

Towards a Conceptual Framework for the Implementation, Integration and Content Integrity of Web 2.0 Technologies in Higher Educational Institutions

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Abstract: The need to implement and adopt web 2.0 technologies into teaching and learning is glaring for higher educational institutions. This is because there are increase numbers of students' vis-à-vis teaching staff, competition for resources, over-crowded classroom, the need for efficient teaching and learning, as well as the need to learn anytime and anywhere. However, it's of no doubt that every technology comes with its menace that users need to be aware of and acquainted with. This call for adequate and efficient security measures, ethical use of web 2.0 tools, as well as ensuring content integrity. This paper is a review of existing literatures on frameworks for e-learning implementation, integration and ensuring content integrity. It also presents the results of a survey of web 2.0 technologies perceived benefits, weaknesses and challenges in teaching and learning within higher educational institutions using Universiti Teknologi PETRONAS (UTP) as a case study.

Key words: Implementation, Integration, E-learning 2.0, Web 2.0, Conceptual Frameworks, Content integrity.

INTRODUCTION

E-learning has evolved from course ware or online education (transfer of knowledge) and e-training or online training (development of skills) with relatively static content to a more interactive, collaborative with web 2.0 services. E-learning is defined as the Internet enabled learning that incorporate multimedia technologies to support teaching and learning. According to the Commission of European Community it is "the use of new multimedia technologies and Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (Ebner, 2007). An e-learning system can serve as a tool and or simulation system (Mayes & De Freitas, 2006) depending on the purpose of the system.

The term web 2.0 originated from Darcy DiNucci in 1999 and then popularized by Tim O'Reilly Media in 2004 (Wikipedia, 2013). Since it has no single definition, it is defined to include several characteristics such as dynamic website with user interaction, participation, collaboration, that allow users to generate, create and or share content with people in their network. Other connotations include the read-write web and social web (Conole & Alevizou, 2010). Thus, it can be described as the participatory web that envisages users as readers, writers, editors, and participators in web content creation.

The rapid development of interest in the use of web 2.0 tools in both academic and non-academic spheres calls for efficient planning for the implementation and integration of these valuable technologies into higher educational institutions (HEIs) for effective, efficient and ethical use of such technologies. Likewise, ensuring the integrity of its content will add value to teaching, learning and research. It will also motivate users and ensure trust in the use of the system.

The integration of web 2.0 technologies such as twitter, wikis, blogs, Google docs, instant messaging, Skype, Facebook, MySpace, Flickr, YouTube into teaching and learning is termed e-learning 2.0 or education 2.0, a concept first coined by Stephen Downes. In addition to its emphasis on social learning, e-learning 2.0 give users the ability to create content, collaborate, interact, and participate or engage in social activities (Banday, 2012; BARBARA & DONNA, 2009; Ossiannilsson & Landgren, 2011). It is envisaged by the supporters of e-learning 2.0 that knowledge is socially constructed through collaborative communication and interactions by concerned participants. Thus, the stakeholders in learning (learner, educator, and administrator) don't have to be present at the same place and at the same time for teaching and learning to take place (Gallula & Frank, 2009). It makes resources available to users and transforms the roles of both the learners and educators. E-learning 2.0 is supported by constructivism, socio-constructivism and connectivism theories which emphasize that knowledge should be collaboratively constructed by network of community of learners, but not by passively absorbing knowledge without participation.

On the other hand, the evolution of e-learning 2.0 and web 2.0 technologies have also raised several issues of ethics, privacy, security, ambiguity, and intellectual property violations (Banday, 2012). Also, the increase workload on professors; plagiarism practices; poor attitude of learners, educators, national government, employers and parents (Usoro & Abid, 2008); as well as inadequate training of lecturers on the use of web 2.0

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technologies (Nawaz, 2011) have been identified as some of the barriers to their adoption and use for teaching.

In line with the above, a wide range of frameworks, models and strategies have been proposed and developed for the implementation, integration and ensuring content integrity of e-learning systems during the past years. These include Conceptual Framework by Ossiannilsson and Landgren; Adaptive Learning Framework (ALEF) by Marián *et al*; Conceptual E-Learning Framework (CELF) by Fletcher and Isenberg; Community of Inquiry Model by Garrison, Archer and Anderson; and E-quality framework by Masoumi and Lindström. These frameworks are intricately connected to the creation of knowledge based environment for learners and ensuring trust and safe use of e-learning system.

