International Journal on Future Revolution in Computer Science & Communication Engineering
Volume: 3 Issue: 12

ISSN: 2454-4248
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Analysis of E-Learning Concept

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***Abstract*—** E-Learning plays vital role in recent years. It is defined as learning with a computer where you can learn in a learning environment and also connected with your teacher. Mostly an e-Learning is a self study course with self interest. In this paper we discuss the overview of e-learning that is history of e-learning, its four main components such as standardization of content, development of content, management of content, and delivery of content with examples, authoring tools and the types of content to present the concept in interactive way.

***Keywords*—** *E-Learning; Components; Authoring Tools; History of E-Learning.*

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I. INTRODUCTION

E-learning is defined by some experts in two ways. First, it includes all kind s of the utilization of ICT in instruction. Second, it is limited to the use of intranet and internet in teaching-learning process.

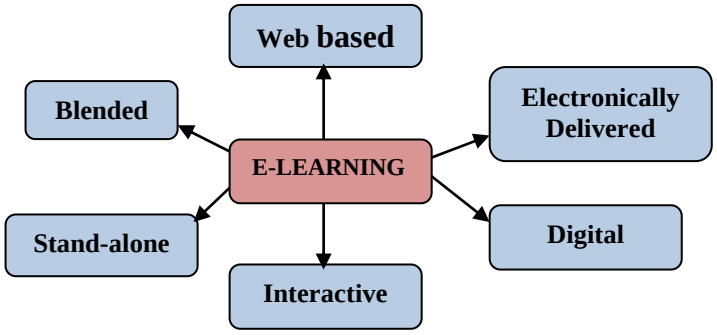

Figure 1. Overview of E-Learning.

In order to make the application of e-learning is effective there are four factors that we should take into consideration.

II. HISTORY OF E-LEARNING

The term "E-Learning" has only been in existence since 1999, when the word was first utilized at a CBT systems seminar. In the 1840's Isaac Pitman taught his pupils shorthand. This form of symbolic writing was designed to improve writing speed amongst secretaries, journalists, and other individuals who did note taking or writing. He was sent completed assignments by his students via the mail system and he would then send them more work to be finished.

In 1924, Ohio State University professor Sidney Pressey invented the Testing Machine called ***Automatic Teacher***, the first device in electronic learning. It was designed students to test themselves. Then, in 1954, BF Skinner, a Harvard Professor, invented the Teaching machine, was a mechanical device whose purpose was to administer a curriculum of programmed instruction. In 1960, PLATO – Programmed Logic for Automated Teaching Operations – was the first computer-based Training (CBT) program. With the introduction of the computer and internet in the late 20th century, elearning tools and delivery methods expanded. The first MAC in the 1980's enabled individuals to have computers in their homes, making it easier for them to learn about particular subjects and develop certain skill sets. Then, in the following decade, virtual learning environments began to truly thrive, with people gaining access to a wealth of online information and elearning opportunities.

In the 2000's, businesses began using elearning to train their employees. New and experienced workers alike now had the opportunity to improve upon their industry knowledge base and expand their skill sets. At home individuals were granted access to programs that offered them the ability to earn online degrees and enrich their lives through expanded knowledge.

TABLE I. HISTORY OF E-LEARNING

YEAR	PROGRESS
1840	Isaac Pitman sent completed assignments by his students via the **Mail System.**
1924	The first **Testing Machine** was invented.
1954	BF Skinner, a Harvard Professor, invented the **Teaching Machine**.
1960	The first Computer Based Training **(CBT)** program was introduced
1966	The Computer Aided Instruction **(CAI)** used in schools.
1969	US DoD commissioned **ARPANET** to create Internet.
1970	Computer **Mouse and GUI** was invented.
1980s	Personal Computers began with first **MAC**.

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1990s	Virtual learning environment began and **E-LEARNING** became recognized term.
2000s	Businesses adopted **E-Learning**
2010+	E-Learning is used by **social media** and **Skype** used to connect and share information and learn from each other.

Today, elearning is more popular than ever, with countless individuals realizing the benefits that online learning can offer. With the beginning of the computer and internet usage in the late 20th century, elearning tools and delivery methods expanded. The first MAC in the 1980's enabled making it easier for them to learn. Then, in 1990's, virtual learning environments began, with people gaining access the online information and elearning opportunities. In the 2000's, businesses began using elearning to train their employees. New and experienced workers now had the opportunity to improve their industry knowledge. Today, elearning is more popular than ever, with countless individuals realizing the benefits that online learning can offer.

