Chapter 18.

E-LEARNING

1. Introduction

Over the last twenty years the explosion of the Internet has fundamentally altered the practice of computer assisted teaching and learning. The Web has quickly changed from a text-based content to one in which all forms of multimedia are available. We are now in the era of Web 2.0 offering applications that facilitate interactive information sharing, interoperability, user-centered design, and collaboration.

Access to the Internet is nowadays nearly ubiquitous. It usually takes place through home or workplace computers, but the placement of publicly available Internet hotspots in schools, libraries and cafes makes it available to the vast majority of people. According to Internet World Stats website\(^1\), which traces the global internet usage statistics, over 52% of European citizens use the Web on a regular basis, which probably includes over 90% of young people interested in taking a formal education course.

The growing ease with which the online content can be updated and revised has resulted in the explosion of video-sharing, social-networking, online forums, web-based communities, wikis, blogs, video conferencing, virtual worlds and user-friendly content management systems built into Web delivery. This trend includes also the development of e-learning software platforms such as MOODLE (http://moodle.org.) or BLACKBOARD (http://blackboard.com), where teachers and learners can access, create, and update learning content without the aid of professional computer programmers or web designers.

Nowadays all modern educational institutions attempt to leverage the use of technology in their curricula hoping to improve the quality and effectiveness of the learning experience offered to their students. E-LEARNING is the currently fashionable term used to describe the diverse use of Information and Communication Technologies (ICT) to support and enhance learning, teaching and assessment. As a subset of distance education it is concerned with providing access to educational experience that is more flexible and efficient than traditio-

\(^1\) For current statistics visit: http://www.internetworldstats.com/stats.htm
nal education. It aims at creating environments in which the learning content is not only more responsive and up-to-date, but also more cost effective.

Different terms are commonly used to refer to e-learning, including ONLINE LEARNING, NETWORKED LEARNING, INTERNET LEARNING, VIRTUAL LEARNING, WEB-BASED LEARNING, etc., which makes it sometimes difficult to grasp a clear picture of the phenomenon. Nevertheless, they all imply that the learner uses networking technology to access the learning materials as well as to interact with the tutor and other learners in the process of learning. This chapter uses the term “e-learning” throughout.

2. Definition of e-learning

Being a fairly recent phenomenon e-learning draws its knowledge from already established fields of education, distance education, Information Technology (IT), and in the case of foreign language learning from the Computer-Assisted Language Learning (CALL). This diversity of associated methodologies is in result reflected in the abundance of e-learning definitions existing in the literature. Since distance education already encompasses various technologies and forms of instruction at a distance to deliver knowledge and skills to the learner, the emergence of e-learning is closely associated with the application of the Internet as the medium for delivering instruction to a remote audience.

However, as noted by in the discussion presented by Ally, e-learning involves more than just the delivery of learning materials via the Web. It puts stress on the importance of the learner and the enhanced learning experience. From this point of view e-learning can be defined “the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience.”

This particular definition follows the claims of Piaget’s constructivism that learners interpret information and the world according to what is received through the senses in their personal reality, and then personalize it into their personal knowledge and Papert’s constructionism which assumes that learning is particularly effective when learners construct meaningful objects in the real world for others to experience.

In day to day practice the term e-learning refers generally to learning facilitated and supported through the use of ICT, which encompasses a broad range of modern technologies including desktop and laptop computers, the Internet, Wide and Local Area Network (WAN and LAN), television, satellite broadcasts, DVDs, interactive whiteboards, and recently also the cellular technology of mobile phones (mobile learning). One must remember, however, that e-learning
does not aim to eliminate existing educational methodology but rather tries to complement it in order to make it more efficient. Irrespective of the technology, the crucial element is to add value to the learning experience and to support new effective ways of learning.

3. Ways of implementation

There are three basic approaches to implementing e-learning within the organization teaching curriculum depending on the actual needs and available resources.

3.1. Posting course information and course materials online

The most rudimentary way of employing technology to support or supplement a traditional course is to place administration notes (e.g. syllabi or study guides) or/and existing teaching materials (e.g. lecture handouts or PowerPoint presentations) online to create a useful resource easily accessible by learners. In this case the essential learning content is delivered traditionally in the classroom. The materials available online are provided for learners’ convenience and are not integrated into learning activities. This model is relatively easy to establish but does not fully exploit the benefits of e-learning. Anyway, this may be beneficial for encouraging learners’ autonomy and preparation of resources that can be later used in a more integrated manner.

