

Web 2.0 and Online Learning and Teaching: A Preliminary Benchmarking Study

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Abstract

The context of online learning has been transformed by the advent of Web 2.0. While universities have just recently started to use Web 2.0 applications, these applications already exist in the students' personal and educational world. Yet it is still not clear in what ways universities may be able to incorporate Web 2.0 applications in learning and teaching practices. This paper gives an overview of Web 2.0 applications for universities and discusses new opportunities that Web 2.0 has brought for universities. Examples of how some universities have used these applications are then outlined and categorized. The paper also discusses some of the main issues with Web 2.0 applications and provides recommendations for resolving these issues.

Keywords: Web 2.0, Online learning, Benchmarking

1. Introduction

Web 2.0 is the term for applications such as Wikis, Blogs, and social networks where users can write as well as read on the Web (Turban & Volonino, 2010). It facilitates collaboration and involvement practices by allowing users to contribute to the online content (Greenhow, 2009). In comparison to Web 1.0, the content of Web 2.0 can be more easily generated and published. The emphasis in Web 2.0 is more on content creation in collaboration with a large number of users rather than just content consumption in Web 1.0 (Boulos & Wheeler, 2009).

The context of learning, and especially online learning, has been transformed by the advent of Web 2.0 (Greenhow, 2009). Recently Web 2.0 applications have been adopted and used by many universities and educational providers. Important features of Web 2.0 applications are their ease of use and free or low-cost hosting and service options (Boulos et al., 2006). Web 2.0 applications encourage greater participation and interaction between learners and teachers, which helps with building communities of learning, supports better feedback provisions, and facilitates more active learning engagement (Selwyn, 2007; Boulos & Wheeler, 2007).

Despite several advantages of Web 2.0 applications, there are some limitations that need to be dealt with. For example, maintaining the quality of the content still is a main concern for Web 2.0 users and moderators (Boulos et al., 2006). Due to the freeform nature of Web 2.0, there is a lack of control over the content which impacts the quality and reliability of the produced material. However, most good Web 2.0 websites use some sort of content moderation and rollback functions to assure the quality of the content and to avoid misuse of copyrighted material.

While educational providers have just recently started to use Web 2.0 applications, these applications already exist in the students' personal and educational world. Most undergraduate students have grown up with a range of Web 2.0 applications and are already using podcasts or social networking applications, leaving the lecturers and universities still wondering how to adopt these applications (Barnes & Tynan, 2007). The concept of a university, therefore, needs to be rethought toward the goal of a University 2.0 to avoid this gap between students and universities grow wider.

This paper investigates the growing use of Web 2.0 applications by university students and it emphasizes the move toward the concept of University 2.0, as well as the necessity for universities and lecturers to adapt their

teaching methods and technologies to these applications. The current study reviews available Web 2.0 applications and demonstrates examples of how some universities have incorporated such applications in their teaching and communication with students. The paper then discusses the issues that universities need to consider when they plan to adopt and use Web 2.0 applications, and it provides some general recommendations to address these issues.

2. University 2.0

University 2.0 is not simply a technical evolution; it is more importantly a new way of thinking. University 2.0 is universities adaptation to the Web 2.0 and social computing phenomena and is defined as “a research and entrepreneurial university which integrates Web 2.0 technologies and applications in all university activities, including ones with all knowledge intensive stakeholders” (Nikolov, 2009). Three advantages of incorporation of Web 2.0 into universities and problem-based learning are (Mejias, 2006):

- It fosters students’ engagement in learning by involving them in development of the social software and the learning content
- It enhances collaboration between students with several Web 2.0 tools which facilitate the generation and organization of knowledge.
- It helps students to learn to improve their skills in knowledge construction and dissemination and consequently enhance their practical research skills

University 2.0 places students and lecturers in more social and flexible learning processes, where collaboration is fostered and facilitated to a greater degree. The inclusion of Web 2.0 applications into university practice challenges learners and lecturers in different ways. Students should be supported and encouraged to shift away from passive learning approaches towards collaborative and interactive approaches in social contexts (Berlanga et al., 2010). Established Web 2.0 applications, such as social networking, file sharing, and mobile telephony are extensively used by a large majority of students (Kennedy et al., 2007). However other applications such as Blogs and Wikis that allow students to collaborate are less used and sometimes unknown to the majority of students. Lecturers, on the other side, have been criticized for a lack of adaptation to Web 2.0 applications into their teaching practices, and also for their lack of knowledge and abilities to bridge between students’ engagement with Web 2.0 uses outside of university and formal classroom-based teaching (Barnes and Tynan, 2007; Greenhow et al., 2009).

