

Web 2.0 Technologies as Tools for Distance Learning

Mayuresan Murugamoorthy, Akila Panditha A.D, Lasindu Vidana Pathirana L.C, Sandamal Weerasinghe P.S.L,
Indeewari Wijesiri T.I.I
Department of Computer Science & Engineering, University of Moratuwa

Abstract — *This paper provides an analysis of the current status in enabling distance learning via web 2.0 and highlights its limitations and problems.*

Index Terms — **Technology-based learning (TBL), Virtual Environment.**

I. INTRODUCTION

The time when Schools, colleges or universities were the only places to provide education is in history books now. With the dawn of web 2.0 technologies, the idea of distance learning became more realistic. With its capability of narrowing down the gap of knowledge distribution among world population, distance learning has become a major research area among experts, and many institutions started to implement distance learning programs. Using Web 2.0 to increase interactivity of distance learning is not a whole new idea, it has been around for a while now and many highly reputed higher education institutes have experimented and implemented different types of web 2.0 based distance learning programs.

Web 2.0 is the latest version of Internet, which fulfills the shortages of Web 1.0 and affords more dynamic interaction and collaboration among communities. Web 2.0 has much more rich features which provide the user with much flexibility, accessibility, scalability and sharing capability. Emerging technologies such as blogging, social networking, video/voice conferencing, media sharing, etc. creates a virtual classroom for a learner to interact and learn with much more resources than earlier even away from a traditional classroom. Such unique features enable web2.0 to be an ideal companion for distance education. This topic “Web 2.0 technologies as tools for distance learning” focuses mainly on how this new version of web actively participates in the process of teaching and learning with the use of cutting-edge technology and its applications.

II. WEB 2.0 TECHNOLOGIES

A. WHAT IS WEB 2.0?

Web 2.0 is the second phase of web related services and products which facilitates interactive information sharing and collaboration. This is not influenced by technology revolution, rather by social revolution. Web 2.0 is not clearly defined or specified in any web related application. No one can search for

a web 2.0 version of a web site or a service. It is just a concept of web services which consist of characteristics known as web 2.0. The concept of web 2.0 is defines new principles rather than giving a totally new web.

The label of “Web 2.0” was officially introduced during a brainstorm conducted by Tim O’Reilly and MediaLive International in 2004 [1]. Web 2.0 is considered as a platform while software is considered as services. Also web 2.0 is said to be the “Second Life” of the World Wide Web. Earlier in web 1.0 there were no collaboration among consumers and producers of the web. It was a passive participation very similar to the physical access of a library. Web 1.0 could not give much more than reading and writing. The “Second Life” of web leads to a new era of publishing, content management and so many fields.

B. Web 2.0 characteristics

O’Reilly offers seven principles of web 2.0 [1]

- The Web as the platform
- Harnessing the collective intelligence
- Managing databases relevance
- Not more software versions
- Lighter programming
- Multi-devices orientation
- Rich user experiences

Web 1.0 allowed users to install software in a machine and run them on the desktop. Instead of that approach, web 2.0 has made users’ life easier using web as a platform and software as services. Google and BitTorrent are clear examples of that concept. Blogs and RSS feeds are new technologies which gather intelligence around the world. Those trends make the web a global brain that can be used for free. Openness is another significant feature of web 2.0. Since software is considered as a service no more version releases occur. These qualities have made the current web much usable, manageable and maintainable.

C. What is Distance Learning?

Distance Learning is another dimension of education where several methods of teaching and technology are combined to

provide the students the access to education when information sources and learners are separated by time and distance or both. [2] Distance learning enables the individuals to learn even though they are not physically present in a traditional classroom.

Virtual learning environment has been growing rich while the diversity of education technology has been increasing. [3] Since the advancement of Web 2.0 from earlier Web 1.0, aspects of learning have been changed with several learning forms as e-learning, web based learning, online learning and virtual learning which promise learners new opportunities to be independent in their study and research. Web 2.0 tools that create distinctive forms of support for learning and for independent research have evolved in this new version of internet. [4]