3.2. Blended learning

An expansion from the above approach is the combination of traditional and e-learning practices through online tools and resources. This is commonly referred to as BLENDED LEARNING which is generally defined as mixing e-learning with a broad range of more traditional methods of learning. In this case some e-learning activities are included along with the classroom teaching to enhance the learning experience. There are many different ways in which e-learning activities can be used within a traditional course, for example:

- **Activities based on online resources.** Tapping into potential of up-to-date material available on the Web may be particularly useful for encouraging learners to develop their research skills. Tutors can post links to enable students to prepare for classes, and to support students’ research into topics connected with project work or essays. The methodology of WEBQUEST activities developed by Bernie Dodge can be particularly useful for this purpose.
• **Online discussions boards.** Electronic discussion boards can be used to maintain relevant discussions over a longer period of time. Setting up a course forum can also decrease the total number of questions from individual learners, because answers to subsequent questions are available on the forum for all course participants to see. This encourages learners to reflect more on their contributions and has the potential to foster peer support.

• **Collaborative learning activities.** Although the blended learning retains opportunities for face-to-face interaction between the tutor and learners as well as peer collaboration, it may be beneficial for learners to work together on projects using online communication tools, share files, and even create collaboratively web pages / wikis. Using deferred (e.g. e-mail, forums, Twitter, etc.) or real-time (Skype, GTalk, Gadu-Gadu, etc.) communication facilities opens up a new potential for collaborative projects between different groups of learners.

• **Electronic summative, peer-to-peer, and self-assessment.** Automatic self-assessment is particularly helpful for diagnostic purposes and can save plenty of time when used with large groups of learners. For the majority of current systems self-assessment quizzes can be prepared using the free HOT POTA-TOES software (http://hotpot.uvic.ca). It is extremely popular among educators worldwide as it enables intuitive and rapid creation of a variety of exercises. Modern e-learning platforms also facilitate peer assessment and make it possible to automatically generate evaluation of learners’ results, or to arrange for students’ answers to be automatically sent to the tutor for marking.

### 3.3. Delivering a course entirely online

Recently, it has become increasingly popular to deliver e-learning courses completely in an online environment. Modern e-learning systems can be used not only to deliver all learning activities but also as the sole medium for communication between tutor and learners, self-assessment, progress monitoring, and submission and evaluation of assignments. In this case the communication and feedback are fully integrated with the learning content delivery through the facilities available on the e-platform. The argument for using e-learning in this comprehensive way is that it provides learners with more flexibility and autonomy, which in turn enhances learning. The key challenge in such settings is to make students feel the part of a learning community that learns together in an online environment.

The above division is often expanded to add more granularity to modes in which e-learning can be incorporated in teaching. For instance, Cook distinguished eight levels at which electronic learning platforms can be used in
education from simple to complex, including: (1) Posting course information and existing course materials; (2) Including links to other online materials; (3) Communication between students, lecturers and outside contributors; (4) Providing a ‘shell’ for computer-assisted learning resources; (5) Assessment, self-assessment and end-of-term exams; (6) Integrating online activities, support and materials with lectures and seminars; (7) Collaborative student projects; (8) Delivering complete online courses with fully integrated activities. Nevertheless, the general conclusion is that the extent to which e-learning can be incorporated in the teaching curriculum may vary between courses according to specific needs and resources.

4. Interaction in e-learning

Interaction has always been valued in distance education and plays a particularly critical role in e-learning. Attempting to outline a comprehensive theory of e-learning Terry Anderson demonstrates that the primary purpose of information technology used in education is to enhance interaction between all participants of the educational process. Interaction is also fundamental for creation of efficient learning communities, since reciprocal communication is the key component of constructivist pedagogy.

From this perspective the process of e-learning can be defined essentially in terms of interactions between content, learners, and teachers participating in the educational process, which are depicted in the Figure 18.1 below.

Figure 18.1. Educational interactions
As learners complete the learning activities, they are involved in a variety of interactions. Learners need to interact with the interface to access the online materials. Learners must interact with the content to acquire the information needed to form the knowledge base. There should be interaction between the learner and other learners, between the learner and the instructor, and between the learner and experts to collaborate, participate in shared cognition, form social networks, and establish social presence.