One way for universities and lecturers to more effectively incorporate Web 2.0 applications into university practices is to study the ways such applications are being used in other contexts and other universities. The next section reviews Web 2.0 application, followed by examples of how some universities have used these applications for teaching and learning practices.

3. Web 2.0 Applications

Web 2.0 applications can be categorized into five types (Boateng et al., 2010):

- Communicative: applications that are used to share ideas, information and creations. Examples are Social networks, Blogs, and Podcasts
- Collaborative publishing: for working with others in a shared working environment for a particular purpose. Examples are Wikis and Blogs
- Documentative (content management): applications which collect and/or present people’s experiences and thoughts. Examples are Blogs and Social Bookmarking
- Generative: applications to generate something new to be used by other users. Examples are Mashups and Media sharing
- Interactive: applications which facilitate information and resource exchange between users. Examples are Social bookmarking and RSS

Universities have generally adopted the above applications for their teaching and learning activities in two ways (Sclater, 2008). One way is to develop the client software, which may include one or more Web 2.0 applications and is tailored to the university and students’ needs. The software mediates between the student and the many resources and must be installed by the learners on their computers. Whereas the second way, which includes initiatives such as Elgg (<http://www.elgg.org>), does not require additional software and distributes learning resources by allowing students to access them via their web browsers. This way eliminates provision of e-learning facilities by the university for their students and instead free resources available on the internet will be

used. Yet one limitation of this approach is uncertainty about the robustness and scalability of the resources, especially when students are paying and expecting quality e-learning systems. The rest of this section briefly reviews Web 2.0 applications.

3.1 Social Networks

A social networking service is an online space or site where people make social relationships and share information and interests. Social networking websites allow users to build profiles, share and update personal information and locate links (Boulos & Wheeler, 2007). Social networking websites allow users to connect with friends or colleagues, recommend links, and use software applications. Examples of social networking service websites are www.Facebook.com, www.Linkedin.com, and www.Myspace.com.

3.2 Media sharing

Media sharing is another Web 2.0 application which allows users to upload, aggregate, host, and distribute online resources such as videos, audios, games, and text. Popular media sharing websites, such as www.YouTube.com and www.Digg.com, are user-friendly and allow users to comment on the uploaded material.

3.3 Social bookmarking

Social bookmarking is a service which lets people collect and tag web links in an online space (normally a website) and let other people freely read and use them (Boulos & Wheeler, 2007). Social bookmarking websites such as del.icio.us (<http://del.icio.us/>), [Furl](http://www.furl.net) (<http://www.furl.net>), and [CiteULike](http://www.citeulike.org) (<http://www.citeulike.org>) help users to easily share and distribute resources, and often they allow the users to rank the web links.

3.4 RSS feeds, Information aggregation, and mashups

RSS (Really Simple Syndication or Rich Site Summary) is used by news sites, Blogs, Wikis and other type of websites to inform their subscribers of recent additions or updates to the website (Boulos & Wheeler, 2007).

Web mashups are websites which mix data and services from various websites. Mashups work like DJs in music, where a DJ mixes and recombines a number of pieces of digital music and produces a new product out of this mixture (Floyd et al., 2007). [Google-Map data©](http://www.google.com/maps) is an example of a mashup website, where the website displays clickable markers to indicate locations and points of interests.

3.5 Wikis

Wiki allows the content to be edited by any of its members. It is a great tool for virtual collaboration in which people can share and obtaining information and knowledge (Boulos et al., 2006). In a learning context, Wikis enable learners to effectively and collaboratively participate in learning activities to construct knowledge or to become a member of a virtual community of practice.

3.6 Blogs

“Because Blogs engage people in knowledge sharing, reflection, and debate, they often attract a large and dedicated readership. They can also engender the drawing together of small virtual groupings of individuals interested in co-constructing knowledge around a common topic within a community of practice.” (Boulos et al., 2006).

