Using Web 2.0 in teaching and learning: A wiki case study

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wiki:
http://www.virtualmv.com/wiki

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Abstract
This paper informs and demonstrates to educators how web 2.0 technologies could be incorporated into their teaching and learning. It describes a case study that uses a wiki as the content container that allows for the inclusion of shared media, such as Flickr, SlideShare and YouTube, plus social media, such as Twitter. The use of a supporting blog that manages out of context content is also described.

Keywords
Wiki, Web 2.0, Teaching, Learning, online, Media Wiki, WikiEducator, Wikiversity

Introduction

As the rate of change of Internet based technologies continues to accelerate, innovative methods of managing personal information and knowledge need to be developed and considered. As a tertiary educator in information technologies, the author has been exploring technologies to manage this change and support teaching and learning in a blended environment.

From an educator's view, there are two interacting systems that need to be taken into account: the pedagogies (strategies or style of instruction), and the technology to support the strategies.

Previously the author developed an educator centered, information and knowledge framework for a blended teaching and learning environment (coined "the virtualMe"), which included the development of a web-based software artifact (Verhaart, 2009). Observations were made as to features that would be desirable for both the teacher and learners. A significant problem with the artifact was its custom built design, and as such, findings needed to be transferred to more open systems.

The internet has evolved from being content driven to one of harnessing the collective intelligence, or moving from Web 1.0 to Web 2.0 (O'Reilly, 2005). Web 2.0 technologies are characterised as managing social structures rather than just content, and include social networks (e.g. Facebook, Linked-in), blogs, and wikis.

The research into a teacher centred, technology supported environment has been conducted as an action research project. As part of the action research, a case study into the use of a wiki and blog as support tools has been undertaken. The question "can Web 2.0 technologies be used to support a blended teaching and learning environment?" is the central question that this paper will explore.

Background

Prior to considering the technology and pedagogy using a wiki, the author developed a custom tool to explore delivery in a blended teaching and learning environment. Findings from the earlier research developed a framework, called virtualMe (Verhaart, 2010) which is shown in Figure 1, and includes:

1. a user management sub-system, to control access and tracking details;
2. a taxonomy structure, to organise the content;
3. a sniplet model to store the content;
4. a multimedia object (MMOs) model with associated metadata described in the multimedia vocabulary markup language (MVML);
5. an annotation framework to manage sharing of information and knowledge and allow for both out-of-context and in-context comments to be managed; and
6. a presentation layer to manage the user interface.

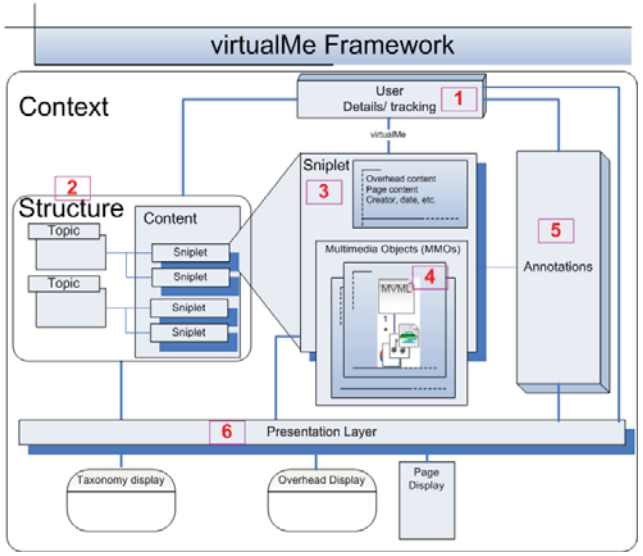

Figure 1: virtualMe framework

3 Generations of pedagogies

- *Behaviorist/cognitive*
- *Constructivist*
- *Connectivist*

Verhaart (2009) compared the custom built virtualMe system to that of a wiki, so placing the research into a wiki environment was a natural progression. Further, many researchers have - and are - exploring the use of wikis in an educational setting, particularly to create collaborative learning activities (Choy & Ng, 2007; Wheeler, Yeomans, & Wheeler, 2008; Lin, Sajjapanroj, & Bonk, 2009).