III. COMPONENTS OF E-LEARNING

Components of E-Learning are depicted in Fig. 2. There are four types of components such as development of content, standardization of content, management of content, and delivery of content.

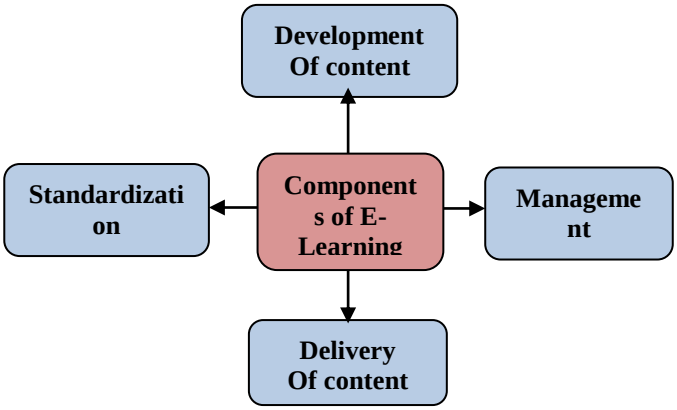

Figure 2. Components of E-Learning.

A. Development of content

Development of content is based on Learning Objects. A **learning object** is a resource, such as digital and web-based, that can be used and re-used to provide support for learning. Learning Objects provides a small chunk of learning activity that also, built around a single learning objective. Larger learning objects are typically harder to reuse, and smaller learner objects save less work for those who want to reuse them [9]. One benefit of utilizing Learning Objects is **Reusable Learning Objects** (RLOs). In e-Learning projects we can reuse Learning Objects when the same learning objectives are part of another learning situation, which increases cost-effectiveness [8].

B. Management of content

Management of content is making the content available though some **e-learning platforms**. An e-learning platform is a software application that integrates different management tools, communication, evaluation, monitoring for providing technological support to teachers and students.

VLE (Virtual Learning Environments)

A VLE is a software system that that is designed to help the tutors or teachers in the management of educational courses for their students. It facilitates **communication, assessments and document sharing** etc. Most VLEs support the Shareable Content Object Reference Model (SCORM) as a standard. People can also share and build together a learning resource helped by some tools such as wiki, blogs, RSS, etc.VLE learning platforms commonly allow:

- Content management
- Curriculum mapping and planning
- Learner engagement and administration
- Communication and collaboration

Examples: Blackboard, WebCT, Moodle.

CMS (Content Management System)

A Content Management System is a set of procedures that is used to describe the processes in an environment which requires collaboration between different actors [11]. CMS allows the **creation and administration of online content** by several people that is pages are composed when user requested by a user's browser [10]. CMS or a Content Management System is essentially designed to support educative or academic courses. It allows the trainer to create a course website, where the documents can be uploaded in popular formats such as word, power point, etc without need to convert them to a web format such as HTML. It handles modification or removal of information resources which are stored in a database. It also supports distance learning with its robust discussion board application. These procedures are designed to manage:

- Data access, based on user roles
- Collecting and sharing information
- Data storage assistance
- Content redundancy check
- Reporting.

Examples: PHPNuke, Drupal, Mambo, Content Management Server, CoreMedia CMS, Joomla, Dotclear, or WordPress

LMS (Learning Management System)

LMS is a web-based technology used to **plan, implement and track** the learning content. It includes user registration, tracking the score and recording the data from the learners; we can also generate reports for analysis the performance. The LMS is a system that is focused on the area of education, allows on both the contents and individual users who interact with it. Some external authoring tools are used to create and load the contents. It has most of the tools of communication and monitoring activities of users. Most LMS enable learning managers to upload online training content created by a variety of authoring tools, as long as the content is compliant with SCORM, the industry standard file format. LMS is learner-

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centric and doesn't have its own authoring capabilities to create the content; rather it will manage the content developed by various sources. If you are working with a Learning Management System (LMS) like Moodle, you need to decide whether your authoring tool produces the type of file that can be integrated. In Moodle, you can integrate SCORM or AICC files. SCORM files (Sharable Content Object Reference Model) are the most common standard used in the e-Learning community. [4]
Examples: Bluevolt, Litmos, Topyx, Elearning manager, Moodle, or Dokeos, *A*Tutor.

