CHAPTER 2

eLearning and Learning Management Software Tools

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2.1 Introduction

The key characteristic of information and communication technology is its ability to provide flexible access to information and resources. The phrase “flexible access” refers to access and use of information and resources at a time, place and pace that are suitable and convenient to individual learners rather than the teacher and/or the educational organization. Taking the advantages of ICT, the educators are presented with eLearning, where education is delivered online on a mass customized basis. It is said that eLearning aims to reduce institutional expenses while increasing institutional revenues, or both [1, 2, 3].

In general, eLearning is the delivery of education, that includes activities related to instruction, teaching, and learning through various electronic media, such as Internet, intranets, extranets, satellite TV, video/audio tape, and/or CD ROM [4]. The origin of eLearning can be identified from the concept of distance education. Again the concept of distance education was founded on the principles of flexible access [5]. The aim was to allow distance learners, generally, adult learners in part-time or full-time employment to study at a time, place and pace as per their convenience. The goal was to free the learners from the constraints of traditional residential/physical educational systems where they had to physically attend the lecturers. The printed distance study materials, which each distance learner received, would carry the core subject matter content they would need including all their learning activities and assessment tasks. Students would be required to complete these tasks, submit their assignments and take their examinations within a set time frame. While these printed study materials allowed distance learners a great deal of freedom from time, place and pace of study, it had its limitations [5].

Use of ICT changed the situation as it offered the possibilities for capturing and delivering all types of subject content to students and teachers in distributed educational set-up. It implies the provision of accessing the subject matter content and learning resources via networked information
and communication technologies across a range of settings such as conventional classrooms, workplace, homes and various forms of community centres [7]. The use of ICT also made possible for the learners to access most up-to-date information as and when they need and also the opportunity to discuss with their peers and teachers as per their convenience. This is becoming increasingly reasonable and appealing with a wide range of open source software applications and also computer conferencing technologies for collaborative inquiry among students and asynchronous discussion [8]. These applications enable learners and teachers to engage in synchronous as well as asynchronous interaction across space, time, and at their own pace.

ICT also made it possible to capture and storage of multimedia information, such as text, audio, video, still images, animation, etc. The networked information and communication technology enabled access to these multimedia contents in a manner that was not possible within the spatial and temporal constraints of conventional educational setup [9]. In the distributed networked information environment, users have access to a wide variety of educational resources in a format that is amenable to individual approaches to learning [10], and accessible at a time, place and manner that is convenient to them [11]. The aim of eLearning is to replace the old-fashioned time-place-content bounded learning with a “just-in-time”-“at-work-place”-“customized on-demand” process of learning [12].

In this chapter we provide working definitions of eLearning and learning objects. We enlist the characteristics of an ideal eLearning system and learning benefits. We discuss the learners’ characteristics as it an important aspect in order to generate the services for the learners. We also discuss on open source software and learning management tools and the evolution of eLearning starting from web based training to eLearning 3.0 influenced by Web 3.0.
2.2 Definition of eLearning

eLearning generally referred to computer-enhanced learning. Technology is used as a support the learning process. New Zealand’s Ministry of Education defines eLearning [13] as, “… learning that is enabled or supported by the use of digital tools and content. It typically involves some form of interactivity, which may include online interaction between the learner and their teacher or peers. eLearning opportunities are usually accessed via the Internet, though other technologies such as CD-ROM are also used”.

In [38] eLearning is described as “…the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration”. Nichols [14] identifies it as a combination of e (electronic) and learning and directed by pedagogy. In his own term, “eLearning is pedagogy empowered by digital technology”.

Kaplan-Leiserson [15] considered eLearning “…a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, and CD-ROM”.

It can be said that eLearning is educational activity, which is enabled and enhanced by the digital technologies. It is a means of employing education, which can be applied in on-campus mode, distance mode of learning, etc. In setting our working definition, we define eLearning as, “an interactive learning mode in which the learning content is available online and provides feedback to the student’s learning activities that can be structured and presented in user defined personal manner”. Here interactive learning emphasizes more on learning contents than just communication between a learner and tutor [16].
2.3 Learning Object

Different researchers have defined learning object in different ways. The most generic one as defined by IEEE [17] is, “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning”. While, Wiley [18] described learning as “any digital resource that can be reused to support learning”. The basic difference between these two definitions is IEEE definition is more generic whereas the latter one is more specific considering only the digital objects.