Briefly, wiki means "quick" in Hawaiian (Louridas, 2006), and has been described as follows: *"Wiki is a piece of server software that allows users to freely create and edit Web page content using any Web browser. Wiki supports hyperlinks and has a simple text syntax for creating new pages and crosslinks between internal pages on the fly" (Leuf & Cunningham, 2002).*

Several major educational projects have also adopted wiki technology as their delivery tool. Notably, WikiEducator (http://www.wikieducator.org) Wikiversity (http://www.wikiversity.org), and Wikibooks (http://www.wikibooks.org). These are all collaborative projects where many educators are providing content into a common pool and use the engine that drives Wikipedia, MediaWiki. Indeed adding content to Wikipedia itself is being used for assessments by some tertiary institutions (Dickison, 2010). The research here, however, centres on a tool for an individual educator, and this is probably more closely aligned to Wikispaces (http://www.wikispaces.com) with over 3.4 million users and 1.3 million wikis (Tangient, 2009a). The wiki application is not only available as a stand-alone system, but is integrated in many Learning Managements Systems (LMSs) such as Moodle.

The closest match to the virtualMe framework is probably Wikispaces, however, with the significant adoption of the MediWiki engine and the transferability of findings to WikiEducator, and Wikiversity it was considered prudent to explore its suitability.

Earlier research identified a need to provide support for unstructured content, that is, content that did not easily fit into the wikis taxonomy, and other web based solutions were explored. The use of Blog technology, has proved to be a suitable technology to meet this need.

A *Blog* or "weblog" (Winer, 2002) is an online diary or journal, typically documenting the day-to-day life of an individual, and has become a way in which individuals can record unstructured comments and allow reader annotations.To understand the impact of Blogging, Blogs (or web logs) have steadily gained popularity, and in November 2006, Technorati, a blog search engine, was tracking more than 57 million (BBC, 2006), and by 2008 346 million people globally reading blogs (Singer, 2009).

The second part of the discussion in this paper, relates to the pedagogies that can be supported through the use of the wikis and/or blogs. In a blended teaching and learning environment pedagogies for both distance and face to face need to be considered. At the 2010 DEANZ Conference, in Wellington, New Zealand, Terry Anderson described three generations of distance education pedagogy. These included: Behaviourist/cognitive, constructivist and connectivist. (Anderson, 2010), where: behaviourist/cognitive includes, self paced and individual study; constructivist, working in groups; and connectivist, using networks

and collectives. For a blended environment, behaviourist includes instructivist, where content is "taught" to students, as in a lecture. It needs to be noted that in a blended environment, multiple strategies are used to engage students, with different pedagogies suiting different situations. Therefore, in order to be useful in a blended teaching and learning environment ideally all three pedagogies should be supported.

Methodology

This paper describes part of a larger action research project, and considers the use of Internet 2.0 tools, such as wikis, and blogs to see whether they would be suitable for a Web enhanced teacher centered blended teaching and learning environment. The overall research question for the research being "*can a framework be developed to acquire contextualized information and knowledge that may exist in a variety of data types, a source*?"

The first cycle of the research (1985-2002) involved using static web pages to investigate use in teaching and learning, followed by the conversion to a database driven web site (2002-2005). Findings from this cycle were synthesized and a third interactive prototype was developed and used (2005-2008). The current prototype investigates the use of open source tools to in which the framework can be developed and is described in this paper. The action research cycles are based on a methodology described by Bourner(2002) and are described in detail by Verhaart (2009).

The implementation of the wiki and blog will first be discussed. This will be followed by examples grouped in the three pedagogical areas identified by Anderson (2010) of: behaviourist/cognitive; constructivist; and connectivist.

Background to the technology

Wiki

Verhaart (2010) describes the development and implementation of the wiki solution and breaks the development into three parts (**Figure 2**):

1. Hosting
2. Content construction
3. Content delivery

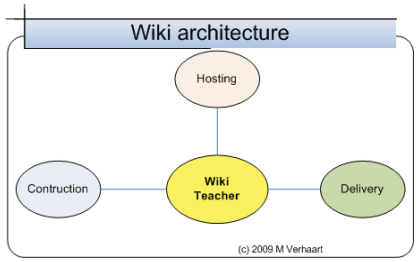

Figure 2: implementing a teaching and learning wiki

HOSTING

As this is a research project and there is a necessity to trial different technologies, it was decided to privately host the wiki. MediaWiki was chosen for the following reasons (Verhaart, 2010)

- Media Wiki has extensive use, as the environment used by Wikipedia the largest global wiki.
- It is used by WikiEducator, Wikiversity and Wikibooks.

- The software is Open Source.
- Has an active extension community continually adding new functionality.
- Supports a wide variety of multimedia types, and has the capability to be extended (e.g. add YouTube and Flickr functionality).
- Would enable the researcher to offer an informed contribution to the existing wiki communities.
- As the software can be installed on a private host, this enables the researcher to gain an understanding of the technology underpinning the wiki.