LCMS (Learning Content Management System) = LMS+CMS

LCMS is a multi-user environment where learning developers can **author, approve, publish, and manage a learning content**. It has the same characteristics of a LMS (administrative and management) and a CMS (content creation and personalized assembly). Content can be in the format such as audio, video, graphics, text that will make your courses completely customizable. It also has the ability to store and retrieve older versions of content whenever required. In LCMS, we can create learning objects that can be reused. Some of the reusable learning objects are Word or PowerPoint files, PDF files, audio and video. Examples: Claroline, e-doceo solutions, Ganesha
Types of e-learning platforms: There are two types of platforms. They are Proprietary Platforms and Open source Platforms.

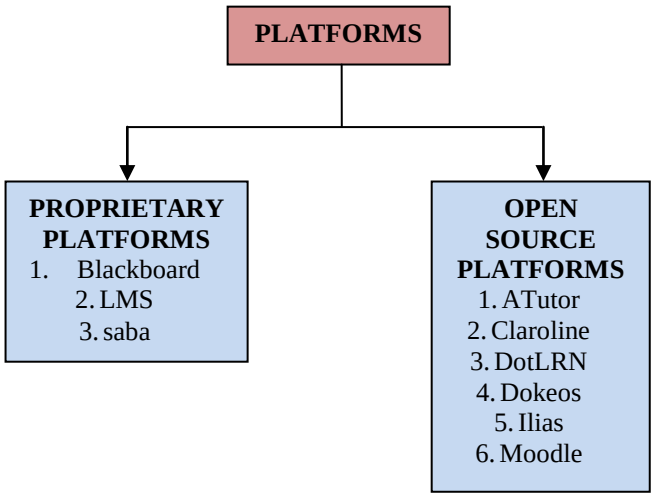

Figure 3. E-Learning Platforms.

C. Delivery of content

Delivery of content is completed by two types of learning for communication purposes. Type of learning is generally divided into one of two categories: **Synchronous** and **Asynchronous E-Learning**. [7]

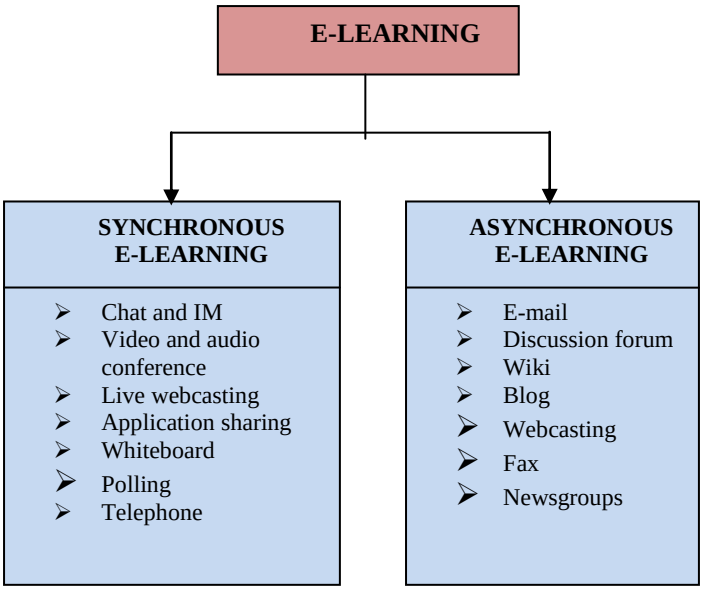

Figure 4. Types of E-Learning.

Synchronous E-learning is mainly online chat and videoconferencing. It contains a real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other. Example: Connect, Breeze, Elluminate, Wimba Live Classroom, chats. ***Asynchronous E-learning*** can be carried out when the student or teacher is offline. It contains a learning in which interaction between instructors and students occurs intermittently with a time delay. (E.g. emails, blogs, wikis, Web 2.0, Blackboard VLE).

D. Standardization of content

According to ISO **E-learning standards** can be [11] described as "documented agreements on training technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose".
TYPES:

1. SCORM
2. IMS
3. IEEE-LOM
4. Dublin Core
5. Ariadne Metadata
6. AICC

1) SCORM

The ADL (Advanced Distributed Learning) is a U.S. government-sponsored organization that is used to ensure access to high-quality education and training materials. The most widely accepted ADL publication is the ADL Shareable Content Object Reference Model (SCORM). The combined elements of the SCORM specifications are IEEE, AICC and IMS. Goals of the standard are Accessibility, Adaptability, Affordability, Durability, Interoperability, and Reusability. SCORM consists of three components such as Content Aggregation Model (CAM), Run-time Environment (RTE), and Sequencing and Navigation (SN).

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2) IMS

The IMS (Instructional Management Systems) Global Consortium is an international USA association of vendor's universities and implementers who are concentrating on the development of XML-based specifications for learning resources. These specifications describe the main characteristics of courses, lessons, assessments, learners and groups.

