A Review of Application of Web 2.0 and Open Source Softwares in E-learning: A Baseline Survey in a Private University, Kenya

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Abstract

E-learning has become popular in many higher level institutions due to advancements in technology such as web 2.0 and Free Open Source Softwares. Many universities have deployed E-learning systems where E-learning based and non E-learning based educational environments coexist. Research in this area has mainly focussed on the technologies such as Web 2.0 and Free Open Source Softwares. The actual adoption, deployment and inclusions of such technologies in Institutions of Higher Learning remain undetermined. This study sought to determine the application of Web 2.0 and Open Source Softwares in E-learning with specific reference to actual adoption, deployment and inclusion. Descriptive Survey Design was used in a local Private University in Kenya to collect data about students on actual adoption, deployment and inclusion of Web 2.0 and Free Open Source Softwares in E-learning. The study found out that Open Source Softwares were the least deployed and adopted technologies in E-learning. ILIAS, EFRONT and Claroline softwares had 100% No response implying that respondents were unaware of existence of these softwares in E-learning.

Keywords: *E-learning, Web 2.0, Open Source Softwares*
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1. Introduction

The advent of the World Wide Web has seen revolution in the manner in which E-learning is conducted. This can be seen from the content of learning materials and faster and more secure availability of internet with the advent of wireless networks and very high-speed rate(Sbihi & Kadiri, 2010). Although various authors disagree as to what extent, learning becomes 'E-learning' there is a general agreement that internet technologies specifically Web 2.0 tools and Free Open Source Softwares plays an important role in shaping the future of E-learning (Clark & Mayer, 2011). The last few years have seen a change in the way the internet is used for learning. In 2004, Web 2.0 appeared as a new vision of the Web which considered the user not a simple consumer of information but as a potential producer of the web content. This distinction meant that the internet will be used like a social software which contrast the earlier technologies that were passive (Greenhow, Robelia, & Hughes, 2009). This radical approach in E-learning has significantly increased the quantity of information and allowed a certain organization of users in the form of communities participating in the production, communication, sharing and diffusion of content. For instance, e-Learning has evolved through a series of overlapping stages. Stage 1 consisted of communication and course management tools, from web page to, course management systems, PowerPoint, email, bulletin boards, and chat rooms. These tools are synonymous with Web 1.0 technologies.

Web 2.0 technologies that have made E-learning possible includes: wikis, blogs, podcasts, Really Simple Syndication (RSS 2.0) and tagging (Safran, Guetl, & Helic, 2012). Web 2.0 technologies emphasize active learning, collaboration, and enhanced interaction through use of Wikis, blogs, podcasts, tags, and social networking. E-learning has not only been influenced by Web 2.0 technologies but also Free Open source softwares. (Azeta, Oyelami, & Ayoo, 2008) defines Open Source Software as software that is made available along with source code at no cost. The freedom to use, study, redistribute and modify the software to suit user's needs is granted to the consumers since the user does not use the software as it is.

The benefits that users are likely to derive from this include: increased quality, greater stability, reduced costs, reliability and rapid fixes to bugs and problems. Compared to proprietary softwares, whose source code is locked to the manufacturer, most learning institutions are likely to benefit more from Open Source Softwares. Examples of most popular Open Source Softwares include: Linux, Apache, Mozilla and OpenOffice. These programmes offer different kinds of freedom to users. This freedom include: the freedom to run the programme, for any purpose, the freedom to study how the program works, and adapt it to ones needs, the freedom to redistribute copies, the freedom to improve the programme, and release the improvements to the public, so that the whole community benefits(Azeta et al., 2008). Various studies have been conducted on the role of Open Source Softwares in E-learning. For instance, a study on open source e-Learning platforms with the aim of finding the platform most suitable for extending to an adaptive one was presented in (Nedyalkova, Nedyalkov, & Bakardjieva, 2013). The result of evaluation showed that the platform Moodle outperforms all other open source e-Learning platforms such as Dokeos, Moodle, ILIAS, EFRONT, and Claroline in learning institutions. Many universities have deployed e-learning systems where E-learning based and non E-learning-based educational environments coexist. Research in this area has mainly focussed on the technologies such as Web 2.0 and Free Open Source Softwares. The actual adoption, deployment and inclusions of such technologies in Institutions of Higher Learning remain undetermined. In Kenya, there is limited knowledge in actual deployment and adoption of E-learning technologies use such as Web 2.0 and Open Source softwares. This study sought to determine the application of Web 2.0 and Open Source Softwares in E-learning with specific reference to actual adoption, deployment and inclusion. The specific objective of this study was twofold. One, the study intended to determine the actual deployment and adoption of Web 2.0 technologies in E-learning in Higher learning institutions in Kenya. Two, the study intended to determine the actual deployment and adoption of Open Source Softwares technologies in E-learning in Higher learning institutions in Kenya. To achieve these objectives, Mount Kenya University was used as locale. The study used students in this institution to collect data about the adoption of Web 2.0 and Open Source Softwares in E-learning.

