

Towards Semantical E-Learning from E-learning

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Abstract: *E-Learning is one of the most promising technologies. It connects different learners to the various resources which are spread across Internet. Our paper is divided into three sections. Section –I review about the various concepts and tools of E-Learning. E-Learning include Virtual classroom, CBT, TEL and Pedagogical based learning concepts. Some of the communication activities which are very popular in communication like asynchronous and synchronous activities how they help in E-Learning. Subsequent sections review about the Semantic E-Learning and its various concepts which make E-Learning more users friendly. Ontology plays the major role as backbone for smooth functioning of Semantic Web. Semantic Web and Ontology plays major role for this. At last Section –III is all about the benefits of Semantic E-Learning over E-Learning. How personalization helps in various levels in Semantical E-Learning.*

Keywords: E-Learning, Semantic Web, Metadata, Ontology, Virtual Classroom.

1. Introduction

With the wide acceptance of technology and Internet, E-Learning became one of the most successful tools for spreading the knowledge. E-learning comprises all forms of electronically supported learning and teaching. E-learning services have evolved since computers were first used in education. There is a trend to move towards blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

Section-I

E-learning is most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology. E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual classroom opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. E-learning content can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio. E-learning is defined as “The delivery of individualized, comprehensive, dynamic learning content in real time, aiding the development of communities of knowledge, linking learners and practitioners with experts” [1].

The term E-Learning 2.0[2][3] is a neologism for CSCL(Computer Supported Collaborative Learning) systems that came about during the emergence of Web 2.0[4] From an E-Learning 2.0 perspective, conventional e-learning systems were based on instructional packets, which were delivered to students using assignments. Computer-supported collaborative learning (CSCL) is one of the most promising innovations to improve teaching and learning with the help of modern information and communication technology. Most recent developments in CSCL have been called E-Learning 2.0, but the concept of collaborative or group learning whereby instructional methods are designed to encourage or require students to work together on learning tasks has existed much longer.

E-Learning 2.0, by contrast to e-learning systems not based on CSCL, assumes that knowledge (as meaning and understanding) is socially constructed. Learning takes place through conversations about content and grounded interaction about problems and actions. Advocates of social learning claim that one of the best ways to learn something is to teach it to others [5]. Druker defined e-Learning as “just-in-time education integrated with high velocity value chains. It is the delivery of individualized, comprehensive, dynamic learning content in real time, aiding the development of communities of knowledge, linking learners and practitioners with experts” [6]. E-Learning aims at replacing old-fashioned time/place/content predetermined learning with a just-in time/at-work-place/customized/ on demand process of learning. It builds on several pillars, viz. management, culture and IT [7]. Some other different tools and concepts which are much known into the domain of E-Learning can be described as *Virtual classroom* environments and social networks have become an important part of E-learning 2.0 [8]. Social networks have been used to foster online learning communities around subjects as diverse as test preparation and language education. Mobile Assisted Language Learning (MALL) is a term used to describe using handheld computers or cell phones to assist in language learning. Some feel, however, that schools have not caught up with the social networking trends. Few traditional educators promote social networking unless they are communicating with their own colleagues [9].

Bates and Poole (2003)[10] and the OECD (2005)[11] suggest that different types or forms of e-learning can be considered as a continuum, from no e-learning, i.e. no use of computers and/or the Internet for teaching and learning, through classroom aids, such as making classroom lecture Power point slides available to students through a course web site or learning management system, to laptop programs, where students are required to bring laptops to class and use them as part of a face-to-face class, to hybrid learning, where classroom time is reduced but not eliminated, with more time devoted to online learning, through to fully online learning, which is a form of distance education. In the Bates and Poole continuum, 'blended learning' can cover classroom aids, laptops and hybrid learning, while 'distributed learning' can incorporate either hybrid or fully online learning.

Computer-based learning (CBT), sometimes abbreviated to CBL, refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes.

Computer-Based Trainings (CBTs) are self-paced learning activities accessible via a computer or handheld device. CBTs typically present content in a linear fashion, much like reading an online book or manual. For this reason they are often used to teach static processes, such as using software or completing mathematical equations. The term Computer-Based Training is often used interchangeably with Web-based training (WBT) with the primary difference being the delivery method. Where CBTs are typically delivered via CD-ROM, WBTs are delivered via the Internet using a web browser. Assessments are easily scored and recorded via online software, providing immediate end-user feedback and completion status. Users are often able to print completion records in the form of certificates.

Technology enhanced learning (TEL) has the goal to provide socio-technical innovations (also improving efficiency and cost effectiveness) for e-learning practices, regarding individuals and organizations, independent of time, place and pace. The field of TEL therefore applies to the support of any learning activity through technology. Along with the terms learning technology, instructional technology, and Educational Technology, the term is generally used to refer to the use of technology in learning in a much broader sense than the computer-based training or Computer Aided Instruction of the 1980s. It is also broader than the terms Online Learning or Online Education which generally refer to purely web-based learning.