Continuing this discussion Anderson shows that among those interactions the learner-learner factor is critical as it results in potential gains in cognitive learning tasks as well as in the acquisition of critical social skills in education. It also increases the completion rates and contributes to the development of communities of learning that allow their members to develop interpersonal skills. This interaction enables learners to explore both the tacit knowledge shared by learning community as well as a formal curriculum of studies.

Learner-teacher interaction is supported in e-learning in a variety of forms that include SYNCHRONOUS and ASYNCHRONOUS communication. Asynchronous communication enables learners and teachers to communicate without having to be in the same place at the same time, and to view information at their convenience. The e-learning resources used to support asynchronous communication include email, electronic mailing lists, online discussion boards, wikis, and blogs.

In synchronous communication interaction between learners and teachers happens simultaneously but without having to be necessarily in the same place. The e-learning resources used to support synchronous communication include text and voice chats, telephone conversations, videoconferencing, and even meetings in virtual worlds, such as Second Life. The easiness of electronic communications may lead to an overwhelming quantity of student communications sent to the teacher and also an increase in students’ expectations for immediate response.

Another major component of education is the learner-content interaction, which has always been present in education in the form of textbook reading or the library study. The Internet supports these passive forms of student-content interaction, but also provides new opportunities corresponding to student psychological behavior and learning preference. Common tools used in this mode include interactive content, computer assisted tutorials, drills, simulations, exercises in virtual labs, and sophisticated search and retrieval tools. All these activities are becoming common instruments for individual learning.

Teacher-teacher interaction creates the opportunity for professional development and support through communities of practice, which encourage teachers to take advantage of knowledge advancement in their subject. Teacher-content interaction focuses on the creation of learning content by teachers. It allows
teachers to monitor and update the content resources and activities they create for e-learning.

Finally, content-content interaction is a completely new mode of educational interaction in which the learning content is programmed to interact with other automated information sources (e.g. RSS feeds), so as to refresh itself constantly, and to acquire new capabilities. All the above mentioned interactions can be successfully carried out in modern virtual learning environments.

5. Characteristics of e-learning

E-learning enhances functions of interaction in education in multiple formats and styles among all the participants. Following various viewpoints, including Bransford et al., Anderson points out that the task of the e-learning teachers is to choose, adapt, and refine (through feedback, assessment, and reflection) educational activities that ensure the quality, accessibility, and affordability of e-learning. In doing so, they create learner-, knowledge-, assessment-, and community-centered educational experiences that result in high levels of learning.

(1) Learner-centered learning

Learner-centered learning reflects awareness of the individual cognitive structures and ideas that the learners bring to the learning context. Learner-centered activities must take into consideration the pre-existing knowledge that the learner has before acquiring new knowledge. Learner-centered learning also pays attention to the particular cultural attributes, especially the language that the learner uses to interpret and build knowledge. Because in an online environment the opportunities for discovering students’ preconceptions and cultural perspectives are often restricted by the limited access to language and paralinguistic clues, e-learning poses a serious challenge to educators in this respect.

The e-learning environment itself is also a unique cultural context that is a novelty to many students. They gradually get accustomed to e-learning through both formal and informal experience gathered in an e-learning environment. In this process they develop their command of communication norms and tools characteristic to the e-learning context. The effective e-teacher should constantly probe for learner comfort and skill with the technology, and provide appropriate learning conditions where learners can increase their sense of online competence.

(2) Knowledge centered learning

Each discipline of study contains a world view that provides often unique ways of understanding and discussing knowledge. Effective learning is both defined and bounded by the epistemology, language, and context of disciplinary
thought. Teaching generalized thinking skills is useless outside of a particular knowledge domain in which they can be grounded, thus learners need opportunities to experience this particular context.

In comparison to traditional based learning, e-learning neither advantages nor disadvantages knowledge-centered learning. Ally argues that, the Internet provides expanded opportunities for students to plunge deeper into knowledge resources, thus affording a near limitless means for students to grow their knowledge of the discipline in thousands of formats and contexts. However, this multitude of resources can be overwhelming, so the skillful e-teacher needs to provide a clear course outline, which is followed by learners to expand their knowledge and explore discipline-centered discoveries.

(3) Assessment centered learning

The third perspective on e-learning environments focuses on the necessity to be assessment centered in the sense of formative evaluation that serves to motivate, inform, and provide feedback to both learners and teachers. E-learning provides many opportunities for assessment that involve both the teacher assessment and the expertise of peers. This includes automatic assessment tools, but even more importantly the reflective self-assessment of the learner.