The rest of the paper is organized into three parts. First, a literature review related to Web 2.0 technologies and Open Source Softwares is presented. Next, Research Methodology is presented and Research findings from the survey. Conclusion is then made regarding the findings.

2. Literature Review

2.1 Theoretical Framework

The theoretical framework adopted in this study is Diffusion of Innovations Theory. Diffusion of Innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures (Rodger, 1995). This theory has been selected because the study is interested in finding out the actual deployment and adoption of Web 2.0 technologies and Open Source Softwares in E-learning in a local Private University in Kenya. According to Rogers, Innovation attributes supporting diffusion are: Relative advantage, compatibility, complexity, observability and trialibility. In this study, adoption characteristics such as Relative advantage, compatibility, complexity and trialibility for innovation will be chosen based on the level of IT familiarity and Proficiency by the students. Based on this theory, the following conceptual framework was derived.
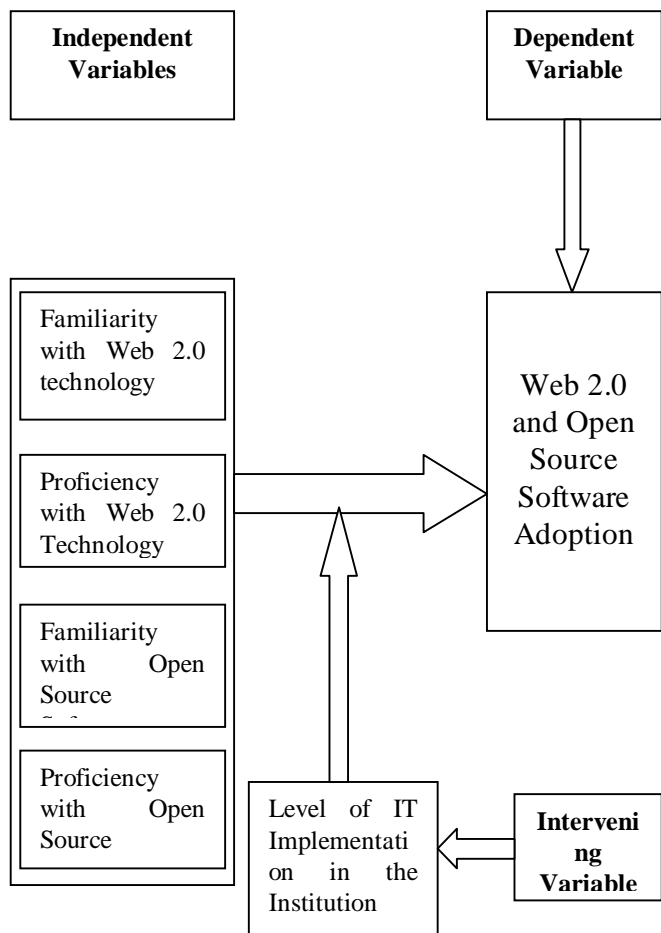
2.2 Conceptual Framework

Figure 1: Conceptual Framework
Source: Researchers own

2.3 Review of Related Literature

2.3.1 Web 2.0 Technologies

According to O'reilly(2005), Web 2.0 technologies refers to technologies for advanced Internet technology and applications including blogs, wikis, RSS and social bookmarking. The use of these technologies has revolutionized learning. This radical approach in E-learning has significantly increased the quantity of information and allowed a certain organization of users in the form of communities participating in the production, communication, sharing and diffusion of content. For instance, E-learning has evolved through a series of overlapping stages. Stage 1 consisted of communication and course management tools, from web page to, course management systems, PowerPoint, email, bulletin boards, and chat rooms. These tools are synonymous with Web

1.0 technologies. Web 2.0 technologies that have made E-learning possible includes: wikis, blogs, podcasts, Really Simple Syndication (RSS 2.0) and tagging (Safran et al., 2012). Web 2.0 technologies emphasize active learning, collaboration, and enhanced interaction through use of Wikis, blogs, podcasts, tags, and social networking. These technologies are explained in detail in the text that follows:

Wikis
A wikis may be defined as web site developed collaboratively by a community of users, allowing any user to add and edit content (Downes, 2005). An example of a Wikis is Wikipedia. The encyclopaedia project of Wikipedia is the most famous wiki on the public web. Wikis can serve many different purposes both public and private, including knowledge management, note taking, community websites and intranets.