Chiappe, et al. [19] described learning object as, "a digital self-contained and reusable entity, with a clear educational purpose, with at least three internal and editable components: content, learning activities and elements of context. Learning objects must have an external structure of information to facilitate their identification, storage and retrieval viz., the metadata". Rehak, et al. [20] defined it as "a digitized entity which can be used, reused or referenced during technology supported learning".

In describing the learning objects, the Learning Objects Network (LON) [21] pointed that “learning objects are stand-alone ‘chunks’ of information designed to be easily reused and repackaged to meet the needs of different audiences. For example, a chapter in a text book; a case study, or an interactive courseware topic, to smaller items such as a single pedagogical concept (e.g., teaching the boiling point of water)”.

So, “learning object” can be defined as “a digital and web based self-contained re-usable learning resource having specific learning objective that supports learning” (working definition). Also it is to be noted that 'Collection of a set of learning objects forms the lesson, whereas aggregation of lessons forms the courses'.

2.4 eLearning Characteristics

Listed below are some of the important characteristics required for an ideal eLearning system [12, 16, 22].
1. Learner centric approach - This approach empowers the learner by facilitating to move from teacher centered learning systems to learner centered learning environments. Typically, in classroom teaching, a teacher decides the agenda and is often the active participant, whereas students are mostly passive participants.

2. Flexibility (time & space independent)- This adopts the flexi-time approach. A learner with his/ her daily tight schedule can have flexibility in participating with the learning process. They can adjust the pace of study to other obligations (e.g. family, work, sport). They are not bound to a semester or strict timetable based educational system.

3. Customized and/ or personalized content- The learning content is determined by a group of learners or by the individual learners based on their needs and aims.

4. Non-linear content- This allows direct access to knowledge in whatever sequence that the learner is looking for, unlike static learning.

5. Continual learning- Learning and knowing runs continuously in parallel loops. They are constant, ongoing processes and never stop.

6. Interactive Learning- A common misconception about eLearning is that the absence of human interaction means that there is no one at hand to help learners with their problems. But in reality it works in the reverse order. It facilitates more chances to have someone around the learners (24/7) to help them with their problems.

7. Dynamic content- Content is changed automatically (repackaged, re-oriented, enriched) continuously for a given user based on the users input, experiences, new practices and heuristics.

8. Systematic Learning- Occurs as an integrated activity.

9. Distributed Content- This content is generated from educator-learner interactions.
From the above list, it is often found that numbers 3 and 7 are missing from present eLearning systems even though they are deemed as the most important characteristics.

2.5 Benefits of eLearning Process
We are living in a knowledge society where knowledge grows exponentially. In time, we become outdated that the time frame for this is diminishing. Also learning cannot be a one time process. It runs in a parallel and continuous loop. The above mentioned eLearning characteristics point towards the potential benefits. There are many significant advantages of eLearning for students as well as teachers and educational establishments. They are as follows, [22, 23]:

Convenience and Portability
1. Courses are accessible as per students' schedule
2. Does not require physical attendance
3. Learning is self-paced (not too slow, not too fast)
4. 24/7 accessibility makes scheduling easy and allows a greater number of people to attend classes
5. Unbound by place - study at home, work, (anywhere!)
6. Read materials online or download them for reading later

Cost and Selection
7. Choose from a wide range of courses to meet requirements
8. Degree, Vocational, and Certificate programs
9. Continuing Education
10. Individual courses
11. Wide range of prices to fit your budget
12. Go back to school to get a degree, learn a new skill, learn a new craft, or just have fun!
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Enhancement of skills
13. It helps the students to build their own learning skill, improve their thinking power and their problem solving skills
14. It helps in preparing learners as potential researchers

Flexibility
15. Student-centered – accommodates their preferences and needs
16. Choose instructor-led or self-study courses
17. Skip over material you already know and focus on topics you’d like to learn
18. Use the tools best suited to individual learning styles

Higher Retention
19. Online learning will draw you to topics you like and enjoy. Studies show that because of this and the variety of delivery methods used to reach different types of learners, retention is frequently better than in a traditional classroom.

