with not having to commute to and from campus.

The cost benefits of E-learning to large corporate organizations are difficult to ignore. When using E-learning to train users of corporate computer systems, normally achieved by way of simulation-based learning content, the learner finds himself in a software environment that is exactly like the real one but which does not carry the same error risk. Unlike classroom training, users may repeat the E-learning course without duplicating the cost. It is commonly accepted that the initial cost of an E-learning implementation is expensive (once-off development cost), but that the cost of training (per user) goes down exponentially as more learners use the E-learning course material. When using E-learning simulations to assess learning progress, the instructor is assessing the actual competence of the user to perform a transaction and not merely knowledge of the system.

Other advantages of E-learning are the ability to communicate with fellow classmates independent of metrical distance, a greater adaptability to learner's needs, more variety in learning experience with the use of multimedia and the non-verbal presentation of teaching material. Streamed video recorded lectures and MP3 files provides visual and audio learning that can be reviewed as often as needed. For organizations with distributed and constantly changing learners (e.g. restaurant staff), E-learning has considerable benefits when compared with organizing classroom training.

Disadvantages of E-learning include the lack of face-to-face interaction with a teacher. Critics of E-learning argue that the process is no longer "educational" in the highest philosophical sense (for example, as defined by RS Peters, a philosopher of education). Supporters of E-learning claim that this criticism is largely unfounded, as human interactions can readily be encouraged through audio or video-based web-conferencing programs, threaded discussion boards, of fact, many in K12 would support E-learning if it was not associated with the more extreme versions that attempt to cut out the directed teacher-student relationship.

The feeling of isolation experienced by distance learning students is also often cited, although discussion forums and other computer-based communication can in fact help ameliorate this and in particular can often encourage students to meet face-to-face, although meeting face-to-face is often not possible due to the disarray of student's physical locality. Discussion groups can also be formed on-line. Human interaction, faculty-to-student as well as student-to-student, should be encouraged in any form.

E-learning tends to work better for the student when the topic matter consists of self-learned items. When much group collaboration is required, E-learning can cause lag times in collaborative feedback if the students are not disciplined. For example, some student's may only check their online agenda once a week, or even less, making it impossible to achieve goals. Web and software development can be expensive as can systems specifically geared for E-learning. The development of adaptive materials is also much more time-consuming than that of non-adaptive ones.

Services

E-learning services have evolved since computers were first used in education. There is a trend to move toward blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

Computer Based Learning

Computer Based Learning, sometimes abbreviated CBL, refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes. The concept is generally seen as being distinct from the use of computers in ways where learning is at least a peripheral element of the experience (e.g. computer games and web browsing).

Computer Based Training

Computer-based training (CBT) services are where a student learns by executing special training programs on a computer relating to their occupation. CBT is especially effective for training people to use computer applications because the CBT program can be integrated with the applications so that students can practice using the application as they learn. Historically, CBTs growth has been hampered by the enormous resources required: human resources to create a CBT program, and hardware resources needed to run it. However, the increase in PC computing power, and especially the growing prevalence of computers equipped with CD-ROMs, is making CBT a more viable option for corporations and individuals alike. Many PC applications now come with some modest form of CBT, often called a tutorial.^[1] Web-based training (WBT) is a type of training that is similar to CBT; however, it is delivered over the Internet using a web browser. Web-based training frequently includes interactive methods, such as bulletin boards, chat rooms, instant messaging, videoconferencing, and discussion threads. WBT

is usually a self-paced learning medium, however some systems allow for online testing and evaluation at specific times.

Pedagogical Elements

Pedagogical elements are an attempt to define structures or units of educational material. For example, this could be a lesson, an assignment, a multiple choice question, a quiz, a discussion group or a case study. These units should be format independent, so although it may be implemented in any of the following methods, pedagogical structures would **not** include a textbook, a web page, a video conference or an iPod video.

When beginning to create eLearning content, the pedagogical approaches need to be evaluated. Simple pedagogical approaches make it easy to create content, but lacks flexibility, richness and downstream functionality. On the other hand, complex pedagogical approaches can be difficult to setup and slow to develop, though they have the potential to provide more engaging learning experiences for students. Somewhere between these extremes is an ideal pedagogy that allows a particular educator to effectively create educational materials while simultaneously providing the most engaging educational experiences for students.