3) IEEE-LOM

The IEEE (Institute for Electrical and Electronics Engineers - Learning Object Metadata) is an international organization that develops technical standards and recommendations in technological areas ranging from computer engineering, biomedical technology and telecommunications, to electric power, aerospace engineering and consumer electronics, among others. IEEE LTSC (Learning Technology Standards Committee) developed the homonymous standard for learning material.

4) Dublin Core

The Dublin Core Metadata Initiative (DCMI) is an organization devoted to promoting the adoption of interoperable metadata standards. It also develops metadata vocabularies.

5) Ariadne Metadata

ARIADNE Foundation is a no-profit Association and also it is involved in work related to technical specifications, mostly in the area of metadata.

6) AICC

AICC is created in 1988; the AICC (Aviation Industry CBT Committee) is an international group of technology-based training professionals. They create CBT-related guidelines for the aviation industry. The AICC's mission is to provide and promote more information, guidelines and standards leads to result in the effective implementation of CBT and WBT.

IV. E-LEARNING AUTHORING TOOLS

Authoring tools allow faster development of elearning courses and they generally contain the capabilities to create, edit, review, test, and configure eLearning. The term authoring tool defined as "software or program used by trainers and instructional designers to create e-Learning courseware". These tools make the trainers to integrate a wide range of media (e.g. text, graphics, audio, video) to create interactive training content and to produce attractive and useful graphic applications. Authoring tools allow non-programmers to effortlessly create multimedia content. [4]

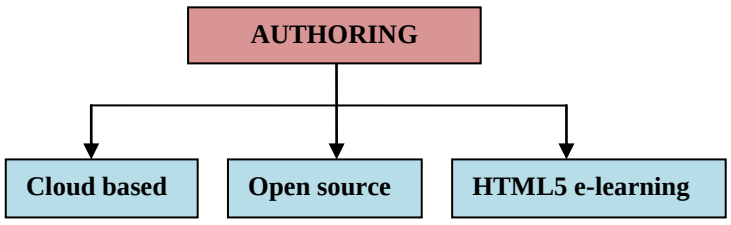

Figure 5. Authoring Tools.

A. Cloud-based authoring tools

Some more eLearning tools are migrating to the cloud. ELearning developers get access the content authoring tools over the Internet via a secure hosted system without thinking about licenses. Cloud-based authoring tools are present completely online. Users are given a login and password that can be used to access their tool anytime, anywhere - as long as they have the internet. [12]

Examples: Litmos Author, Easy Generator, Lectora Online, eCoach, Ruzuku, Smart Sparrow, Versal

B. Open source authoring tools

Open source authoring tools are Front, Moodle, Dokeos, Claroline, ILIAS, SAKAI project, OLAT, What2Learn, Xical, ClassTools.net, eXe project, Wink, CourseLab, Xerte, LAMS, JeLSIM Builder, Quandary, RELOAD, CamStudio, Hot Potatoes, Multimedia Learning Object Authoring Tool.

C. HTML5 elearning authoring tools

Traditionally, eLearning courses have been designed using Adobe Flash, which allowed the eLearning Professionals to distribute the content that was more immersive and effective. On the other hand, many mobile devices do not support Adobe Flash. Then Bring Your Own Device (BYOD) support is on the rise and the HTML5 is supported on a wide range of platforms and browsers. As such, users are able to take their eLearning courses with them, rather than using computer. It also allows for offline storage and data management. HTML5 eLearning courses actually use less CPU space and battery power.

Examples: Adobe Captivate 9, Elucidat, Adapt Learning, Adobe Edge Animate, Articulate Storyline, Brainshark, Camtasia Studio 8, omposica , Enterprise 6, Dictera, DE-Scribe, Dominknow Claro, EAD Builder, Gomo Learning, Hot Lava, H5P, iSpring Presenter, Landmark Liquid, Lectora Inspire, Litmos Author, Luminosity Studio, Raptivity, ReadyGo, SmartBuilder, SHIFT, Zenler Studio.

V. TYPES OF CONTENT

The organization 5Learn classify based on the desired outcome of education and the level of uniqueness of the content utilized by the type of content used during the E-learning process. Content is classified mainly into **three types** of content; according to **uniqueness**, **format, and interactivity**. [5]

A. Based on Uniqueness

The more the content becomes organization specific the more customization it may require. As a result, such content are different categories.