Greater Collaboration
20. Technology tools make collaboration among students much easier. Since many projects involve collaborative learning, the online environment is far easier (and often more comfortable) to work, since learners do not have to be face-to-face.

Global Opportunities
21. The global learning community is at learners' fingertips with online learning. The technologies used give online instructional designers the ability to build tools that take the learners to resources, which they never might have seen in a traditional classroom.

Reduce Costs
22. Teachers as well as eLearning establishments can reuse the learning materials prepared for a course. This saves their time as well reduce
the costs for delivering courses and increased number of participants attending in eLearning process. There is a considerable amount of eLearning resources as open access material. One such example is, Open Course Ware (OCW) of Massachusetts Institute of Technology (MIT) [51].

2.6 Essential Characteristics of Learners for Successful eLearning Experience

In comparison to traditional (face-to-face) learning process in eLearning process, learners need or/must have several characteristics that contribute to success in eLearning process. Learners’ success as well as their failure in eLearning process depends on multiple interdependent factors, for example, “technology”, “course materials”, “participants’ personal characteristics”, etc. [23, 24, 25].

There are certain studies being carried out to identify the essential characteristics of e-learners required for successful learning experience in eLearning. Nedelko [26] conducted an important survey in identifying the learner’s characteristics. He enlisted the individual learner characteristics responsible for success as well as failure in eLearning. He carried out this study on the 2nd and 3rd year undergraduate students of Faculty of Economics and Business, Maribor, Slovenia. Another important study carried out by Khalil, et al. [27] on the Lebanese students to examine the necessary characteristics for the successful e-learner and the readiness of Lebanese students for the eLearning experience.

Some of the essential characteristics of e-learners to success in the eLearning experience are as follows [24, 25, 27, 28]:

1. Cognitive skills – since eLearning is a self-learning pace, cognitive skills, such as, sensory, memory, elaboration, and problem solving, appear to be essential for a self-directed eLearning process.
2. Executive Skills - e-learner must have the ability to use strategy for gathering and using information. They must be self-aware and self-monitored.

3. Self-discipline – learners in eLearning process can set their own pace of study. They must be self-disciplined. They need to complete their tasks as defined by the learning system, no matter when and where. Learners have a lot of freedom on one hand, but on the other hand, participants must be very self-disciplined in order to succeed in eLearning process.

4. Information Processing Skills - information processing skills, such as, observing, seeing and translating, reading, and listening are also important in self-directed learning pace. Self-directed learner must have the ability to see, understand, and do, as well as the ability to translate visual information to notes and records, and to graphically reproduce visual information and to relate it to existing information schemes.

5. Decision Making Skills - It is essential that self-directed e-learners develop the ability to determine and evaluate the sources of information as well as its reliability, validity, and meaning.

6. Self-awareness - Successful self-directed e-learners must have the ability to be aware of their learning processes and of their weaknesses and strengths, so that they can have a realistic perception of their ability to achieve their learning goal. They need to recognize the gaps in their knowledge in order to establish what they need to find out.

7. Independent thinking capacity – learners should have the capacity to think independently.

8. Attitude towards usage of modern ICT – since ICT is a central construct and a basis for eLearning process, learners must have high positive attitudes towards usage of modern ICT.

9. Skills and knowledge for working with modern ICT and computers – since eLearning process is mainly computer-mediated, participants
need appropriate and/or sufficient level of skills enough for them to exploit the system according to their needs.

10. Motivation for studying – participants with higher motivation have good prospects for succeeding in any (e.g. traditional, eLearning) type of learning. In this case, due to the lack of social interaction with the teachers in eLearning process, learners’ self-motivation is needed.

11. Interest in participating the eLearning process – learners with high level of interest for participation in eLearning process have more prospects to succeed.

12. Positive attitudes towards usage of e-literature – a great proportion of literature in eLearning process is in electronic form. Learners who like to use mainly e-literature in comparison to traditional literature (e.g. hard copy books) are more suitable for eLearning process.