ScreenCasting is the recent trend in the E-Learning. There are many screencasting tools available but the latest buzz is all about the web based screencasting tools which allow the users to create screencasts directly from their browser and make the video available online so that the viewers can stream the video directly. The advantage of such tools is that it gives the presenter the ability to show his ideas and flow of thoughts rather than simply explain them, which may be more confusing when delivered via simple text instructions. With the combination of video and audio, the expert can mimic the one on one experience of the classroom and deliver clear, complete instructions. From the learner's point of view this provides the ability to pause and rewind and gives the learner the advantage of moving at their own pace, something a classroom cannot always offer.

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

Pedagogical bases learning are the next important concept which helps in execution and implementation of E-Learning. Pedagogical elements are an attempt to define structures or

units of educational material. When beginning to create E-Learning content, the pedagogical approaches need to be evaluated. Following Table describes about some pedagogical concept with its key working concept.

Table 1: Concepts and structure in Pedagogical approaches

Pedagogical Approaches	Defining Structure /Working concept
Social-constructivist	Well afforded by the use of discussion forums, blogs, wiki and on-line collaborative activities.
Cognitive perspective	Focuses on the cognitive processes involved in learning as well as how the brain works.[4]
Emotional perspective	Focuses on the emotional aspects of learning, like motivation, engagement, fun, etc.[12]
Behavioral perspective	Focuses on the skills and behavioral outcomes of the learning process.
Contextual perspective	Focuses on the environmental and social aspects which can stimulate learning.
Mode Neutral Convergence	E-learners can coexist within one learning environment thus encouraging interconnectivity and the harnessing of collective intelligence. [13]

Self-Paced courses are also the form of E-Learning. The obvious advantage of a self-paced course is convenience. People can get the training they need at any time. Self-paced courses are created with e-learning authoring tools. Some popular ways of delivering the Self-paced courses are:

- Internet
- Intranet or Local Area Networks
- CD-ROM or DVD

Following Table describes about the features of Self-paced courses.

Table 2: Features of Self-paced course

Multimedia	A mix of text, graphics, animation, audio and video to enhance the learning process.
Interactivity	An instructional strategy that helps a learner practice what they have learned.
Bookmarking	Let's the learner stop the course at any time and restart it from the same point.
Tracking	Report the learner's performance within a course to a Learning Management System (LMS).

Since self-paced courses can be offered without a teacher and without a required completion time there may be many learners who will not enroll or complete the course work.

A **Learning Management System (LMS)** is software used for delivering, tracking and managing training/education. LMSs range from systems for managing training/educational records to software for distributing courses over the Internet and offering features for online collaboration.

A **Learning Content Management System (LCMS)** is software for authoring, editing and indexing e-learning content (courses, reusable content objects). An LCMS may be solely dedicated to producing and publishing content that is hosted on an LMS, or it can host the content itself. Content is a core component of E-learning and includes issues such as pedagogy and learning object re-use.

Communication activities are the methods and tools by which a user gets connected with the recourse. People learn in many different ways and at different times. To support these different learning needs, different e-learning delivery methods are required. These methods can be divided into two parts, referred as Asynchronous and Synchronous activities described in following Table3.

Table 3: Asynchronous activities vs Synchronous activities

Dimension	Asynchronous activities	Synchronous activities
Technologies	E-mail, blogs,wikis, and discussion boards	Online chat session, Virtual classroom, Virtual Meeting.
Concept	Participants may engage in the exchange of ideas or information without the dependency of other participant’s involvement at the same time.	Participants may exchange of ideas and information with one or more participants during the same period of time.

Section-II

In E-Learning when people participate from different environments with different backgrounds and different level of knowledge then there is a need of common understanding of terminologies, which are frequently used in E-Learning. Therefore, some mechanism for establishing a shared-understanding is needed. Ontologies are a powerful mechanism for achieving this task. In fact, ontology constrains the set of possible mapping between symbols and their full meanings [14].

Ontology refers to the interpretation of a group of ideas within a specific domain that defines the interrelationship between those ideas. Ontology can be used to study the existence of entities within a specific domain and sometimes can be used to identify the domain itself. [15]

Semantic Web (SW) derives from W3C director Tim Berners-Lee’s vision of Web as a universal medium for data, information and knowledge exchange [16]. The word semantic web is a product of Web2.0 (second generation web) which makes the web itself to understand and satisfy the user requests and web agents or machines to use the content of web [17][18]. Semantic Web is about building an appropriate infrastructure for intelligent agents to run around the Web performing complex actions for their users [19]. Most important feature of Semantic Web is “Expressing Meaning” and to make it possible several layers of representational structure are needed. The basic layers are represented in the following Table [20].