1) *Off the shelf:* This type of content is pulled off the shelf to serve a purpose previously served by similar content. Usually such content contains basic introductions to generic knowledge that applies similarly to different organizations.
2) *Customized:* When off-the-shelf content is used with minor modifications that help to optimize the content to fit a specific concern it can be classified as customized content. This could be due to difference in languages, cultures, and in learner characteristics etc.
3) *Custom:* In the custom type E-content is designed and created from the full application to a specific organization. Such content is always based on information specific to that organization.

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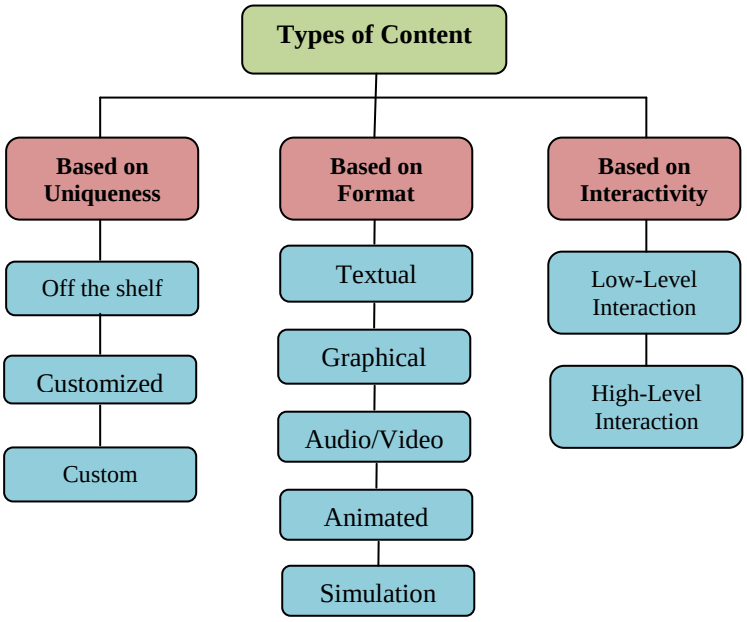

Figure 6. Types of Content in E-Learning.

B. Based on Format

After classifying the content as per the level of uniqueness it is essential to address the format of the content during delivery and specify whether the content will be designed into textual, audio, video, graphical or animated content, or simulated content.

1) *Textual:* This form of content traditionally delivers education in the form of text. It is ideal to combine textual content with other formats to achieve greater impact. Such a format is viewed as less effective and non-desirable. The textual format is the most effective format when delivery according to the subject of learning.
2) *Graphical:* It is frequently a very smart way to distribute a message by some sort of visual aid that matches what the text says. Graphical Content is usually made of static images and graphs that communicate certain information to the learner. This method can have great impact in the maintenance of information by the learner. Textual and Graphical content are usually closely used together for best outcome.
3) *Audio/Video:* Learning material can be communicated using methods of Audio or Video, by converting educational messages into such forms. Audio and Video can be used in a range of ways to convey material to learners that is best communicated through moving pictures. One of the limitations of audio and video is their lack of interactivity which involves one way communication between the sender and Learner, with no space for feedback from the receiver.
4) *Animated:* People mostly confuse with animated material and Video & Audio. Animations also allow the user interaction to give the learner a better more realistic feel of the content. Animated Content secret key that lies in the word is "interactivity".
5) *Simulation:* An advanced form of learning is the simulation. The simulation of educational material varies greatly from other form of simulations. However, this form of learning can be a practical and entertaining way to deliver a message to the learners. Usually, simulations as a form of learning are used to help the learner acquire, enhance or develop certain skills and abilities. It can be said that simulations achieve what can be called "Edutainment", a mixture of both education and entertainment.

C. Based on Interactivity:

When two elements mutually influence one another an interaction takes place. In the learning process interaction is a very important factor for retaining more material acquired. Interactive content is designed to create a learning experience for the learner that changes their behaviour to achieve an educational goal. The degree of interactivity is determined according to the amount of knowledge exchanged between the learner and the learning environment. Such content is divided into two forms:

1) *Low-Level Interaction:* Instructional content with low-level of interactivity may not achieve high level of education. However, such type of content is a desirable way to deliver learning material relative to plain textual content.
2) *High-Level Interaction:* With high levels of interaction the learner may interfere with the learning process by answering questions, interacting with an animation or going through a simulation.

VI. CONCLUSION

E-Learning is education given to anywhere, anytime for anybody. History of E-Learning starts at 1840. Components of E-Learning have four parts and Authoring tools allow faster development of elearning courses and they generally contain the capabilities to create, edit, review, test, and configure eLearning.

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