On the one hand, e-learning often reduces opportunities for immediate interaction between learners and the teacher in the process of assessment. On the other hand, e-learning platforms offer the enhanced communications capacity through electronic media and provide opportunities to create assessment activities that are situated in authentic settings, and that benefit from peer review through online collaboration. Understanding what is most important and useful rather than what is most easily assessed is a challenge for the designers of e-learning content, who should provide high quality assessment while maintaining student interest and commitment.

(4) Community centered learning

The community-centered perspective adds the critical social component to e-learning settings. According to the idea of community of practice members of a learning community both support and challenge each other, leading to effective and relevant knowledge construction. However, it may be quite challenging to create and sustain e-learning communities, especially because of the lack of placedness and synchronicity, i.e. mutual presence in time and place. This may be even more fundamental hindrance than the absence of face-to-face conversations and paralinguistic clues mentioned above.

Moreover, distance education traditionally attracts students who value the freedom from constraints of time and place. The major motivation for enrollment in distance education is the freedom to move through a course of studies at a pace of the student’s choice. In reality, however, participation in an e-learning
community inevitably places constraints on this independence, even when the pressure of synchronous connection is eliminated by the use of asynchronous communications tools. E-learning allows more flexible participation, but there is no single environment that responds to all learners’ needs. Thus, the need for diversity of activities that accommodate for the needs of different learners.

The challenge for teachers working in an e-learning context is therefore to construct a learning environment that is simultaneously learning centered, content centered, community centered, and assessment centered. However, taking the above factors into consideration Anderson arrives at a conclusion that there is no single, right medium of online learning, nor a formulaic specification that dictates the kind of interaction most conducive to learning in all domains with all learners. Rather, teachers must learn to develop their skills so that they can respond to student and curriculum needs by developing learning content that is adaptable to diverse learning and social contexts.

6. E-learning platforms

Different publications present a certain discrepancy in discussing e-learning systems. Probably the most frequently used term in this context is the VIRTUAL LEARNING ENVIRONMENT (VLE). British Educational Communications and Technology Agency (BECTA 2002, 2004, 2005), defines a Virtual Learning Environment as “a standardized, computer-based environment that supports the delivery of web-based learning and facilitates on-line interaction between students and teachers.”

In more descriptive terms, VLEs are generally web-based applications, providing teachers and learners with easy access to learning content from any computer with an internet connection. They allow teachers to create resources quickly and intuitively, typically provide an integrated set of online authoring tools, enable easy upload of materials, and offer a consistent look and feel that can be customized by the user.

The services that VLEs provide are basically aimed at teachers and learners, but may also include administrative personnel, and parents. They are usually password-protected to offer a secure, closed environment that prevents unauthorized third-party access. In practice, support for local applications such as word processing, presentation and spreadsheet tools may also be required to fully take advantage of activities or assignments available in the system.

6.1. Confusion of terms: VLE, CMS, LMS, LCMS, MLE

As mentioned above, currently there is a certain confusion in definitions used to describe e-learning systems, because they are still evolving and rapidly
gain new functionalities. Apart from the term Virtual Learning Environment described above some terms commonly used by BECTA and European Schoolnet to describe online learning systems include:

CONTENT MANAGEMENT SYSTEM (CMS) is an environment where developers can create, store, reuse, manage, and deliver digital content from a central object repository. CMSs are commonly used to manage big websites’ workflow, which means an automated system that takes care of the life cycle of web content step by step. They can be used for e-learning but a Virtual Learning Environment is a more specific type of CMS offering tools designed to support teaching and learning in particular.

LEARNING MANAGEMENT SYSTEM (LMS) manages and tracks the use of digital learning content and predicts the future needs of a learner based on the available information. It is generally designed to undertake administrative and management tasks such as learner tracking, assignment monitoring, and online assessment to provide appropriate delivery of courses and resources. Typically, a Learning Management System includes a database of student records, handles the learning delivery and administration, and is structured around the course and not the course content.

LEARNING CONTENT MANAGEMENT SYSTEM (LCMS) is intended for management and tracking of learning objects that the learner interacts with. LCMS provides the ability to store, assemble and deliver personalized learning content in the form of learning objects, which are discussed in a separate section below.

MANAGED LEARNING ENVIRONMENT (MLE) includes the whole range of information systems and processes that support learning and the management of learning within of a whole organization (including its VLE and administrative support systems) that contribute directly, or indirectly, to learning and the management of that learning.