13. Lower need for social interaction with peers – learners in eLearning process almost never meets face-to-face. Therefore learners who have low need for social interaction with peers are very suitable for participation in eLearning process on the other hand learners with feeling of isolation, will find eLearning as boring.

14. Time management – learners must have good time management skill. They must be capable to develop a schedule, establish goals and meet due dates.

2.7 Learner’s Characteristics and Learning Styles

Understanding the learners and their characteristics is an important aspect in any mode of teaching learning process, be it face-to-face classroom teaching, distance mode of learning or eLearning space. It is often observed that some teachers in classroom teaching claim that they work hard to give the best learning experience to the students whereas most of the students fail to have successful learning experience. Teachers tend to attribute this to lack of hard work from students' side. On the other side, students also claim that this teacher is good, that teacher does not teach well, and so on. As a
result, most of the students slowly develop disinterest towards the topics and try to skip the classes.

Our common belief is that students learn and develop through exposure and that the content is all important. We have been accustomed to a traditional learning process where a teacher (one who knows) presents ideas to a student (who does not know). Under the traditional lecture system, we generally focus on coverage of material through teaching by narration/lectures (telling). This approach may work for few but it may not work for the majority of today's students. Students are changing dramatically, and we need to respond to those changes. “If we believe that what we are teaching has real value, then we can benefit from understanding the effect of how we are presenting it and to whom” [29]. In order to facilitate learning, Pask [30] argued that subject matter should be represented in the form of entailment structures, which show what is to be learned. Entailment structures exist in a variety of different levels depending upon the extent of relationships displayed (e.g., super/subordinate concepts, analogies).

It is commonly believed that most people favour some particular method of interacting with, taking in, and processing information. Based on this concept, the idea of individualized "learning styles" originated in the 1970s, and has gained popularity in recent years [31].

eLearning is a self-learning space; understanding the learners' learning behavior is the most important aspect. In classroom teaching (face-to-face) it was possible for a teacher to observe the students behavior and based upon that he could tune his teaching method. But in eLearning process since there is no face-to-face contact between the tutors and the learners, it is the responsibility of tutors or learning facilitators to assess the learning styles of their potential learners and design the system accordingly to best fit each learner’s learning style. Success and failure in learning is highly influenced by the individual learner’s learning characteristics. Sudbury Model [32] asserts that there are many ways to study and learn. It argues that learning is
Learning styles are used to predict what kind of instructional strategies or methods would be most effective for a given individual and learning task. It specifically deals with characteristic styles of learning. Kolb [33] proposes a theory of experiential learning that involves four principal stages: Concrete Experiences (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). The CE/AC and AE/RO dimensions are polar opposites as far as learning styles are concerned and Kolb postulates four types of learners,

1. Divergers – tend toward concrete experience and reflective observation. They are imaginative and are good at coming up with ideas and seeing things from different perspectives.
2. Assimilators – are characterized by abstract conceptualization and reflective observation. They are capable of creating theoretical models by means of inductive reasoning
3. Convergers - are characterized by abstract conceptualization and active experimentation. They are good at making practical applications of ideas and using deductive reasoning to solve problems
4. Accommodators- use concrete experience and active experimentation. They are good at actively engaging with the world and actually doing things instead of merely reading about and studying them

Mills discussed a model in [34] which is based on the existence of perceptions. These perceptions in turn are the foundation of specific learning strengths, or learning styles. The model consists of two perceptual qualities, concrete and abstract; and two ordering abilities, random and sequential.

1. Concrete perceptions - involve registering information through the five senses
2. Abstract perceptions - involve the understanding of ideas, qualities, and concepts which cannot be seen
3. Sequential ordering - involves the organization of information in a linear, logical way; and
4. Random ordering - involves the organization of information in chunks and in no specific order

There are four combinations of perceptual qualities and ordering abilities based on their concreteness and abstractness, such as, Concrete Sequential, Abstract Random, Abstract Sequential and Concrete Random. Individuals with different combinations learn in different ways—they have different strengths, different things make sense to them, different things are difficult for them, and they ask different questions throughout the learning process.