Therefore, the aims of this research are to assess the effectiveness of implementing web 2.0 technologies, to investigate literature on the extent to which web 2.0 technologies are adopted to support teaching and learning, to make a comparative analysis of existing frameworks and to conduct and present a survey of web 2.0 technologies perceived benefits, weaknesses and challenges in teaching and learning within higher educational institutions using Universiti Teknologi PETRONAS (UTP) as a case studies.

The paper is divided into five sub sections. The next section presents the literature review of our investigation of e-learning frameworks and concepts. We then present our research methodology. This is followed by the presentation of survey analysis and finally we present the conclusion and future work for this research.

Related Works:

Web 2.0 technologies are valuable tools when incorporated into teaching and learning and it's of no doubt higher educational institutions should embrace it. The technology will help increase students participation in learning; allow self-organize learning, discussions, group work, content creation, editing and sharing. Web 2.0 allows user to collaborate, create everlasting social relations among learners and between educators and learners. Web 2.0 can be efficient and responsive channel for supporting and engaging with students. They can be used to enhance traditional in-class learning, support distance learning, used for official correspondence, assignment submission, or urgent queries and feedbacks.

In addition, web 2.0 tools have dramatically improved communication among professionals in education from "unidirectional to multidirectional" (Rodriguez, 2011). It supports group works and also provides opportunities to support students in their independent researches (Moran, Seaman, & Tinti-Kane, 2011; Thackeray, Neiger, Hanson, & McKenzie, 2008). Furthermore, Web 2.0 enhances the learners to develop confidence and prepare them for future technology. Web 2.0 has the benefits of reducing teachers-students ratio, solve the overcrowding problem, and increase the rate of admission intakes, (Adanu *et al.*, 2011). It offers an assortment of tools that learners can mix and match to meet their individual learning style and get support from other participants (Rodriguez, 2011).

Some students also feel more relaxed to express themselves fully and confidently in online contexts; for these students, Web 2.0 provides them the opportunity to express themselves freely. For others, Web 2.0 is simply a means to avoid isolation. The participation of teaching and supporting staff in these spaces provides the opportunity to build richer relationships with learners, and to notice concerns, issues, or misunderstandings. These issues may not be easily or comfortably articulated in other teaching spaces, such as a more formal classroom or e-learning space.

According to Rasli *et al.*, the adoption and use of Web 2.0 in education will lead to skills like "effective problem solving, communication, collaboration, information literacy, critical thinking, independent or lifelong learning, and creative innovation" (Rasli, Ahmad, & Churchill, 2010).

Finally, according to Conole and Alevizoun, web 2.0 transforms formal education and revolutionizes both informal and non-formal learning. It enables learners to become more active co-producers, co-authors, co-evaluators and co-commentators of learning contents (Conole & Alevizou, 2010). Such a distributed research environment will help generate more resources and ideas than a single researcher.

Despite the above benefits of web 2.0 technologies use in education, their implementations are often faced with challenges. (Gold, 2001) investigated existing literatures and came out with a conceptual framework of four challenges; (i) individual challenges related to students and lecturers (lack of motivation, conflicting priorities, financial difficulties, lack of academic and technological confidence and lack of social support); (ii) courses challenges (content, design and delivery of courses); (iii) technology challenges (infrastructure, costs, usability and appropriateness of technology); and (iv) context challenges (organizational, societal, culture, traditions, rules and regulations). (Gold, 2001) also belief that factors such as high cost of implementation, absence of infrastructure, insufficient quality curriculum as well as poor professional training are some of the reasons for e-learning failure.

According to (Usoro & Abid, 2008) lecturers in online environment are associated with the challenges of lack of strategic vision and planning, lack of support for pedagogy development, lack of motivation and commitment, and increase workload.

Minocha emphasize on the issues of privacy, unequal participation, distrust in peer feedback and issues of ownership. She concluded that the “use of Web 2.0 technologies needs thoughtful integration and alignment with both learning outcomes and assessment strategies” (Minocha, 2009).