Blogs
A blog refers to a website on which an individual or group of users record opinions, information, etc. on a regular basis (O'reilly, 2005). The use of blogs may fast track the dissemination of information on the internet.

Podcasts and Video casts
(Sbihi & Kadiri, 2010) defines a podcast as learning by listening to the audio files that are disseminated on the internet. This may also include video files. These files can be accessed easily on you tube.

Tagging
Tagging may be used to improve and personalize the research by attaching special links to files, videos on the internet (Downes, 2005). According to O'reilly(2005), content tagging has become more and more common due to social networking, photography sharing and bookmarking

RSS
RSS (most commonly expanded as Really Simple Syndication) is a family of web feed formats used to publish frequently updated works (Boulos, Maramba, & Wheeler, 2006). The RSS are regular informational monitoring in research in institutions of higher learning.

2.3.2 Open Source Softwares
Open Source Software as software that is made available along with source code at no cost. The freedom to use, study, redistribute and modify the software to suit user's needs is granted to the consumers since the user does not use the software as it is. The benefits that users are likely to derive from this include: increased quality, greater

stability, reduced costs, reliability and rapid fixes to bugs and problems. Compared to proprietary softwares, whose source code is locked to the manufacturer, most learning institutions are likely to benefit more from Open Source Softwares. Examples of most popular Open Source Softwares include: Linux, Apache, Mozilla and OpenOffice. These programmes offer different kinds of freedom to users. This freedom include: the freedom to run the programme, for any purpose, the freedom to study how the program works, and adapt it to ones needs, the freedom to redistribute copies, the freedom to improve the programme, and release the improvements to the public, so that the whole community benefits(Azeta et al., 2008). Various studies have been conducted on the role of Open Source Softwares in E-learning. For instance, a study on open source e-Learning platforms with the aim of finding the platform most suitable for extending to an adaptive one was presented in (Nedyalkova, Nedyalkov, & Bakardjieva, 2013). The result of evaluation showed that the platform Moodle outperforms all other open source e-Learning platforms such as Dokeos, Moodle, ILIAS, EFRONT, and Claroline in learning institutions.

Dokeos

Dokeos is an open source corporate learning suite with four components: AUTHOR to build E-learning content, LMS to handle interaction with learners, SHOP to sell a course catalogue, and EVALUATE for assessment and certification.

Moodle

Moodle is one of the most popular open source e-learning systems. It is built with PHP and uses MySQL or PostgreSQL to store data. It has a powerful course management feature that covers creating lessons, assignments, quizzes, documents & more. There are various modules that help students & teachers to interact with each other like chat, forum, survey or workshop. It is used in 1000s of websites, has a detailed documentation and a wide community.

Figure 1: Moodle Software

ILIAS

ILIAS is a powerful web-based learning application where every user has a comprehensive personal desktop to use the system, keep notes and bookmarks. It offers a cooperative learning environment where user can create working groups, or groups of certain interests. It has a flexible test system where time based tests can be created with multiple choice, single choice, allocation questions, cloze questions (free text, select box), ordering, matching, hot spot and more question types.
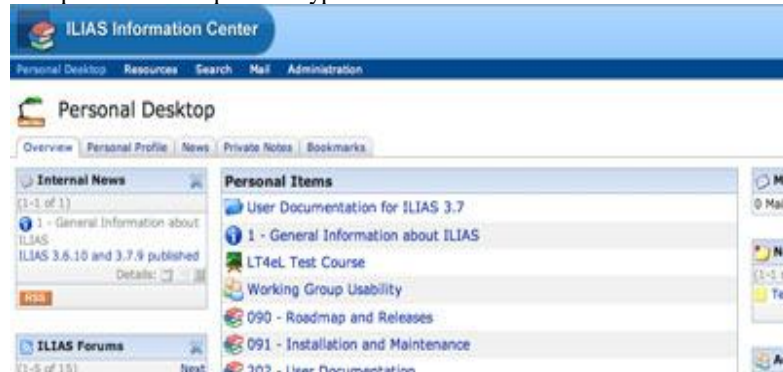

Figure 2: ILIAS Software

EFRONT

EFront is complete E-learning software with a good looking Ajaxed interface. It enables administrators to **create & manage lessons** easily with various tools like:

- Content editors (has a flexible visual content editor and support for pictures, sound, video, flash or java)
- File manager & digital library (for file sharing)
- Test builders
- Ability to assign projects
- Creating surveys and more.