CONTENT CONSTRUCTION

Building teaching and learning content in MediaWiki is not as straight forward as expected. While, wiki means "quick" there is a learning curve required to understand the cryptic wiki syntax, as it is not in a "what you see is what you get" (WYSIWYG) interface.

Secondly, MediaWiki is primarily designed to manage the huge Wikipedia encyclopedia, whereas this research considers the use of a wiki in a blended teaching and learning environment. Fortunately, the designers of MediaWiki provided the four ways in which MediaWiki can be extended.

1. By adding to a common JavaScript page that is loaded with each web page in the wiki.
2. Using templates, to automate common layouts.
3. Using PHP extensions that add additional code to the MediaWiki engine.
4. Using a Widget extension, which allows code to be generated on a standard wiki page in the Widget namespace.

There are other tools and features that fall outside this but are never-the-less very useful when using the tool in a blended environment. These include the ability for students to create personal sub-wikis and a Zooming application – ZoomIt (Russinovich, 2009) which is easily installed on a Windows based PC.

Extending MediaWiki

The following extensions were added to the MediaWiki created for this research to and allow for the specific needs in a blended teaching and learning environment.

Common JavaScript extensions: Two extensions were added to MediaWiki. The first to hide the navigation/toolbar, was required when projecting the page onto a large screen. The screen area used by the left navigation/toolbar reduced the viewable area significantly. A second extension was the ability to Hide/Show the body of a table, which was used to create interactivity in the presentations where questions could be asked then solutions revealed. This was done when Help Desk problems were displayed and the solutions were revealed after discussion, on an overhead.

Building templates allowed for common designs to be implemented. Most pedagogies follow a standard pattern and using templates provides a consistent look and feel on the pages for parts of the learning object such as Objectives, Questions, etc.

Adding references. Interestingly many presentations that the author has observed do not cite or reference correctly, yet, students are asked to provide accurate referencing in their assessments. MediaWiki has a referencing system which is reasonably free format,

however, as the author's institute requires APA from students a way to reference using this style was developed.

Referencing tools such as zotero look for COinS meta-data on a page, this has been implemented using a template to generate the correct meta-data and reference in the footer.

BLOG

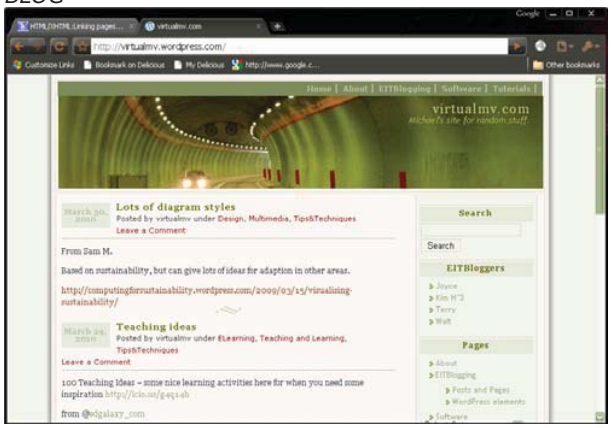

Figure 3: WordPress blog showing unstructured content

Unlike the wiki technology, where extensions are required to enhance the functionality for a blended teaching and learning environment, the Blog in this research is used to manage unstructured data (Figure 3). While there are some advantages in privately hosting a Blog, WordPress provides a platform that provides all of the functionality that would be included on a private blog, with the advantage that updates and maintenance are automatic. Initially EduBlogs was used (which uses the WordPress engine) but, limitations in allowing posting via email and mobile devices, plus the inclusion of advertising made the shift to WordPress desirable.

CONTENT DELIVERY

The author has used the wiki for over 12 months and has trialed several different ways to present the wiki to students. This includes: presenting the wiki in a lecture, providing wiki pages that contain directions to learn software products and languages such as MS-Access, MySQL, HTML, Flash and JavaScript.

The following discussion considers various pedagogical teaching and learning techniques as identified by Anderson (2010), using a wiki or blog. The merits or otherwise of each technique are beyond the scope of this paper.

Delivery: Teaching use cases

Behaviourist/cognitive.

This includes self paced and individual study, and is based on Gagne's Events of Instruction (1965 as cited by Anderson, 2010) and enhanced by the "cognitive revolution" and includes: chunking, cognitive load, working memory, multimedia effect (Sorden, 2005 as cited by Anderson, 2010). In this pedagogy content is the primary driver.