Pedagogical Approaches or Perspectives

It is possible to use various pedagogical approaches for eLearning which includes:

- **instructional design** - the traditional pedagogy of instruction which is curriculum focused, and is developed by a centralized educating group or a single teacher.
- **social-constructivist** - this pedagogy is particularly well afforded by the use of discussion forums, blogs, wiki and on-line collaborative activities. It is a collaborative approach that opens educational content creation to a wider group including the students themselves.
- **Laurillard's Conversational Model** is also particularly relevant to eLearning, and Gilly Salmon's Five-Stage Model is a pedagogical approach to the use of discussion boards .
- **Cognitive perspective** focuses on the cognitive processes involved in learning as well as how the brain works.
- **Emotional perspective** focuses on the emotional aspects of learning, like motivation, engagement, fun, etc.
- **Behavioural perspective** focuses on the skills and behavioural outcomes of the learning process. Role-playing and application to on-the-job settings.

- **Contextual perspective** focuses on the environmental and social aspects which can stimulate learning. Interaction with other people, collaborative discovery and the importance of peer support as well as pressure.

Reusability, standards and learning objects

Much effort has been put into the technical reuse of electronically-based teaching materials and in particular creating or re-using *Learning Objects*. These are self contained units that are properly tagged with keywords, or other metadata, and often stored in an XML file format. Creating a course requires putting together a sequence of learning objects. There are both proprietary and open, non-commercial and commercial, peer-reviewed repositories of learning objects such as the Merlot repository.

A common standard format for e-learning content is SCORM whilst other specifications allow for the transporting of "learning objects" (Schools Interoperability Framework) or categorizing meta-data (LOM).

These standards themselves are early in the maturity process the oldest being 8 years old. They are also relatively vertical specific: SIF is primarily pK-12, LOM is primarily Corp, Military and Higher Ed, and SCORM is primarily Military and Corp with some Higher Ed. PESC- the Post-Secondary Education Standards Council- is also making headway in developing standards and learning objects for the Higher Ed space, while SIF is beginning to seriously turn towards Instructional and Curriculum learning objects.

In the US pK12 space there are a host of content standards that are critical as well- the NCES data standards are a prime example. Each state government's content standards and achievement benchmarks are critical metadata for linking e-learning objects in that space.

Communication technologies used in E-Learning

Communication technologies are generally categorized as asynchronous or synchronous. *Asynchronous* activities use technologies such as blogs, wikis, and discussion boards. The idea here is that participants may engage in the exchange of ideas or information without the dependency of other participants involvement at the same time. Electronic mail (Email) is also asynchronous in that mail can be sent or received without having both the participants' involvement at the same time.

Synchronous activities involve the exchange of ideas and information with one or more participants during the same period of time. A face to face discussion is an example of synchronous communications. *Synchronous* activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting.

E-Learning 2.0

The term eLearning 2.0 has been used to refer to the user of social software such as blogs and wikis. This approach has been particularly evangelized by Stephen Downes who runs the very popular daily blog and newsletter.

In many models, the writing community and the communication channels relate with the E-learning and the M-learning communities. Both the communities provide a general overview of the basic learning models and the activities required for the participants to join the learning sessions across the virtual classroom or even across standard classrooms enabled by technology. Many activities essential for the learners in these environments require frequent chat sessions in the form of virtual classrooms and/or blog meetings.

The various blogs that are being used for providing writing approaches are gaining popularity.

Computer Aided Assessment and Learning Design

Computer-aided Assessment (also but less commonly referred to as E-assessment), ranging from automated multiple-choice tests to more sophisticated systems is becoming increasingly common. With some systems, feedback can be geared towards a student's specific mistakes or the computer can navigate the student through a series of questions adapting to what the student appears to have learned or not learned. Most software for this is still very primitive however.

The term *Learning Design* has sometimes come to refer to the type of activity enabled by software such as the open-source system LAMS^[1] which supports sequences of activities that can be both adaptive and collaborative. The IMS Learning Design specification is intended as a standard format for learning designs, and IMS LD Level A is supported in LAMS V2.

e-learning software platforms

Free

- ATutor
- Bodington
- Dokeos
- ILIAS
- KEWL
- LogiCampus
- LON-CAPA
- .LRN
- Moodle
- myUdutu
- Sakai Project

Non-free

- 123Doc Medical Education
- ANGEL Learning
- Authorware
- Blackboard
- Captivate
- Acado
- Brihaspati
- Conursos & Cursos - IETAV System
- Desire2Learn
- Eduadi
- Edumate
- FirstClass
- Knowledge Forum
- SimplyDigi.Com Inc
- Scholar360
- Studywiz
- Thinking Cap
- TrainCaster
- WebCT
- Litmos
- Xmind
- TutorVista
- ziizoo