Claroline

Claroline is an open source e-learning and e-working platform that allows teachers to create effective online courses and to manage learning and collaborative activities on the web. It has a wide user community & already translated to 35 languages.
You can create online exercises & track the result of them, define a learning path where students can follow one-by-one, add group works, assignments & more..
It is possible to interact with users via chat or forums.

Figure 3: Claroline Software

3. Methodology

The study used a quantitative descriptive survey design. Data was collected from 4 categories of students using structured questionnaire. The first set of students pursued Certificate Courses; the second set of student pursued Diploma Course, the third category pursued Degree Courses and fourth category pursued Masters Courses. A sampling size of 120 students was selected from a target population of 700 students pursuing their courses on regular day mode at Mount Kenya University, Kitale Campus. The table below illustrates the distribution of sampling frame.

Table 1: Sampling Criteria

Category of student	Number of Students
Certificate	30
Diploma	30
Degree	30
Masters	30
Total	120

Source: Own

The following variables were identified.
a) Familiarity with Web 2.0 technologies
b) Proficiency with Web 2.0 technologies
c) Familiarity with Open Source Softwares
d) Proficiency with Open Source Softwares

This study employed both descriptive and inferential statistics to analyse the data. Descriptive statistics used included use of histograms, frequency tables and pie charts to represent data. This was mainly used to determine the actual number of sampled respondents that have actually deployed and adopted Web 2.0 technologies and Open Source Softwares in E-learning. On the other hand, inferential statistics was used to verify a number of hypotheses concerning the correlations of some of the survey's variables as indicated in the table below:

Table 2: Hypothesis

H1	Students pursuing Certificate Courses are familiar with Web 2.0 technologies
H2	Students pursuing Certificate Courses are can develop applications using web 2.0 technologies
H3	Students pursuing Diploma Courses are familiar with Web 2.0 technologies
H4	Students pursuing Diploma Courses are can develop applications using web 2.0 technologies
H5	Students pursuing Degree Courses are familiar with Web 2.0 technologies
H6	Students pursuing Degree Courses are can develop applications using web 2.0 technologies
H7	Students pursuing Masters Degree Courses are familiar with Web 2.0 technologies
H8	Students pursuing Masters Degree Courses can develop applications using web 2.0 technologies

All data was analysed at level significance of 95% or α =0.05 and the degrees of freedom depending on the particular case as was determined.

4. Research Findings

This study sought to determine the actual deployment and adoption of Web 2.0 technologies in E-learning in Higher learning institutions in Kenya. The study also sought to determine the actual deployment and adoption of Open Source Softwares technologies in E-learning in Higher learning institutions in Kenya. The table below shows the descriptive statistics

Table 3: Descriptive Statistics

Variable	Yes (%)	No (%)	Somehow (%)
Familiarity with Wikis	46.3	40.5	12.4
Familiarity with Blogs	23.1	59.5	16.5
Familiarity with Podcasts and Video casts	32.2	57	9.9
Familiarity with Tagging	33.9	63.6	1.7
Familiarity with RSS	32.2	67.8	0.0
Proficiency with Wikis	28.1	66.1	5.0
Proficiency with Blogs	63.6	33.9	1.7
Proficiency with Podcasts and Video casts	24.2	75.8	0.0
Proficiency with Tagging	18.2	81	0.8
Proficiency with RSS	22.3	71.9	5.0
Familiarity with Dokeos	42.1	54.5	2.5
Familiarity with Moodle	9.9	87.6	1.7
Familiarity with ILIAS	0.8	99.2	0.0
Familiarity with EFRONT	0.8	99.2	0.0
Familiarity with	0.8	99.2	0.0