The new term for Distance Learning is called, "Technology-based learning (TBL) constitutes learning via electronic technology, including the Internet, intranets, satellite broadcasts, audio and video conferencing, bulletin boards, chat rooms, webcasts. TBL fosters greater accessibility to learning by offering anytime and anywhere delivery. Furthermore, learning can be synchronous, when delivery occurs when instructors and learners meet at a specific time in a physical or virtual classroom, or it can be asynchronous, when the learning does not occur at a pre-specified time and thus can be self-paced. Web conferences, online forums, electronic mailing lists, wikis and virtual collaborative workspaces, blogs (weblog), simulations, learning management systems (LMSs) are the most common delivery methods and tools used in a TBL environment." [3]

D. What are the technologies that can be used as tools for Distance Learning?

"e-Learning 2.0" is a new paradigm enhanced by web 2.0. Distance learning is a major aspect of e-learning which allows education of many parties in separate physical locations. Review Process

1) Web 2.0 technologies in distance learning

a) Audio and Video

- Interactive audio or video conferencing can provide real time face-to-face (or voice-to-voice) interaction.
- Video repositories allow sharing video clips similar to YouTube. E.g.: - Teachertube, Our media, Sclipo, Expert village, Ubu films and EngageMedia.

b) Data

- Computer-assisted instruction (CAI) - uses the computer as a self-contained teaching machine to present individual lessons.
- Computer-managed instruction (CMI) - uses the computer to organize instructions and track student

records and progress. The instructions themselves need not be delivered via a computer, although CAI is often combined with CMI.

- Computer-mediated education (CME) - describes computer applications that facilitate the delivery of instruction. Examples include.
 - Electronic mail allows real-time computer conferencing.
 - Multimedia presentation, written documents and images are allowed accessing in shared documents and podcast
 - Read/write web such as blogs, wikis and social bookmarking.

E. Current research trends of Web 2.0

- Learning anywhere - Students tend to make their workspace anywhere on the web considering it as a platform
- Social construction of knowledge - Age of literacy is much important than the author of a resource
- Multiple devices - Students are encouraged to use mobile devices for education at any moment

F. What are Web 2.0 Tools?

TV, radio, email, one way video conferences, discussion forums were one of the first used technologies for distance learning. But those earlier tools of information lacked effective interaction and collaboration. In web 1.0 tools users were merely passive consumers of content and to provide with more interaction and flexibility, people investigated the ways of using blogs effectively, wikis, podcasts and social network in education. [5]

Web 2.0 main characteristics are active user participation in content creation, efficacious evolution of technology, critical thinking, social presence, collaborative learning and two way communications.

"However, necessity of collaborative technology that leads the student toward achieving desired learning outcomes, requirement for flexible models that allow designers to begin at any given point in the process and purpose of technology using in the instructional design framework show that emerging technologies have an impact on new models of teaching and new ways of learning in distance education" [5]

Technology	Description
Blogging	<ul style="list-style-type: none"> • Online Diaries • Anyone can create, publish and organize content even without any technical skill • Open for comments, discussion, feedback etc. • Improves writing skills and encourages new ideas and critical thinking[5]
Media Sharing	<ul style="list-style-type: none"> • Share, comment and add descriptions to photos, videos, mp3 all over the world. • Use several tags for the ease of finding in the web.
Wikis	<ul style="list-style-type: none"> • Freely expandable collection of interlinked Web pages, a hypertext system for storing and modifying information [5] • Use for student projects, collaborating on ideas and organizing documents and resources from individuals and groups of people • People can add, edit, discuss and support.
Social Media	<ul style="list-style-type: none"> • Supports collaboration, knowledge sharing, interaction and communication of users from different places who come together with a common interest, need or goal.[5] • Range of applications that augments group interactions and shared spaces for collaboration, social connections, and aggregates information exchanges in a web-based environment.
LMS	<ul style="list-style-type: none"> • Manages learning materials, quizzes, surveys, polls, timetables, videos etc. • Works as a virtual classroom for students facilitating their needs.

G. Advantages of Distance Learning tools [3] [6]

- Accessibility, offering anytime and anywhere delivery
- Training that is self-paced and matched to the learners' needs
- Full scalability
- Timely dissemination of up-to-date information
- Streamlined and effective learning delivery
- Reduction of costs
- Flexibility, as far as the possibility of choosing technologies is concerned
- Possibility to control access to resources by authenticating users;
- Sharing accumulated experiences (blogs, wikis, flickr, youtube) and resources
- Independence from the platform (a computer, with browser and Internet connection is enough)
- The low level of complexity needed for use (minimum skills in using the Internet)
- Reliability in continuous usage, over an extended period of time.