Blogs are easy to create and are tools that allow people to create web diaries and easily manage content management (Boulos & Wheeler, 2007). They are often networked between several individuals interested in co-constructing knowledge. There are various free services like [LiveJournal](http://www.livejournal.com/) (<http://www.livejournal.com/>) and [Google Blogger](http://www.blogger.com/) (<http://www.blogger.com/>) for users to create a blog.

3.7 Podcast

Podcasting is about creating digital files (e.g. audio or video) for people who want to use them anytime, anywhere (Boulos et al., 2006). Podcasts can be downloaded and transferred to portable devices such as MP3/MP4 players or laptops for later use.

4. The Benchmark

The use of Web 2.0 applications in learning scenarios is still in its infancy and not many early adopters have so far extensively used Web 2.0 technology to improve learning and teaching practices (Ebner & Maurer, 2007). The objective of a benchmarking in this section is to review experiences of some of the universities with Web 2.0 applications and compare the type of tools they have used. Thus, the literature of electronic and online learning has reviewed. Amongst studies which used any type of Web 2.0 applications, those that have indicated objectives as well as name of the tool or platform they used have been considered for this benchmark study. While it was

found that universities may use Web 2.0 applications for instructional and/or non-instructional purposes, this section emphasized on only instructional uses of Web 2.0 applications by universities.

One example of non-instructional purposes is the use of Google mapping technology by Tufts University to create mashups to allow staff and students to explore the campus and services (Thompson, 2007). Marywood University, Purdue University, and Berkeley College also use Web 2.0 platforms to provide dining services, such as allowing students to check the day's menu and to send feedback to the dining director (Ibid). Stanford University uses Wikis with over 203 pages which are categorized in several groups, including eating, student events, and sports.

Table 1 shows examples of instructional uses of Web 2.0 applications by different universities. It presents which Web 2.0 applications and for what purposes is used. It also shows whether these applications have been developed by each university or accessed via popular Web 2.0 initiatives available on the Internet.

[Insert Table 1 Here]

Review of the literature indicated that universities are increasingly trying innovative ways to incorporate Web 2.0 application in their teaching and learning activities. Academics pilot test Web 2.0 technologies for delivering teaching materials and/or specific assignments to better understand the implications and capabilities of these technologies. Once they achieve improvements in a small pilot test, academics and universities have shown interest in further use of Web 2.0 technologies.

In addition, the findings in the above table show that Wikis and Blogs are amongst the most used applications by universities compared to other Web 2.0 applications. Wikis have been used to encourage collaboration and teamwork, and to share and exchange information and ideas. Programs such as MediaWiki.org, Wikia.com, and Wikispaces.com allow universities to use private label Wikis. Using this type of Wiki allows higher education institutions (such as British Columbia University, Columbia University, and TAFE NSW-Western Sydney) to integrate Wiki services with their existing online learning and teaching technologies with little cost and time investment. One of the recent developments in the application of Wikis in education is www.Wikiversity.org. Wikiversity.org is a www.Wikimediafoundation.org project that covers all levels of education, from pre-school to university, for formal and informal learning purposes. Currently this service is available in twelve languages and contains almost 15000 learning resources.

Blogs have mainly been used to disseminate knowledge and information, support group discussions, and encourage students in searching for and sharing information. In a recent study, it was found that Blogs are useful tools for students to (i) read other students' posts on their blogs of others, (2) to receive comments and (3) to review feedback received from lecturers and other students (Churchill, 2009). Several universities, such as Princeton University and Harvard University, use Blogs to share news and updates with their students and staff as well as public users. These updates are archived and searchable for users. Chancellors and deans of faculties at other universities, such as Macquarie University, use Blogs to post their point of view about hot topics in higher education, recent technology changes, and even new policies they intend to introduce, so that staff and students are able to read and comment.

Podcasting has also started to become of greater more interest to educators to record lectures and instructions and to let students to download and use these on their portable computer devices or mobile phones. This finding is in line with a previous study at the University of Oxford about usage of different Web 2.0 applications, which indicates that while the use of social bookmarking was low, the use of Wikis, audio and video podcasts, and Blogs was relatively higher amongst students than other Web 2.0 applications (Safran et al., 2007).