Claroline

The graph below displays the summaries depicted in the above table
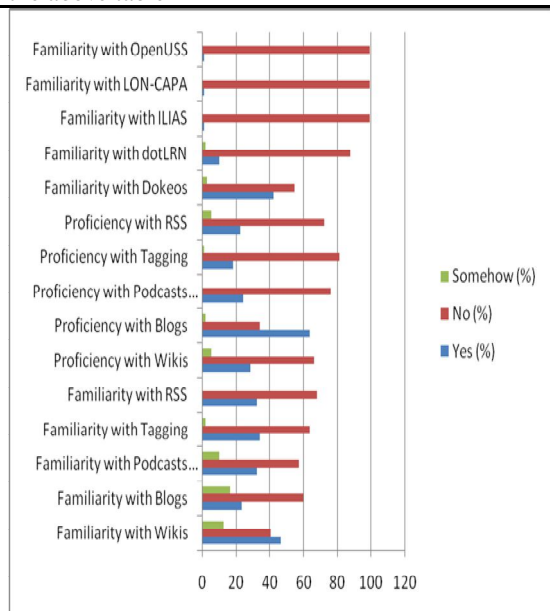
From the results, the following can be concluded:

- Wikis is the most popular technology deployed and adopted by students at Mount Kenya University. 46.3% of the respondents agreed that they were aware and were using Wikis as a technology to support E-learning.
- Blogs is the least deployed and adopted Web 2.0 technology in E-learning at Mount Kenya University. Only 23.1% of the respondents agreed to have adopted Blogs as a technology in E-learning.
- Dokeos is the most popular technology deployed and adopted by students at Mount Kenya University. 42.1% of the respondents agreed that they were aware and were using Dokeos as a technology of E-learning.
- Blogs is the most popular technology that can easily be applied in developing applications. This is shown by 63.6% of the respondents that agreed to be proficient in the use of Blogs.
- Tagging is the least Web 2.0 technology in E-learning at Mount Kenya University that students agreed to be proficient in. Only 18.2% of the respondents agreed to be proficient with tagging as technology that supports E-learning.
- Majority of the students that had adopted Wikis as a technology of E-learning were enrolled to pursue Information Technology related courses. 71.2% of the respondents in Information Technology related courses had adopted Wikis as a technology of E-learning.
- Majority of students pursuing Certificate courses had the least adoption percentages of the Web 2.0 and Open Source Softwares in E-learning.
- Open Source Softwares were the least deployed and adopted technologies in E-learning at Mount Kenya University. ILIAS, EFRONT and Claroline softwares had 100% No response implying that respondents were unaware of existence of these softwares in E-learning.

The study also found out the following

a) Majority of students pursuing Certificate Courses at Mount Kenya University were not familiar with Web 2.0 technologies
b) Majority of students pursuing Certificate Courses at Mount Kenya University cannot develop applications using web 2.0 technologies
c) Majority of students pursuing Diploma Courses at Mount Kenya University were not familiar with Web 2.0 technologies
d) Majority of students pursuing Diploma Courses at Mount Kenya University cannot develop applications using web 2.0 technologies
e) Majority of students pursuing Degree Courses at Mount Kenya University were familiar with Web 2.0 technologies
f) Majority of students pursuing Degree Courses at Mount Kenya University cannot develop applications using web 2.0 technologies
g) Majority of students pursuing Masters Degree Courses at Mount Kenya University were familiar with Web 2.0 technologies
h) Majority of students pursuing Masters Degree Courses at Mount Kenya University cannot develop applications using web 2.0 technologies

5.0 Conclusions and Future Work

This study sought to determine the actual adoption, deployment of Web 2.0 technologies and Open Source Softwares in Higher Institutions of learning in Kenya. This study has found out that there is low adoption and deployment of these technologies in Kenya. From the findings, it was found that Open Source Softwares were the least deployed and adopted technologies in E-learning at Mount Kenya University. ILIAS, EFRONT and Claroline softwares had 100% No response implying that respondents were unaware of existence of these softwares in E-learning. Despite the increased quality, greater stability, reduced costs, reliability and rapid fixes to bugs and problems that these softwares provide, deployment

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and adoption in E-learning in higher institutions remains a mirage. Policy makers of E-learning in these institutions need to carry out sensitization in this area to encourage more students to adopt these technologies in E-learning. This study focussed on determination the actual adoption, deployment of Web 2.0 technologies and Open Source Softwares in Higher Institutions of learning in Kenya. This study has found out that there is low adoption and deployment of these technologies in Kenya. Further studies should be conducted to determine the challenges faced by students in deployment and adoption of Web 2.0 technologies and Open Source Softwares in support of E-learning in Kenya.

Acknowledgement

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