H. Current implementations

Already there are many tools available to the public that utilize the power of Web 2.0 for educational purposes. These tools can be categorized in to 11 groups. [4]

1) Media sharing

Media sharing websites allow users to share digital educational material such as videos, slide shows and notes among each other. These web sites allow learners around the world to access, and study these materials anytime, anywhere. YouTube is a very good example of a video sharing website. Learners from Sri Lanka can watch lectures taught at prestigious universities like Massachusetts Institute of Technology, Stanford University etc. [7] Likewise slideshare is a website that allows users to share slide shows with each other. [8]

2) Media manipulation

Diagrams and illustrations make it easier for learners to understand complex issues much clearly. Websites such as Gliffy allow users to draw complex diagrams and publish them on the internet or share them with friends. [9]

3) Conversational arenas

These are basically websites that allow users to discuss/debate specific topics, create separate chat rooms, ask for help from others etc. BBC Student life can be taken as an example of an implementation of a conversational arena.

Internet Relay Chat (IRC) services are also utilized by many users to discuss about problems with others who have similar interests.

4) *Online games and virtual worlds*

Applications such as these allow users to learn by actively engaging in various activities inside the virtual world. Powerup is a game that allows the players to save a world that is in the brink of destruction. by working together with fellow teammates. [10]

5) *Social networking*

Social networking is undoubtedly one of the most important tools that can be used for distant learning. If we take facebook for example, there are many groups created by people who share a passion for a specific domain, they share their knowledge by actively participating in discussions, asking questions, sharing useful links and material etc.

6) *Blogging*

Blog publishing platforms such as Blogger and Wordpress are the main reason for the vast number of blogs that are up on the internet. Teachers or any other enthusiasts can create a blog, publish articles about topics that interest him/her and allow others to add comments about the content. Blog authors can share their practical experience, which can never be found on a textbook with others. Blogs are undoubtedly one the main sources of information that is available to learners.

7) *Social Bookmarking*

Systems such as these allow users to share bookmarks. [11] is one of such websites designed specifically for research and education users, whereas [12] is a website for more general users.

8) *Recommender systems*

Recommender systems typically produce a list of recommendations for a user based on his/her past interactions with the system, or by considering products related to a particular product the user is interested in. Ratelyteachers is an example of a recommender system in the education domain. It allows users to evaluate teachers. [13]

9) *Collaborative editing*

Systems such as Google docs allow users to edit diagrams, text, or spread sheets concurrently. The document being edited will be stored in a central location. These systems allow users to brainstorm and put their ideas together. They simulate real-world team working environments. [14]

10) *Wikis*

Wikis are probably the most used tools for distant education. The contents in wikis go through a process of evolution. This concept is known as "Darwinism". Because of the openness of Wikis, they undergo a process of selection similar that of animals or humans. Poor quality content gets removed and "fit", good quality content prevail. Therefore the Wikis will eventually consist of quality material. [15] [16]

11) *Syndication*

Students get the ability take advantage of syndicated material such as podcasts by visiting various publication sites. [17]

A proper system for distant education would have a combination of tools from the above groups. Take the Stanford online learning program as an example. Every year there are about 16 courses available for students to take. And there are no restrictions based on geographic location. any student, anywhere can enroll for these courses.

The lectures are delivered as short interactive video clips that allow students to follow the course at their own pace. There are live quizzes with live feedback, and they are going to implement a system that allow students to rate questions, so that the top rated questions would be posed to the instructors.

I. *Student response*

Distance learning web 2.0 tools are used by almost everyone involved in education. From a school child, to person studying for a doctorate uses these tools. In an age where reading books has become obsolete; these tools have become an integral part of a students' life.

J. *Paradigm shift: From class room to virtual class room*

Adopting web 2.0 technologies and distance learning involves major paradigm shift in education. Introduction of distance learning has made the requirement of physical presence of a student in the class room obsolete. With tools of distance learning, teacher and student can continue with the process of education without being in the same physical location. This paradigm shift only by itself raises many questions and tensions. According to research carried out by Learning Sciences Research Institute, University of Nottingham. There are 11 tension areas [4]. The key points from this list can be summarized as

- Role of teachers in student centered education model in distance learning
- Lack of control for teachers in the environment of distance learning
- Adopting Collaborative learning model
- Digital resources and their integrity issues
- Potential risks of intellectual property violations and plagiarism

K. *Virtual Environment: Administration and institutional Issues*

With the freedom of distance learning students are no longer required to physically be present at an institute for their education. Major administration issues can be listed as

- Supervising student activities
- Problems in enforcing rules and regulations
- Lack of transparency in online evaluation processes.