The findings presented in Table 1 also show that the universities studied in this paper have mainly either used cheap Web 2.0 platforms (e.g. Elgg, WikiMedia), or have added new features to their existing online learning systems for using Web 2.0 applications rather than developing customized systems. While free platforms on the Internet offer flexibility and many benefits, the findings of this paper shows that universities are not currently prepared to heavily invest in creating new online learning systems. Many are still in a testing phase, where they pilot different Web 2.0 applications and also observe other universities' experience with these new applications.

5. Web 2.0 Applications: Issues and Recommendations

While universities are increasingly taking advantage of Web 2.0 applications for enhancing learning and teaching practices, they should also be prepared to address a number of general issues associated with these applications. These issues become especially important when Web 2.0 applications are used on a large scale to support a variety of learning related activities and communications. Franklin and Harmelen (2007) have studied the implications of Web 2.0 for universities and suggest the following issues for further consideration:

- *A mechanism for controlling/moderating the Web 2.0 discussions:*

Since with Web 2.0 applications any user can potentially create or edit the content, a mechanism is necessary to avoid inappropriate content. For example, one disappointing aspect of using Elgg at the University of Brighton was the slow adoption by external professionals who could have contributed to learning and teaching programs. There were also some inappropriate postings, such as unsuitable sale activities, which were disappeared in a short time due to peer pressure. Violation of copyright and ownership of intellectual material is another situation which requires a careful mechanism for moderating the Web 2.0 discussions. For instance, at Warwick University students were often overly relaxed about re-using material from other sources without referencing or any sort of acknowledgement. Due to these concerns, some form of control and/or moderation is necessary to avoid the posting of inappropriate and/or offending messages online. Yet moderating the online content has its own limitations; for example, it may cause concerns about censorship and academic freedom. Moderation may also become a very difficult task when the volume of posts goes up significantly. One way to deal with these moderation concerns is to resolve them when an issue is reported by users.

- *The decision whether to locally host the systems or rely on externally hosted systems*

As mentioned earlier in this paper, universities may either locally develop and implement their systems, or use available systems on external websites. When universities develop and host the systems locally, they can tailor it more effectively to their specific needs. They may also be able to better integrate the Web 2.0 applications with their current e-learning systems. On the other hand, externally hosting the systems does have some advantages. While some externally hosted systems are free to use, for those which are not free, universities are able to pay for their usage only for as long as the systems are needed. There will be also less pressure on universities to maintain and update the systems. Yet externally hosted systems also have drawbacks; for instance, a service provider could stop or be unable to offer the service at any time, which may cause loss of resources which have not been backed up. In addition, the service provider may introduce charges at any time, and university lecturers may be given only limited control on administrating the content. Due to these concerns, a number of factors such as reputation of the service provider as well as the degree of customization of the system should be considered when externally hosted systems are used.

- *Encouraging the users to use Web 2.0 applications; and assessment of use of these applications on learning outcomes*

Universities need to decide how to encourage students and staff to use Web 2.0 applications for learning and teaching purposes. Universities could either automatically enroll all users in these applications, or do it only by request. Currently most universities are using Web 2.0 applications on a small scale and as their secondary learning technologies. Users' perceptions of the usefulness of Web 2.0 applications and word of mouth recommendations are critical factors that encourage more people to use them. The next question that needs to be answered is the extent to which Web 2.0 applications may facilitate learning and may influence the learning outcomes. It is still not clear in what ways and how Web 2.0 applications should be tailored to best support university teaching and learning practices.

- *Development of a Web 2.0 strategy*

Internet technologies are rapidly changing and new applications are evolving every day. Universities need to have a well-defined strategy to address these changes, since a lack of sufficient attention to technological changes may keep universities well behind users, especially among younger students. The University of Edinburgh, for example, has developed a Web 2.0 strategy that addresses the University's overall strategic plan and includes recommendations that fulfill the University's long-term objectives as well as facilitating effective use of Web 2.0 applications. Examples of these recommendations are 'Use Blogs and RSS feeds instead of newsletters'; 'Make use of Web 2.0 mapping technologies such as Google Maps to supplement or replace the online versions of the University campus maps'; 'Social bookmarking can support development projects and research projects, allowing an information resource base to be constructed in a collaborative way'; and 'Provide podcasts of public lectures (honorary graduates, inaugural lectures, high-profile special events), which can be downloaded after the event from the relevant part of the University's website'.