Fleming’s VARK model [35] characterises the learners into four types based upon their learning style which extended Neuro-linguistic programming (VAK) models:

1. visual learners - have a preference for seeing (think in pictures; visual aids such as slides, diagrams, handouts, etc.)
2. auditory learners - best learn through listening (lectures, discussions, tapes, etc.).
3. reading/writing learners – prefer to learn by reading/ writing the textual materials
4. kinesthetic learners or tactile learners - prefer to learn via experience—moving, touching, and doing (active exploration of the world; science projects; experiments, etc.).

From the above discussion we can see how important is learner characteristics in eLearning process. It is an important factor in developing the successful learning scenario. Among the above mentioned models, Fleming’s model is the most popular and relatively simple and covers all the aspects of learner characteristics. We have followed this model in building student ontology for the present work.
2.8 Open Source Software (OSS)

Open source refers to software’s source code that is freely available to anyone who wishes to use it, extend, modify, and improve the code. Some examples of open source projects are Linux (http://www.linux.org), Apache (http://www.apache.org), Mozilla (http://www.mozilla.org), and OpenOffice (http://www.openoffice.org).

The open source model encompasses a set of principles and values that ensure the integrity of open source software. Open Source Initiative [36], a not-for-profit organization has proposed 10 features that are widely accepted by the open source community. These are:

1. Free redistribution
2. Source code must be included
3. Derived works – allow modifications
4. Integrity of the author's source code
5. No discrimination against persons or groups
6. No discrimination against fields of endeavor
7. Distribution of license
8. License must not be specific to a product
9. License must not restrict other software
10. License must be technology-neutral

The GNU project [37] defines free software as “a matter of the users' freedom to run, copy, distribute, study, change and improve the software.” Particularly, attention is given to four freedoms. They are:

1. Freedom 0: the freedom to run the program, for any purpose.
2. Freedom 1: the freedom to study how the program works, and adapt it to our needs. Access to the source code is a precondition for this.
3. Freedom 2: the freedom to redistribute copies, so that we can help others.
4. Freedom 3: the freedom to improve the program, and release our improvements to the public, so that the whole community benefits. Access to the source code is a precondition for this.

2.9 Learning management systems (LMSs) and Open Source Software (OSS)

Learning management systems are a suite of software tools that enable the management and facilitation of a range of learning and teaching activities and services. In large-scale operations, online learning management systems (or LMSs) can save costs and time. The use of online Learning management systems in conventional educational settings helps to improve the speed and effectiveness of the educational processes, communication among learners, and also staffs and students. In non-traditional educational settings (such as in distance education mode) uses of LMSs allows organizations to maximize their value by enabling flexible access to its resources and services. [38].

Most of the learning management systems also incorporate a Learning Content Management System (LCMS), which is a set of software tools that enables the, storage, use and reuse of the subject matter/content.

Higher education institutions as also other organizations, implementing eLearning applications are increasingly considering the open source software/product [39]. Siemens [40] suggests for using the open source software. According to him, the benefits of using open source model are,

1. Increased quality
2. Greater stability
3. Superior performance
4. Improved functionality
5. Reduced vendor reliance
6. Reusability
7. Reduced costs
8. Auditability (users validating security)
9. Reliability
10. Rapid fixes to bugs/problems

Coppola and Neelley [39] delineated several benefits of open source software for open learning. They are as follows:

1. The software evolves more rapidly and organically.
2. Users’ needs are rapidly met as the OSS [Open Source Software] model harnesses their collective expertise and contribution.
3. New versions are released very often and rely on the community of users and developers to test it, resulting in superior quality software tested on more platforms, and in more environments than most commercial software.
4. The development “team” is often largely volunteers, distributed, many in numbers, and diverse. Often, paid members of the development team will manage the project and organize the work of the volunteers.
5. Security is enhanced because the code is exposed to the world.