Table 4: Layers in Semantic web

XML layer	Represents the structure of data
RDF layer	Represents the meaning of data
Ontology layer	Represents formal common agreement about meaning of data
Logic layer	Enables intelligent reasoning with meaningful data

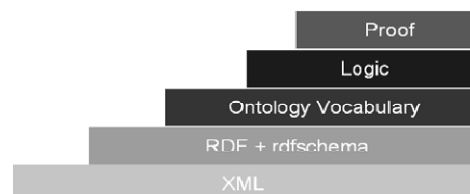


Figure1: Layers of the semantic web architecture

Each component of the eLearning system can be described with the help of **metadata**. The metadata level is the first level of a semantic WEB-based application [21]. Metadata is a component which can be easily attached to Web based system in order to store many characteristics like execution on platform, information retrieval, responsiveness. Metadata can also be helpful for retaining the information as per the individual basis. With the help of semantic web the information could easily travel between different software agents, which will help to express information in accurate and machine interpretable format. Software agent helps to understand and to describe data, to process data and to share and reuse it.

Web services are the next most important concept which makes all the expectation of semantic web fulfill. As with the help of several metadata concepts, web services help software agents to work like search agent, information filters, to provide smart information integration and knowledge management. These roles of software agents are possible when different ontologies are working together enabling semantic interoperation between the software agents and applications on the Semantic web. The Semantic Web enables better machine processing of information on the Web, by structuring web documents in such a way that they become understandable by machines [22]. The Semantic Web framework includes major components such as: ontologies, ontology languages, tools, semantic annotations, logical support, intelligent agents, and applications/services. Educational semantic web will influence the next generation of e-learning systems [23]. With the concept of Semantic web and according to user preferences, a user can find and combine useful learning material very easily. The process is based on semantic querying and navigation through learning materials, enabled by the ontological background [24]. [25] presents a service-based architecture for a distributed learning environments based on Semantic Web technologies to add the personalization capability to open, dynamic, learning networks. Several web-services use the learners profile to customize the learner’s queries, or to generate recommendations in accordance with his request and needs or generate links to other related resources.

Section-III

Benefits of Semantic E-Learning over E-Learning

Internet is a collection of huge web content and knowledge. The main communicating tool which is bridging the gap between the computers and web content is hypertext markup language (HTML) formatting language. The main goal of the Semantic Web is to provide the capacity for computers to understand Web content that exists on systems and servers across the Internet, ultimately adding value to the content and opening rich new data, information, and knowledge frontiers [26]. Semantic Web provides personalization on

various parts to user like to help them to make personalized course management, their profile management, on content delivery, in adaptive assessment formulation, in assessment delivery. Some of the key characteristics of these are in following Table.

Table 4: Key Characteristics in Semantic Web Personalization

Personalized Course Management	Courses, compliant to e-learning standards, with various forms of web enabled e-content adhering to same learning object, for serving the individual needs and preferences of learners [27]. Learner can create itself different courses their own and learning goals, manage their learning. Learner preference based self-organizing course content repository. [29]
User Profile Management	Learners' e-Portfolio management [28], for extracting and interpreting the learners' preferences, based on artifacts, for rendering the e-learning services according to each learner. [29]
Personalized Content Delivery	Context based device independent content delivery. Eg. Mobile, PC, Palm top, etc. using adaptive hypermedia. Content delivery of preferred e-content format which is backed with personalized course management service and assisted by user profile management service. [28]
Adaptive Assessment Formulation	Formation of assessment based on the learner's cognitive pattern. Building of question repository conforming to standards backed by semantic web, web mining technology and assisted by instructor. [28]
Personalized Assessment Delivery	E-Learning assessment standard based delivery. Personalized interaction types for assessment. Tracking and evaluation. [28]

2. Conclusion

According to a research half of the internet users across globe are youth of age 30[30]. Approx. all the countries with maximum percent of youth population is surfing the internet for the different purposes. Different user is using the internet, from different hardware and software platform. This is also an issue to address that how to make internet accessible smoothly from different platform and it could be achieved by implementing the concepts of Semantic web. With the implementation of semantic web user get an environment which is more personalized. Like this user will feel more satisfied and will want to involve in learning activities in which user want to involve. Semantic web has totally changed the way by which user connect to each other. This provide the contact and services more personalized by which user can communicate, cooperate and create new content dynamically to share in eLearning environment also.

3. Future Scope

As the Internet is growing and it is becoming the essential part of the day to day life of the society. At the same time there is a need to provide a structure on Internet which can help the users in much more personal way. Semantic Web helps the users in more personal way by providing the content and result according to the users need and preferences. This is where semantic web can also help to various learners on Internet, who are utilizing the help of E-Learning different sources.

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