- Lack of control in distribution and reproduction of learning material

This leads to several issues in applying current frameworks, theories and standards of education management into distance learning systems [18]. There are discussions and research going on to decide whether those frameworks should change to adopt distance learning or tools of distance learning should be changed to fit into the current system [18][19]. We suggest that somewhere in the middle of both these extremes are the best solution for current situation and in the future, new theories and frameworks should be developed to cater requirements of management in distance learning. As per the current situation, most recognized institutions are having restricted or limited distance learning environments rather than using web 2.0 distance learning tools, with their full set of capabilities due to this problem [18].

L. Quality: Maintaining Instructional, Institutional and Technological quality in distance learning

Due to the significant deviation from traditional education systems, implementing and maintaining distance learning systems can affect quality standards of an institute. Since almost all quality standards and regulations which measures and rank educational institutes are currently being more focused towards measuring traditional education process, the risk of losing quality standards by implementing distance learning systems is high [18]. This problem is a major drawback for the future of web 2.0 tools in distance learning and it keep out institutions from implementing fully functional distance learning systems apart from commonly implemented support systems. Change in measuring criteria is critical in order to proceed with the transition from traditional learning to distance learning in higher education.

Also technological skills of students and teachers need to meet a certain level of quality standards in order to effectively use web 2.0 in higher education [18]. Future research on quality aspects is required and a new model for effectively measuring distance learning tools needs to be developed through discussion and research among stakeholders.

M. Current solutions and research areas - status and projections

The problems and limitations explained above are managed partially by some institutes, which have already integrated web2.0 for distance learning [4].

These actions include:

- Providing training sessions and workshops to the teachers on using web2.0 tools for education
- Developing a web2.0 strategy which maps with the action plans of the institute's strategy
- Changing the system completely from the traditional one to a VLE(Virtual Learning Environment)

Another problem is the data available in web2.0 related sites like wiki are not reliable, as anyone using web can edit the data. Currently this problem is solved by sites like Digg, Del.icio.us, Google Buzz, and others by providing information to prove the authenticity of the data. Features like rating and commenting enabled in some websites contribute much to the reliability of the data.

At present the usage of wikis and blogs has increased a lot, as a result Google has added a search option for searching in blogs. The current trend of Web2.0 includes the introduction of Service Oriented Architecture (SOA), which is an architectural approach in which highly independent, loosely coupled component based software services are made interoperable. Semantic web is another emergent part in the future of web2.0. It aims in converting current unstructured form of web into a structured model as "web of data" and also considered as an integral part of web3.0. These will not completely solve the problems discussed earlier, but those who have successfully implemented web2.0 in distance education can consider integrating these elements.

N. Proposals for implementation models

Web 2.0 can be implemented in several ways in distance education other than the ways implemented up to now. According to [4] possible usages can be summarized as:

- Institutions should have to check their learning, teaching and assessment strategies and should consider integrating new tools and new approaches in to them.
- Universities should monitor the practice and law over the content in a Web 2.0 environment, and should update their policies accordingly
- Dissemination websites(like blogs) can be used to create groups, including teachers of same interest for sharing educational materials
- Using wikis to develop IS plans and facilitate meetings, preparing agenda etc.
- University of Edinburgh has created a list of implementation actions in their report [4]. It includes
 - Using blogs and RSS feeds instead of newsletters
 - Use of web2.0 mapping technologies for university maps
 - Social bookmarking, supporting development and research projects
 - Providing podcasts of public lectures

O. Recommendations for future enhancements and research areas

There should be researches done focusing in the following areas in order to successfully use web2.0 in distance education and solve the problems discussed above to a great extent. [20]

- Familiarity of the teachers and students with web2.0 tools and practices
- Degree of internet access enjoyed by the students
- Students' judgment of resources developed in web2.0 and used in distance education
- Skills of teachers in judging the reliability of the resources
- Responsibility of institutions in publishing reports developed by their learners
- Actions taken for removing irrelevant or offensive data from blogs, wikis or any web2.0 tool
- Hosting web2.0 services in universities or to external parties

In this field researches are done scarcely, because the field changes so quickly, that when a researcher does a research and finalize his report the technology will have become out dated. Researches can be done focusing on the intervention of web2.0 in the distance learning process so far and details of successes and failures, giving reasons for them. This will help not only the educationalists, but also to the future teachers and students for an effective usage of these tools [20].