The present day open source LMSs are making important inroads into the world of learning. Open source eLearning software now includes [41]:

1. Learning Management Systems (LMS)
2. Learning Content Management Systems (LCMS)
3. Course authoring tools
4. Tools to create media elements such as animations, audio, and video clips
5. Browsers and players to present content
6. Courseware libraries
7. Discussion forums
8. Wikis, blogs

Furthermore, most people believe that the open source model promotes collaboration and sharing of resources. It creates a community of people that work together to achieve common goals. Specifically, in the open
learning environment, Coppola and Neelley [39] suggest that open source model promotes freedom to choose, increases user access/control, encourages link to a global community, promotes quality, and enhances innovation in teaching and learning.

2.9.1 Learning Management Software Tools
There are many online learning management software available both in commercial and open source software market. In recent years there is a significant eLearning movement towards open source model. There are many open source projects dedicated to eLearning. Below is a list of several selected organizations that are involved in creating open source software for LMSs. (listed alphabetically):

1. **ATutor (http://www.atutor.ca)**
ATutor is an Open Source Web-based Learning Content Management System (LCMS). It is designed with accessibility and adaptability in mind. It is a cost effective tool for both small and large organizations presenting their instructional materials on the Web, or delivering fully independent online courses. It has adopted the IMS/SCORM Content Packaging specifications. It allows content developers to create reusable content that can be swapped between different eLearning systems.

2. **Claroline (http://www.claroline.net)**
Claroline is an Open Source eLearning and eWorking platform. It allows teachers to build effective online courses and to manage learning and collaborative activities on the web. It has a large worldwide users’ and developers’ community.

3. **Dokeos (http://www.dokeos.com/)**
Dokeos is an integrated learning management suite integrating an LMS, a reporting dashboard, live conferencing ability and rapid content authoring. It is one of the largest and most recognized companies dedicated to open source Learning Management Systems. Its main product is a SCORM
compliant open source learning suite used by multinational companies, federal administrations and universities in some 60 countries for a total of 1,000,000 users.

4. **ILIAS (http://www.ilias.de/)**

ILIAS is a powerful web-based open source learning management system. VIRTUS project of the Faculty of Economics, Business Administration and Social Sciences at the University of Cologne has developed ILIAS. It allows to easily manage learning resources in an integrated system. It compliance with many of the eLearning standards, such as, LOM, SCORM 1.2, SCORM 2004, IMS-QTI, AICC, etc.

5. **.LRN Course Management (http://www.dotlrn.org/)**

.LRN is the world's most widely adopted enterprise-class open source software for supporting eLearning and digital communities in higher education, government, non-profit and k-12. It can be deployed readily by small and large organizations. It was originally developed at MIT, US. It is backed by the .LRN Consortium, a non-profit organization committed to advancing innovation in educational technology through open source principles.

6. **Moodle (http://moodle.org)**

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a course management system (CMS) - a free, Open Source software package for learning management. It is designed using sound pedagogical principles, to help educators create effective online learning communities. It has a large number of developers. It has a significant user base with 38934 registered sites with 26,820,482 users in 2,668,094 courses (as of August, 2009) [42].

7. **Sakai (http://www.sakaiproject.org)**

Sakai is an online Collaboration and Learning Environment. It is a free and open source product. It is built and maintained by the Sakai community. Many users of Sakai deploy it to support teaching and learning, ad hoc
group collaboration, support for portfolios and research collaboration. The Sakai community is actively developing new Sakai tools: IMS Common Cartridge, SCORM, blog tool, shared whiteboard, shared display, multipoint audio, multipoint audio, pod-casting, IMS Tool Interoperability, and others.

8. **Worldcircle CMS** (http://wordcircle.org/)
Worldcircle is an open-source, commercial, free and collaborative learning/course management tool. It focused on the needs of teachers, students and those looking to create and conduct online web courses. It includes a calendar, discussion board and course materials (files) module as well as a project module for students to store journal entries and documents related to teaching and self-assigned activities.