Lecturing ("sage on the stage") is still a significant delivery medium in most tertiary institutions, and indeed is used extensively in Conferences. Delivering content in a lecture format from a wiki presents many challenges. Firstly, the text needs to be large enough for a projector. Detail in diagrams needs to be clear enough, and what you (as a teacher) are talking about

may need to be highlighted. Further, as a wiki is designed for reading, care has to be taken so that projections are not swamped with too much text!

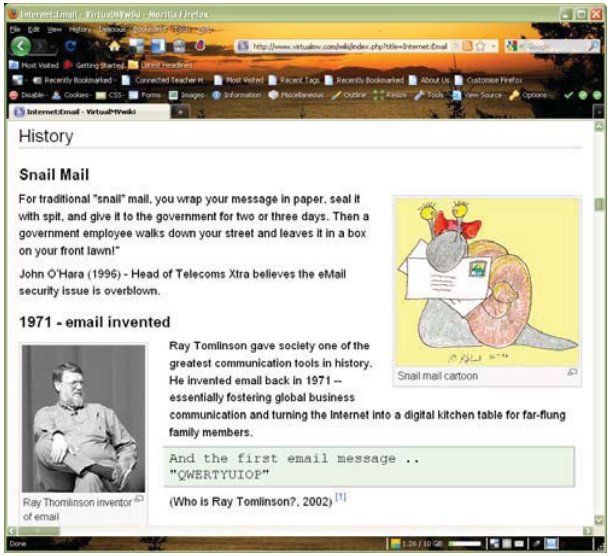

Figure 4: A wiki lecture presentation in Firefox

The author has used the wiki to successfully deliver content in a lecture format, where browser text resizing is used. Both Internet Explorer (IE) and Firefox (Figure 4) have the capability to enlarge text without enlarging images (Chrome 2.x does not). The wiki navigation bar uses valuable space, and using the common.js extension it is possible to hide this when presenting.

A workbook or learning tasks can be presented in the wiki (Figure 5). Students are able to have the web-browser open plus the application they are using (in the example notepad to learn HTML) and can view the instructions alongside their work. A drawback of this approach is that students can cut and paste from the browser to the application. Notice that in Figure 5 the *objective* "pedagogical template" has been used.

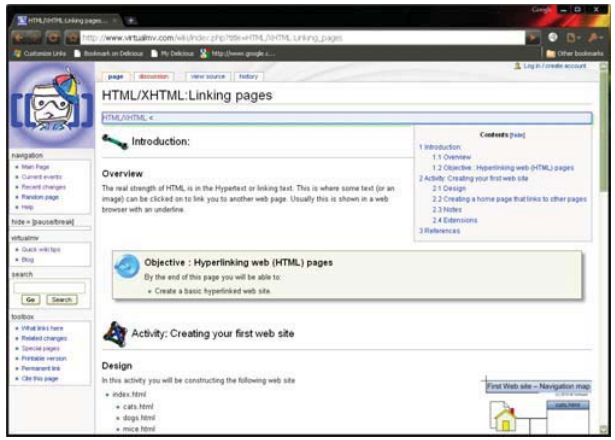

Figure 5: A wiki learning task presentation in Chrome

The Blog was used to post content that did not fit into the wikis taxonomy, and as such served as a way to disseminate unstructured content.

Constructivist

Constructivist pedagogies center on socially constructed knowledge and consider that the process of knowledge acquisition is what is important (Jonassen, 1991 cited by Anderson, 2010).

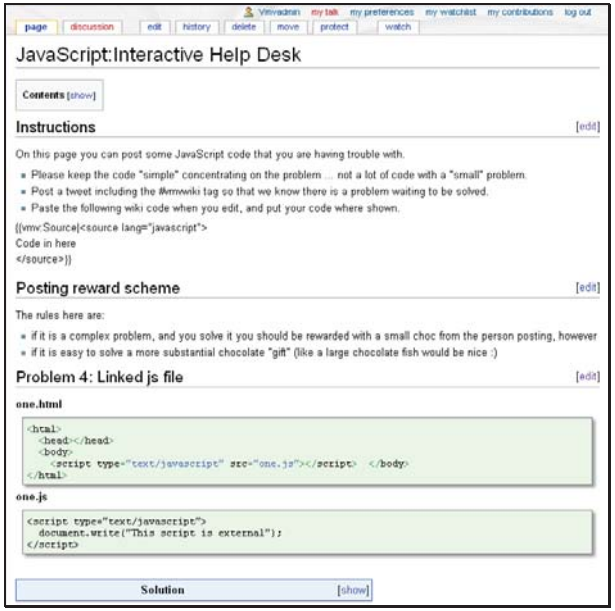

Figure 6: An interactive help desk

In the wiki, constructivist learning can take place as students are able to edit the actual web pages. As an example in a JavaScript class an interactive help desk page was been created allowing students to post problems they were having (Figure 6). Once solutions were found they were placed in hidden tables so future students could try to work out the solutions prior to seeing the solution. While several problems have been posted – they are the result of problems encountered in a face to face class – they have been entered onto the page by the author.