Collier’s white paper written for Sun, Inc. supplements this division with VIRTUAL CLASSROOMS which are collaboration environments suitable both for general conferencing and collaboration as well as for formal e-learning, which can be tightly integrated into available systems. They provide synchronous collaboration tools, including audio and video conferencing, application/screen sharing, synchronous Web browsing, shared white board, voting, and opinion polling. Virtual Classrooms also provide asynchronous collaboration tools, including discussion groups, email group management, and audio/video replay.

Apart form the above mentioned terms, there is yet another, more generic, term used by BECTA to refer to a broad range of ICT systems used to deliver and support learning. It is the concept of LEARNING PLATFORM, which combines functions performed by a virtual learning environment (VLE) as well as other components of a managed learning environment (MLE).
As definitions of what constitutes a LMS, LCMS, MLE, and VLE, etc. are constantly being updated, we have decided to use in this chapter the term e-learning platform (or simply e-platform) as an ‘umbrella’ term to describe the broad range of e-learning environments currently available. A clearer picture of functions available on such systems may be obtained by exploring their features and advantages.

6.2. Features of e-learning platforms

A key characteristics of an e-learning platform is that learning can potentially take place “anytime, anywhere” and is not dependent upon the traditional school timetable or availability of premises. Modern e-learning platforms are advanced enough to allow for the learning of social skills, the collaborative learning of content, and the development of personal relationships among participants. An e-learning platform usually consists of various components used both to assist conventional classroom learning as well as remote access to the learning and assessment materials.

BECTA’s technical papers generally state that a VLE allows for importing and/or creating course materials coupled with the delivery of learning content; on-line interactions between students and tutors; on-line tracking and assessment of students’ progress. Other publications, like O’Leary and Ramsden or European Schoolnet, enumerate more specific tools and features, which are offered and supported by a virtual learning environments:

- Communication between teachers and students supporting various types of communication: synchronous and asynchronous, one-to-one, one-to-many and many-to-many.
- Self-assessment and summative assessment tools that enable tracking of learner’s progress, for example multiple-choice quizzes with automated marking and immediate feedback and facilities for online submission of papers.
- Delivery of learning resources and materials, usually in the form of standard compliant learning objects, including multimedia, links to Web resources, online discussions and collaboration facilities.
- Shared work group areas which enable specific groups of students to upload and share files, communicate with one another as well as create resources collaboratively in the form of wikis or glossaries.
- Support for students through access to online help and tutoring, which may include provision of supporting materials such as Frequently Asked Questions (FAQs) and communication with other students.
- Management and tracking of learners, which links course participants to administrative information and ensures that only registered students can access the course.
Learner-centered tools, for example personal blogs within the course or digital drop boxes for easy upload of coursework.

- Standard user interface with customizable look and feel that is easy to use for both teachers and learners with a consistent navigation structure, usually supported by a standard navigation toolbar.
- Intelligent diagnostic tools that automatically detect where learners experience difficulty and provide opportunities for remediation by re-sequencing content and personalizing assessment.

Although VLE users have access to many different types of learning resources the functionality offered by VLEs is not always entirely exploited. Some features, for example communication via e-mail, are extremely popular and used on a day to day basis, whereas other features may be used very seldom.

### 6.3. Advantages of e-learning platforms

As discussed in the previous section e-learning platforms integrate and provide easy access to a wide range of related functions. They offer a simple and integrated mechanism for the creation and publication of learning resources that are just as easy to access as conventional web-based content, with additional assessment, support and tracking functionalities.

However, implementing an e-learning platform by an organization is inevitably connected with certain infrastructure and staff costs. For an educational institution to make such an investment, it must offer compelling advantages over traditional classroom learning. There are numerous papers (e.g. BECTA’s guidelines) discussing the benefits of e-learning that can be distinguished from various perspectives.

**1) General benefits**

E-learning platforms widen the teacher and learner access from both on and off the school premises to learning resources which become available at any time, in any place. Staff and students can find it easier to use ICT within an integrated environment, since implementation of a VLE consolidates different aspects of e-learning (e.g. content delivery, student tracking, e-mail communications) which are already in use. Moreover, educational software acquires a consistent look and feel across the whole organization, which makes its use more intuitive and user friendly.