There are also many commercial organizations working towards developing LMSs. Some of the important (most used in the recent years) commercial LMSs are as follows:

1. BlackBoard (http://www.blackboard.com/)
2. ClassFronter (http://com.fronter.info/)
3. FirstClass (http://firstclasselearning.com/)
4. WebCT (http://webct6.cortland.edu)

### 2.9.2 Selection Process of eLearning Software

In the previous section, we have seen many open source LMSs. To select a LMS for our project work we primarily considered three main factors, such as it should be **open source software**, should be **platform independent** and have **strong user base**. Some of the other important functional criteria considered are [43],

1. Communication tools
   a. Discussion forum
   b. File sharing
   c. e-Mail
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2. Productivity tools
   a. Bookmarks
   b. Link database
   c. Visual editor
   d. Generate reports
   e. Localization
   f. Help

3. Student involvement tools
   a. Group learners (age, subject, geographic region, etc.)
   b. Student portfolios
   c. Enrollment manager
   d. Assessment/ testing

4. Backup manager
5. Standard compliance
6. Documentation
7. Multilingual support

After a threadbare analysis of eight open source LMSs (as listed in the previous section) on the basis of above criteria, Moodle (Modular Object-Oriented Dynamic Learning Environment) is the most popular one.

2.10 Evolution of eLearning
The introductory section of this chapter already discussed about the origin of eLearning, starting from the idea of traditional distance mode of education (paper based) to the application of ICT to make the education time and space independent and in a more convenient way. We also pointed that ICT made it possible to capture and store the multimedia information and transfer them over the network using the networked information and communication technology.
In this section, we discuss evolution of eLearning in detail starting from the web-based distance training to the eLearning 3.0, influence by Web 3.0 in the following sections.

**Web-based Training**

The root of web-based training can be traced to the concept of on-line training programmes, emerged in ‘90s and used in business. It was based upon the on-line distribution of autonomously used learning materials. In describing the objectives of it, Gonella, et al, [44] mentioned that the “objective was the ‘training’ rather than education or learning”’. Here, the term “training” emphasizes more on the role of the end user in the learning process. The term “web-based training” covers web-based didactic approach, multimedia contents and the software to manage and deliver additional services.

**eLearning 1.0**

The next phase of web-based training can be identified as eLearning 1.0 influenced by Web 1.0. eLearning 1.0 refers to the state of the Internet as well as eLearning when interaction with the online content was not possible. It was the age when we had static and non-interactive content and the use of proprietary software.

Learning Management Systems (LMS) or Learning Content Management Systems (LCMS) were the basis of eLearning 1.0. These systems are very effective in designing and delivering the course contents, registering, managing, tracking and certifying the learners [44]. The biggest advantage of this eLearning 1.0 platform is, it is easy to administer and manage the learning content, courses and a large number of users. In this eLearning platform, there is no teacher available in guiding the learners physically. It is a self-learning space with minimum support from the tutors. The biggest disadvantage in this learning platform is there is no or little use of
communication technologies in making the learning process collaborative and interactive [44].

**Online education**

In the late 90’s people started giving importance to the web-based collaborative and interactive learning process. And it became more popular in the academia than in the business set up. Students and tutors started communicating through mailing lists and newsgroups and latter on using conferencing systems, which provide a forum like communication environment where messages are organized according to the thematic areas [44]. The application of communication technologies, made it possible for learners to actively participate in the discussions along with other routine in learning process. The participation of students makes the learning a social process.

**eLearning 2.0**

eLearning 2.0 refers to second generation Web which have been designed to facilitate online communication and collaboration. Term eLearning 2.0 has become a buzzword. Wikipedia described it as a new ways of thinking about eLearning influenced by the emergence of Web 2.0. In defining Web 2.0, MacManus, et al. [45] state “Enter Web 2.0, a vision of the Web in which information is broken up into “microcontent” units that can be distributed over dozens of domains. The Web of documents has morphed into a Web of data. We are no longer just looking to the same old sources for information. Now we’re looking at a new set of tools to aggregate and remix microcontent in new and useful ways”. The web is shifting from being a medium in which information was transmitted and consumed into being a platform, in which content is created, shared, remixed, repurposed and passed along [46]. The Web is transforming from “read only Web” to “read-write Web”. But we should not just recognize this evolution as a technological revolution but we should consider it as a social revolution [46]. Downes further stated that “Web 2.0 is an attitude, not a technology. It
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is about enabling and encouraging participation through open applications and services”.

eLearning 2.0 platform influenced by Web 2.0 places increased emphasis on social learning and use of social software such as blogs, wikis, instance messaging systems (IMS), social bookmarking, Web feeds, podcasts, etc. In eLearning 2.0 platform, the learning content is used by the learners rather than just to read it. And also the learning content comes from the students than just from courseware authors as with the support of Web 2.0, it is now easy to create and publish contents on the Web [46]. In contrast to this, conventional eLearning where learning materials were only produced by publishers, organized and structured into courses and delivered to students using Internet technologies. The roles played by the students consist in learning by going through those materials and preparing assignments and assignments are evaluated by the teacher.[47].