6. Discussion and Conclusion

The use of Web 2.0 by universities is not simply a technical evolution, it is a new way of thinking which requires

universities to understand and prepare for the opportunities and issues with the use of Web 2.0. While Web 2.0 applications have a diverse use for learning and teaching, their potential reach is still undetermined. Web 2.0 applications are potentially disruptive (Thompson, 2007). The challenge is to reshape established educational methods and beliefs in order to use the benefits of Web 2.0. While universities, at least in the short term, are being slow in preparing to adjust to Web 2.0, Web 2.0 applications will continue to evolve and new applications will keep emerging which may leave the universities far behind their students.

Currently many universities are pilot testing different Web 2.0 applications for different purposes. But they are still slow in incorporating these applications throughout the university and for their all courses and degrees. Wikis, for example, are increasingly used by the universities in a variety of ways, such as to allow students and staff to create and manage events; to facilitate students' collaboration in group work; and to engage them in community activities. Blogs are often used to update students, staff and even the public with news and events and also to allow readers to comment on blog posts. Universities may also integrate Blogs into their current learning and teaching technology to allow students and staff to openly discuss different course topics. In addition, some universities use Podcasts to record lectures and allow students to use them on their mobile phones or laptops. It is also becoming popular for universities to use mashups and integrate services such as Google maps into their website, and to use social networking sites such as YouTube and Facebook for promotional and marketing activities.

While universities need to catch up with Web 2.0 advances, they also should be prepared for its issues and challenges. Since Web 2.0 is more a change in the way of thinking than a technical change, and since the key difference between Web 2.0 and Web 1.0 is the users' ability to write as well as read, universities should prepare for accepting inputs and comments from students in a defined and manageable manner. Not only should the university develop strategic plans about how to incorporate Web 2.0 applications into current teaching practices, but they should also provide users, including staff and students, with instructions about the rules of collaboration and engagement in the University 2.0 community. This will then help both the university and users to use Web 2.0 applications for more effective collaboration and engagement in teaching and learning.

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Table 1. Instructional uses of Web 2.0 application by universities

Source	University	Objectives/ functions	Tools	Platform
(Franklin and van Harmelen, 2007)	University of Brighton, UK	Fostering sense of community; sharing academic interests; delivery of courses;	Blogs, Podcasts	www.Elgg.com
	University of Leeds, UK	communicate information, work as groups, share research findings, and take part in communities of practice	Blogs, Wikis	www.MediaWiki.org; www.Elgg.com
	Warwick University, UK	to foster a community, with education seen as secondary function, integration of blogging with other systems in the university	Blogs	Own logging system
(Samarawickrema, 2007)	Deakin University, Australia	Create communities of practice which included learners and professionals from outside the university, provide learners with their own space to collaboratively build knowledge, provide a formative peer-feedback mechanism, reduce the presence of the lecturer, display and share work, and use as a research method for case study	Wikis, media sharing, social networks	www.MediaWiki.org; Gallery 2© (own system); Joomla!-SMF(a content management system with social networking functionality)
(Conole, 2010)	UK Open University, UK	A self-created website. A place to share, find and discuss learning and teaching ideas and experiences.		www.CloudWorks.ac.uk
(Ebner et al., 2007)	Graz University of Technology, Austria	Exactly the ease of use aspect is an absolute necessity for successful Web 2.0 learning applications. Features: Weblog, Data pool (for uploading files), adding personal information, community building, keyword tagging, rss-reader,		LearnLand© which is based on the open source software Elgg.com
(Ullrich et al., 2008)	Jiao Tong University, China	Blogs used to increase active participation of the students in oral communication courses for English as a second language. Social bookmarking used to support authoring learning resources.	Blogs, Social bookmarking	www.Twitter.com, Social bookmarking features added to the existing online learning system
(Virkus, 2008)	Tallinn University, Estonia	Several Web 2.0 tools have been added to the university's online learning system (IVA) to support face-to-face lectures or online learning, encourage collaborative research, and enhance library services.	Blogs, RSS, Podcasts, Wikis	Web 2.0 tools added to the existing online learning system
(Gray et al., 2010)	Several universities	To assess university students' authoring through followings: "To develop critical awareness of e-media to help select and evaluate appropriate teaching resources, to create and share original teaching material, to develop critical insight and greater self-awareness, to reflect on course concepts, to increase student involvement in and responsibility for their learning,"	Podcasts, Blogs, Social networks, Social bookmarking, Wikis	Not specified

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