Other factors include resistance to change and innovation, negative attitudes and fear of openness, lack of interest, teaching staff have not integrated these tools into their teaching, population digital literacy skills, Also the nature and scale of national strategies regarding investments in infrastructure, the use of technology and the promotion of e-learning in the education is recognized as an important driver. Institutional structures and legacy systems serves as a barrier to uptake of web 2.0 technologies on their networked systems.

The above advantages and challenges of web 2.0 tools provide useful steps for this research to focus on to achieve the maximum benefits.

Review of E-learning Models and Frameworks:

Models and frameworks are structural set of activities to guide research process. According to Angela Cooper Brathwaite, it is important to “evaluate different theories or frameworks available within a topical area of interest before selecting one” (Brathwaite, 2003). Thus, the essence of this section of research which we have divided into two sections is to investigate existing frameworks on the topic.

1. Frameworks for Implementation and Integration of Web 2.0 Technologies into Teaching and Learning:

Garrison, Archer and Anderson’s Community of Inquiry Model demonstrated that any online educational experience must consider three main elements – social presence, cognitive presence and teaching presence. These envisage that content without context will not result in quality learning and that the interactions and participation of all stakeholders (educators, learners, and content) in education are very much important in successful online education and achievement of critical thinking (Garrison *et al* 2000). This model was revised in 2010 by Shea and Bidjerano to include learner presence since by directing teaching activities on learners development will have significant effects on cognition – those learners’ behaviors such as students’ collaboration, discussions and negotiations, self- negotiation, self-reflection and self-monitoring must be promoted.

Social presence implies learners’ ability to present and reveal their real identity to community of inquiry, interact and collaborate in a trusted online or computer mediated communication environment (CMC) and develop interpersonal relationships. Cognitive presence is the ability of learners to construct and confirm meaning through reflection and discourse. Teaching presence is the design, facilitation and direction of both cognitive and social presences to support learning.

McLoughlin and Lee emphasized the incorporation of the three Ps: Personalization (the individual motives and motivation), Participation (the individual’s participation in the learning process), and Productivity (the individual as a co-producer in the e-learning process) in any successful e-learning design (McLoughlin & Lee, 2008). According to Awidi, good policies are the fundamental factors to the successful implementation of e-learning systems in higher educational institutions (Awidi, 2008).

Furthermore, (Masoumi & Lindström, 2011) as well as (Gunga & Ricketts, 2007) advocated for the incorporation into the elearning framework factors such as socio-cultural reasons, national and regional ICT infrastructures, policies, students workload as well as their attitudes toward e-Learning. The framework was to help achieve quality enhancement and assurance.

Also, in their conceptual framework for e-Learning, (Ossiannilsson & Landgren, 2011) emphasized the incorporation of accessibility, flexibility, interactive, personalization, and productivity in e-learning application for easy use by stakeholders.

To achieve quality learning and successful integration of Web 2.0 the following factors have to be taken into consideration (Conole & Alevizou, 2010):

- Both instructors and students must support student-centered educational approach.
- A pedagogical approach must allow students to contribute to knowledge creation.
- The approach must be well structured and understood by both instructors and students. The students must not be confused as to what is expected of them, and to what standard.
- The processes and students output must be assessed as part of overall course assessment practices. (Conole & Alevizou, 2010)

Finally, (Dadzie, 2009) suggested the provision of infrastructure, technology and training by the university administrators to increase the rate of adoption of e-learning within the community. He further suggested the integration of e-library services within the e-learning platform and efficient management of the system.

2. Frameworks for Ensuring Content Integrity of e-learning 2.0 Systems?

It’s of no doubt that the reliability of e-learning system will result in users having trust, confidence and loyalty in the system. Thus, any form of vulnerability need to be taken into consideration. By content integrity it means ensuring that the receiving content or data is in its original form and has not been modified by updating,

addition and deletion of any sort when it's been transferred. It includes the validity and security of data. This call for some level of controls, encryption, keeping log of users' activities, proper monitory of privacy, security and plagiarism check to be well implemented.

According to (Aljawarneh, Laing, & Vickers, 2007) web contents can be tempered with on the static or dynamic servers by changing the style class; referenced object such as audio, video and images; Source code; and by running malicious code. These suggest that, it's important to secure and protect the client, the server and communication channel. Their web security framework architecture is belief to provide reliable services to users.

Singh *et al* on the other hand proposed HTTPi protocol since it provides authentication by signing content hashes, it specifies the requirements for pages using HSTS in advance, and evaluate integrity (Singh, Wang, Moshchuk, Jackson, & Lee, 2012).