Another important aspect of a VLE is that communication within an organization is facilitated through email, discussion groups, chat rooms, etc. It helps educational institutions to achieve objectives that would not otherwise be feasible, for example, providing an intensified degree of personalization for each learner.
E-learning platforms offer innovative ways of learning and teaching, such as collaborative projects involving students at a distance. Peer-to-peer learning through collaborative tools encourages reflection and increases evaluative skills. This promotes active and independent learning, where learners solve problems while taking responsibility for their own learning. In the near future e-learning platforms can potentially bring about profound changes in education and pedagogy towards more learner centered approaches, enhancing interactivity, helping constructional knowledge building, as well as complementing the learning that takes place in classrooms.

(2) Benefits for learners

E-platforms offer flexibility of time and space, thus for example, learners can submit their assignments online or contribute to discussions with classmates via forums from any location. It provides support for different learning styles and self-paced learning that enables learners to work at their own pace, which is particularly important to those with special educational needs. It also enables learners to revisit learning activities, which helps those who were absent to catch up with work that had been missed. Finally, situated learning is facilitated, since learners can complete online courses while working on the job and contextualize the learning in their own personal space.

The variety of interactive e-learning tools caters for individual learning styles and supports learners with both class work and homework. Learners gain easy access to a wider range of up-to-date attractive learning materials (including hypertext, audio, video, interactive programs, etc.) and can use a wide range of communication tools to interact with peers and experts in the field they study.

E-learning is associated with developing higher levels of learning through enabling learners to engage in online discussions and fostering self-study. This shifts the role of the learner to be proactive and often results in improved engagement in the learning process as the opportunity to share ideas and to join in online discussions is a powerful motivator. It may also help less confident students to participate in discussions, for example through virtual worlds.

(3) Benefits for teachers

E-learning platforms can help teachers to manage the assessment and monitoring of learners. They can be used for automatic tracking of student work to determine the current level of progress. Teachers also benefit from easier access to learning resources as e-platforms make it easier for instructors to direct learners to appropriate online materials based on their needs. If remedy is required, teachers can select the appropriate material from the repository of learning content and assign it to learners who are falling behind to achieve the desired learning outcomes.

Because e-learning facilitates sharing of resources teachers can adapt and re-use existing learning materials for their own teaching needs. Preparation of
the learning content and online tutoring can be done from anywhere at any time and the learners can see the updates of the learning content immediately after publication. Finally, e-learning platforms provide teachers with convenient communication tools to both support their learners and collaborate with their colleagues.

**4) Benefits for parents**

Last but not least, the use of e-learning platforms by an institution makes it possible to engage parents in the school community. Some schools offer electronic systems of parental access to information concerning their child’s progress where parents can communicate with the school using e-mail or SMS messages. Parents can also be drawn closer to the school by being given access to curriculum and homework materials.

**6.4. Challenges in implementation**

One must be aware that the implementation of an e-learning platform alone will not automatically provide the benefits for education. E-learning platforms may be relatively easy to use, but generally e-learning is still in its initial phase. Following empirical case studies O’Leary and Ramsden warn that some teachers may become initially discouraged, since populating a VLE with learning material requires considerable effort and time, especially at the beginning. Teachers may also be frustrated by limitations of presenting or integrating e-learning materials in their courses. Finally, if the learning content is not prepared in an interesting and fully integrated way, it may not be used properly, or at all by learners.

To achieve success with e-learning appropriate training and ongoing support is needed for both learners and teachers. Organizations should avoid situations where a VLEs becomes a ‘dumping ground’ for materials not designed to be delivered online and teachers involved in e-learning must bear in mind that even independent learning still needs to be guided and supported. It is particularly important for teachers to plan online courses carefully to avoid overloading learners with online materials. Another important factor is the support for standards which enable to take learning content from one platform to another.

**7. E-learning materials**

Presenting foundations of educational theory for e-learning Ally notes that different theories have contributed to the design of online learning materials. Behaviorist strategies are used to determine how teach the facts (what); cognitivist strategies dictate how to teach the principles and processes (how); and
constructivist strategies influence the real-life applications and contextual learning. All these ideas are equally valid in development of materials for e-learning.

One of the assumptions of e-learning is that it should respond to different learning cultures, styles, and motivations. Thus, for e-learning materials to be effective they must be designed properly to engage the learner in a variety of learning activities that have high authenticity, interactivity, and the element of collaboration.