Constructivist learning can be supported in a wiki, as students can build their own sub wikis off the main wiki by branching off their user ids. Access to their pages is available on every page via their userid.

Incorporating assessable items into the wiki has been trialed, where students have been asked to add content as part of a research assignment. This is in the true form of the wiki where knowledge is co-created. Additionally, adding the quiz extension allows students to assess their progress in an interactive way (Figure 7).

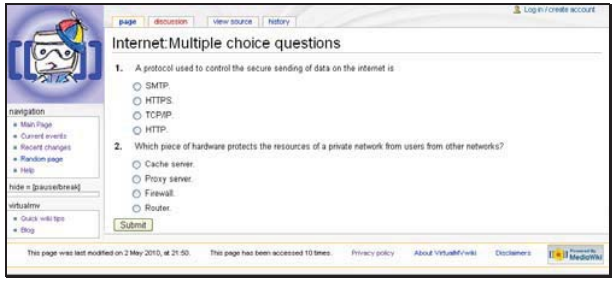

Figure 7: A wiki quiz

The Blog can also be used to provide constructivist learning opportunities as postings can be discussed via comments. However, in practice the Blog was used to present unstructured content and comments were not added by students.

Connectivist

Connectivist pedagogies focus on networks, that are based on a shared common interest, are mostly self organising and learning can take place beyond the course (Anderson, 2010).

As a demonstration of how the wiki could be used to support connectivist pedagogies, a page used for presenting at the DEANZ 2010 conference contained a live twitter feed, plus the inclusion of a Google presentation document and this is shown in Figure 8.

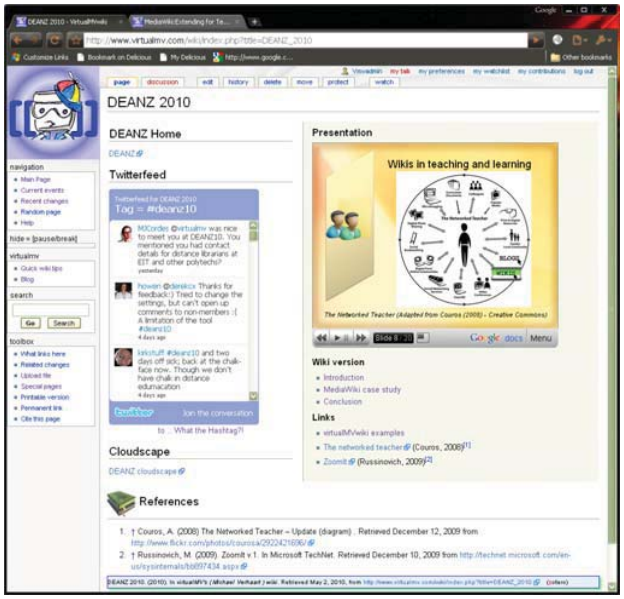

Figure 8: A wiki showing a live twitter feed and inclusion of Google Presentation doc

Other connected technologies that have been successfully integrated into the wiki include a Flickr feed, where images with a specified tag are displayed, Google docs (presentation), YouTube, and SlideShare.

A potential problem linking objects to a tag to identify appropriate images, or filter tweets is that anyone (globally) could create a tweet or image with that tag and it would display on the wiki. So far this has not been an issue.

The use of the Blog also allows connectivist learning activities, as students – and the global community – can comment on posts.

Conclusion

Teachers use multiple ways to facilitate learning of students. The central question identified at the start of this paper was "can Web 2.0 technologies be used to support a blended teaching and learning environment?

The paper initially looked at how a wiki could be implemented and considered a three stage model: hosting, content construction, and content delivery. From a research perspective, the wiki was privately hosted to allow for extensions related to pedagogy to be installed, while the Blog was publically hosted as WordPress provided the functionality necessary to develop innovative learning opportunities.

The paper then described how the wiki/blog combination could be adapted to the three eLearning pedagogies identified by Anderson (2010): behaviourist/cognitive – through the use of the wiki as a presentation tool; constructivist – through using the interactive nature of the wiki and comment feature of the blog; and connectivist – allowing for the inclusion of social media such as twitter, and cloud applications such as Google documents. This illustrated that Web 2.0 technologies could be used to support blended teaching and learning.

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