Zuev also argue that securing an e-learning system can be achieved using the following four ways; by ensuring privacy of data, integrity of assets, availability, and providing regular work of application according to the algorithm laid down (Zuev, 2012).

The above review of benefits and challenges of web 2.0 technologies use in teaching and learning, as well as frameworks and models will give the basic ideas for developing a useful framework for implementing, integrating and ensuring content integrity of web 2.0 use in education.

Methodology:

After a systematic search and review of literature from well-recognized articles, journals, and official websites, a questionnaire instrument was designed consisting of 24 questions. A copy of the questionnaire was distributed to each of 150 undergraduate students of various faculties and departments in UTP using stratified and random sampling techniques. 102 sets of responses were returned of which 87 sets contained valid and usable responses. The questionnaire was used to explore students' perceptions, challenges and prospects of web 2.0 technologies use in teaching and learning. The results of the analysed data are presented below.

RESULTS AND DISCUSSIONS

Tables 1 and II illustrate respondents to our survey by gender and by departments. Out of the overall number of 87 respondents, 23 (26.4%) were female and 64 (73.6%) were male. Respondents however belong to different departments as indicated in table 2.

Table I: Gender of Respondents.

Gender	Frequency	Percent (%)
Female	23	26.4
Male	64	73.6
Total	87	100.0

Table II: Department that Respondent Belong.

Department	Frequency	Percent (%)
Civil engineering	7	8.0
Computer Information	22	25.3
Electrical engineering	7	8.0
Mechanical engineering	23	26.4
Petroleum engineering	28	32.2
Total	87	100.0

Figure 1 and table III shows learners perceptions about challenges of using web 2.0 in teaching and learning. Most of the respondents 44 (50.6%) mentioned privacy issues as their prevalent problem, this is followed by the issues of unreliable information 11 (12.6%), distractions 8 (9.2%), low internet connection 7 (8.0%), and time consuming 6 (6.9%). Other problems include security issues, plagiarism, viruses, miss communication, and less human contact.

Figure 2 on the other hand demonstrate students' perception about the benefits of web 2.0 use in teaching, learning and research. 50 out of 87 valid respondents believe web 2.0 tools could make it easy to find information to support teaching, learning and research. Other significant benefits mentioned include support for learning, to help collaboration with colleagues and instructors, save time, and making resources available anywhere and any time.

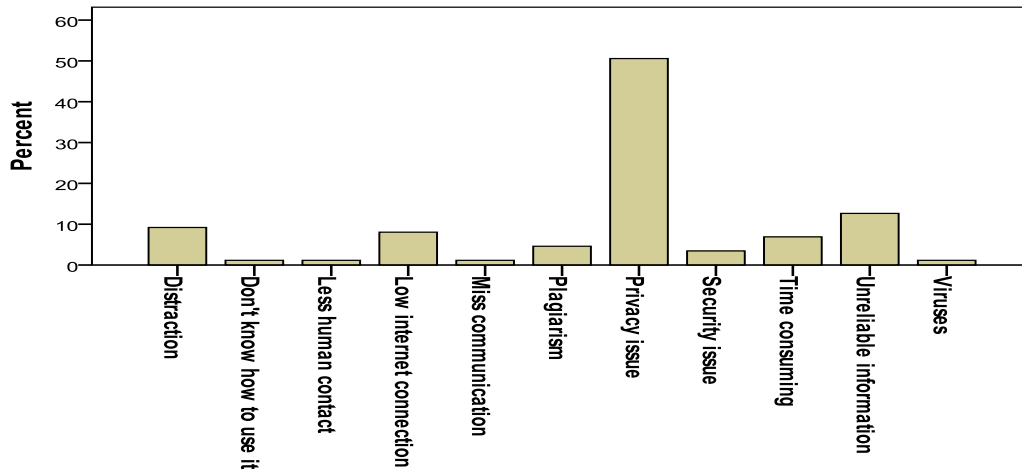


Fig. 1: Students Perception about Weaknesses in Using Social Media.

Table III: Challenges of Web 2.0 Technology in Education.