Recently, there has been a shift toward constructive learning, in which learners are given the opportunity to construct their own meaning from the information presented during the online sessions. Reflection in learning journals (blogs) can be used to allow learners to add personal meaning to the process of learning and share their ideas with one another. Engaging learning activities include conducting research on the Web to acquire additional information from authentic sources, especially in collaborative settings. To establish the relevance of the materials to real life, practical application exercises should be embedded in the syllabus along with revision activities that enable learners to monitor their own progress.

To achieve the required flexibility online materials they should be designed in small separate portions, so that they can be redesigned for different contexts.

7.1. Learning objects

LEARNING OBJECTS are defined in various guidelines, reports, and research papers in different ways, but they are generally chunks of learning material that are used by an e-learning system. A more down-to-earth approach is to think of a learning object as a digital part of a course ranging in size and complexity from a single graphic to an entire course itself.

The essential aim of using learning objects in e-learning is to promote flexibility and reuse of online materials to meet the needs of individual learners. Therefore, e-learning materials should be prepared in small coherent segments described with metadata, so that they can be re-used many times in different courses for different learners. Educator developing learning objects should follow commonly used standards, e.g. SCORM to achieve flexibility in storage, cataloging, delivery, and reporting.

7.2. SCORM specification

SCORM (Shareable Content Object Reference Model) is a set of related technical standards, specifications, and guidelines brought together by Advanced Distributed Learning (ADL) to enable the use of learning objects across a variety
of e-learning platforms. The SCORM books (several versions have been developed over time, v.1.1; v.1.2; v.2004 3rd Edition; 2004 4th Edition released in 2009) provide information and explanations of some of the key concepts as well as technical specifications. Not all of the specifications described in SCORM are adopted as mandatory requirements for learning platforms.

SCORM content can be provided in various forms. Some are assets (the SCORM term is SHARABLE CONTENT ASSET) that are simply initiated by the platform without any further communication, while others are learning objects that provide the platform with information that can support tracking and feedback (the SCORM term is SHARABLE CONTENT OBJECT). The creation of SCROM packages consists of the assembling of assets and learning objects into a particular structure with metadata so that it can be unpackaged and delivered to the user on an e-learning platform. SCORM documentation explains that SCORM packages are designed to provide the following benefits:

- **Accessibility**: The ability to locate and access instructional components from multiple locations and deliver them to other locations. For example, a tutor can identify relevant content that has already been developed by another organization in a common repository and deploy it on his/her e-platform compatible with the same version of SCORM.

- **Interoperability**: The ability to take instructional components developed in one system and use them in another system. For example, learning content packaged for delivery in one SCORM-compliant platform could be loaded into another platform that complies with the same version of SCORM.

- **Durability**: The ability to withstand technology evolution and/or changes without redesign, reconfiguration, or recoding. For example, upgrading to a new computer operating system should have no impact on the delivery of content to learners.

- **Reusability**: The flexibility to incorporate instructional components in multiple applications and contexts. For example, e-learning content designed for one organization can be redeployed, rearranged, or rewritten by other organizations with similar learning needs.

Beginning with version 6.2, Hot Potatoes introduces support for SCORM 1.2 in the form of an automatically created zip file that can be imported into any e-learning system which supports SCORM 1.2, for example Moodle.

8. The role of technology vs. pedagogy in learning

Discussing the theoretical foundations of e-learning Ally investigates an ongoing debate about whether it is the use of a particular delivery technology or the design of the instruction that improves learning in the context of modern technologies. On the one hand, it is obvious that information and communication
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technologies provide fast and convenient access to learning materials. However, one should be careful about putting responsibility for learning on technology, because, on the other hand, it serves only as a medium that while efficiently delivering educational content does not influence learner’s achievement directly.

Ally cites Clark’s argument that although the computer enables the use of virtual simulations in the learning process, they will not be efficient for learning unless designed according to sound pedagogical principles. Thus, it is not the technology as such that makes students learn, but the design of learners’ interaction with the material it provides. Ally summarizes the discussion about the role of technology vs. pedagogy in the context of e-learning by emphasizing that neither placing information on the Internet nor linking to other digital resources on the Web constitutes e-learning. E-learning occurs when learners use modern technologies to complete the learning activities, and to achieve learning outcomes and objectives.

The search for effective pedagogy is of key importance here because the need to explore learners’ interests and enable their progress is vital to teachers as well as to the learners themselves. Findlay claims that the key to success in e-learning is moving beyond an understanding of e-learning as simply providing learning content, to thinking about technology as essential to modern teaching and learning processes, and seeing e-learning as part of the range of resources available to educators.

BACKGROUND READING