The fundamental difference between eLearning 1.0 and eLearning 2.0 is that, eLearning 1.0 is based on “formal” learning which is developed within a structured and organized context, such as, school education, business training courses. While eLearning 2.0, is predominantly based upon “informal” processes and is developed as a result of daily activities related to work. It is not structured in terms of learning objectives, time and support [44].

In eLearning 1.0 the focus was on using the Internet to replicate the instructor-led experience. The content was designed to lead a learner through the content, providing a wide and ever-increasing set of interactions, experiences, assessments, and simulations [48]. In contrast, eLearning 2.0, is built around collaboration. It assumes that knowledge is built socially. Learning takes place by continuous conversations about content and the conversation is grounded about problems and actions.
**eLearning 3.0**

eLearning 3.0 is a learning platform influenced by the emerging Web 3.0. The emphasis is on creation of high quality content and services. Till now there is no standard definition for Web 3.0. However, it can be defined as the next evolution of linked data, ubiquity of linked devices and people across the Web [49]. It is a new way of finding, integrating and analyzing data created by individuals, organizations or machines, from diverse sources to achieve new information and insights never before possible. Ubiquitous linked devices make possible new ways of connecting to the Web via a variety of machines, and of exchanging data between machines which enables Web access for anyone, anywhere, anytime, using any device. W3C (World Wide Web Consortium) standardizes the emerging technologies that will enable Web 3.0 to become a reality. These include: *Semantic Web, Video on the Web, Mobile Web* and *Ubiquitous Web* [49]. Web 3.0 basically comprises of semantic technologies and social computing environment.

In describing the eLearning in the context of Web 3.0, Wheer [50] identified four key drivers, namely,

1. Distributed computing
2. Extended smart mobile technology
3. Collaborative intelligent filtering
4. 3D visualization and interaction

He further stated that “eLearning 3.0 will transgress the boundaries of traditional institutions, and there will be an increase in self-organized learning …due to the easier access to the tools and services that enable us to personalize our learning and these will be aggregated more easily too”. He called eLearning 3.0 as “Read/ Write/ Collaborative Web” on the same line as eLearning 1.0 and eLearning 2.0 are identified as “Read Web” and “Read/ Write Web” respectively. eLearning 3.0 is not only about the technology but it is the combination of technology, methodology and skills to use the technologies properly. Also it is worth mentioning that eLearning
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3.0 is not only about the rich collaboration; rather it is to bring the learners much closer in an 'anytime and anywhere' learning. eLearning 3.0 is to provide intelligent solutions to Web searching, document management and organization of content [50].

In comparing the supportive tools between eLearning 2.0 and eLearning 3.0 platform, for the former one are, such as, forums, podcasts, wikis, weblogs, pedagogical games, etc., whereas, in case of the later one, the supportive tools will be the new interactive synchronous tools, such as, chats, conference calls, webcasts, e-meetings, e-workshops, video conferencing, etc. The good thing about eLearning 3.0 is that it will be developed under the umbrella of open standards and open source softwares (OSS).

2.11 Conclusion
In this chapter, we furnished a working definition of eLearning and learning objects. We discussed the eLearning and learners characteristics along with benefits of eLearning. We also introduced open source software and learning management systems. We explained the evolutionary phases of eLearning driven by technology. Next chapter is about the learning metadata standards that basically provide better access to elearning content.

2.12 References
   http://www.learningcircuits.org/glossary.html
   http://reusability.org/read/chapters/wiley.doc
casa.com/PDF/Krakow%202008/krakow%20papers%20pdf/paper%20database%20krakow/Nedelko.pdf
37. GNU operating system. http://www.gnu.org