Weaknesses of SMT	Frequency	Percent (%)
Distraction	8	9.2
Don't know how to use it	1	1.1
Less human contact	1	1.1
Low internet connection	7	8.0
Miss communication	1	1.1
Plagiarism	4	4.6
Privacy issue	44	50.6
Security issue	3	3.4
Time consuming	6	6.9
Unreliable information	11	12.6
Viruses	1	1.1
Total	87	100.0

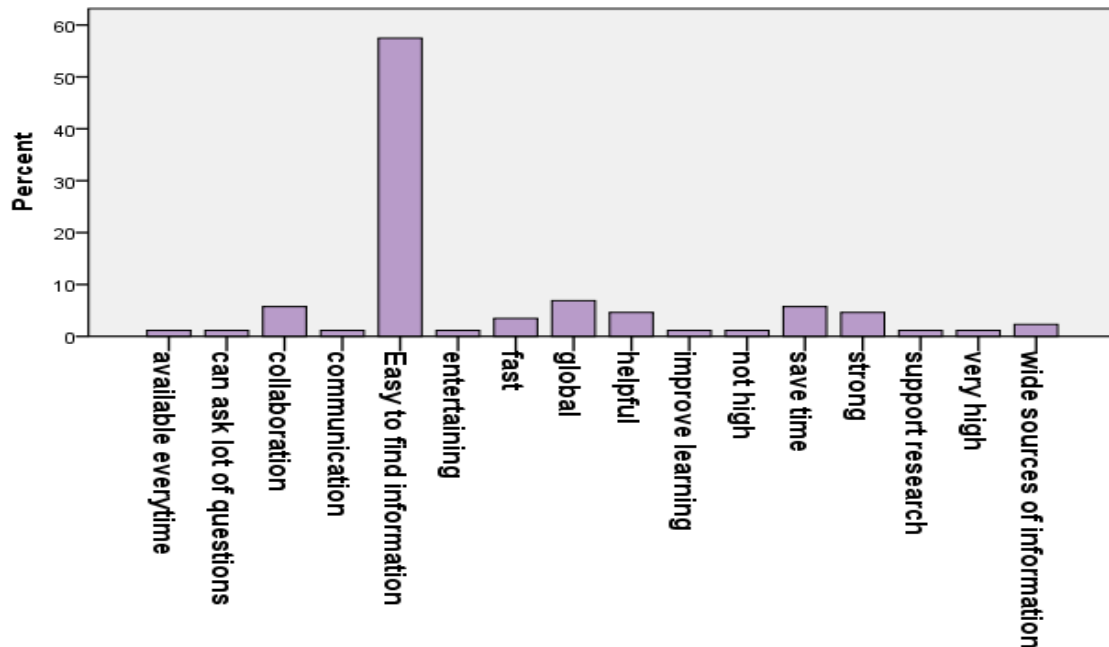


Fig. 2: Students Perception about benefits of Social Media.

The above analyzed results together with findings from literature review were then used to draw our conclusions and future directions of this research.

Conclusions and Future Work:

Researches have revealed that higher educational institutions have not caught up with the trends in web 2.0 systems because there are always challenges to the introduction of web 2.0 technologies in universities

curricula. In addition, the lack of institutional policies and inadequate knowledge and skills on web 2.0 technologies have contributed to lack of clear framework on the effective use of these technologies pedagogically or for support (Kelly, 2008). Furthermore, the evolution of web 2.0 technologies have also raised several issues of ethics, privacy, security, ambiguity, intellectual property violation, plagiarism practices by students, poor attitude of learners and educators, inadequate as well as the inability of users to access new technologies have been identified as some of the barriers to web 2.0 adoption and use.

More importantly, findings from literature reviewed and survey conducted have revealed that relationship between the use of web 2.0 technologies and current teaching cultures remains unbalanced. These mean that the use of web 2.0 technologies needs to be carefully integrated into the existing curricular practices for easy adoption and use. It is also important to identify and understand the barriers to broader uptake so that effective strategies can be devised to overcome them and this is what the current research is about.

The current research investigated existing frameworks and models to identify key elements for implementation, integration, and ensuring content integrity. This research also presented survey results. Both finding from literature and survey as presented above will serve as the basis of our future direction in the formulation of conceptual framework. Our future research will therefore establish a comprehensive framework for implementing, integrating, and ensuring content integrity of web 2.0 technologies into higher educational curricula with more emphasis on integrity, security and users liabilities.

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