References

- [1] Tim O'Reilly (2005, Sept.). "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software" [on-line] Available: <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html> [Feb 03, 2012]
- [2] Honeyman, M.; Miller, G. (1993 Dec.). "Agriculture distance education: A valid alternative for higher education?" *Proceedings of the 20th Annual National Agricultural Education Research Meeting*: 67-73.
- [3] Nadire Cavus and Sezer Kanbul. (2010). "Designation of Web 2.0 tools expected by the students on technology-based learning environment", *Social and Behavioral Sciences*, 2(2), pp. 5824-5829, Available: <http://www.sciencedirect.com/science/article/pii/S1877042810002200> [Feb 4, 2012]
- [4] C. Charles. (2008, May). "Web 2.0 technologies for learning. The current landscape – opportunities, challenges and tensions". Web 2.0 technologies for learning at Key Stages 3 and 4. [On-line] Available: <http://dera.ioc.ac.uk/1474/> [Feb 2, 2012]
- [5] Yasemin Koçak Usluel, Sacide Güzin Mazman. (2009, March). "Adoption of Web 2.0 tools in distance education." *Procedia - Social and Behavioral Sciences*. [On-line]. 1(1), pp. 818-823. Available: <http://www.sciencedirect.com/science/article/pii/S1877042809001422> [Feb 4, 2012]
- [6] Gabriela Grosseck. (2009). "To use or not to use web 2.0 in higher education?" *World Conference on Educational Sciences*, pp. 478-482. Available: <http://www.sciencedirect.com/science/article/pii/S1877042809000825> [Feb 3, 2012]
- [7] Internet: <http://www.youtube.com>, [Feb. 3, 2003].
- [8] Internet: <http://www.slideshare.net>, [Feb. 3, 2003].
- [9] Internet: www.giphy.com, [Feb. 3, 2003].
- [10] Internet: <http://www.powerupthegame.org/home.html>, [Feb. 3, 2003].
- [11] Internet: <http://www.bibsonomy.org/>, [Feb. 3, 2003].
- [12] Internet: <http://delicious.com/>, [Feb. 3, 2003].
- [13] Internet: <http://www.ratemyteacher.com>, [Feb. 3, 2003].
- [14] Internet: <http://docs.people.com>, [Feb. 3, 2003].
- [15] B.J.C Perera. (2007). "The current craze: web 2.0 tools" *Sri Lanka Journal of Child Health*. [On-line], 36(2), pp. 39-42. Available: <http://www.sljol.info/index.php/SJLJCH/article/view/47> [Feb 3, 2012]
- [16] Internet: http://en.wikiversity.org/wiki/Wikiversity:Main_Page, [Feb. 3, 2003].
- [17] Internet: <http://itunes.stanford.edu/>, [Feb. 3, 2003]
- [18] Moonen, Betty Collis and Jef (2008, June) "Web 2.0 tools and processes in higher education: quality perspectives". *Educational Media International*. Vol. 45, 02, pp. 93-106. Available: https://ayresources.wikispaces.com/file/view/Web_2.0_tools_and_processes_in_higher_education_quality_perspectives.pdf [Feb 4, 2012]
- [19] Selwyn, Neil. (2007) "Web 2.0 applications as alternative environments for informal learning - a critical review." in OECD-KERIS expert meeting - Session 6 - Alternative learning environments in practice: using ICT to change impact and outcomes. Available: <http://www.oecd.org/dataoecd/32/3/32468225.pdf> [Feb 3, 2012].
- [20] Tom Franklin, Mark van Harmelen. (2007, May) "Web 2.0 for Content for Learning and Teaching Higher Education" [On-line]. Available: http://www.ncsl.ac.uk/media/documents/programmes/digital_exposition/vs_b2_content_learning_and_teaching.pdf [Feb 2, 2012].