

## The Wiki as a Web 2.0 Tool in Education

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While the only contact most people have had with wikis is through browsing Wikipedia, wikis are a powerful tool for employing online collaboration to allow students to create and modify their own knowledge structures within any discipline. This article explains why wikis have major potential in an educational environment, describes a specific classroom example of wiki use, and provides recommendations for educators considering the possible use of a wiki as one of the more powerful Web 2.0 tools currently available.

Keywords: Wiki, Web 2.0, collaborative editing, higher level thinking skills, course management system, interaction

### INTRODUCTION

The World Wide Web was a creature of the very end of the 20th century, and it burst onto the scene with such momentum that as we made our way into the first decade of the 21st century it was already being transmogrified into something we seem to be calling “Web 2.0”. This “Web 2.0” phenomenon has yet to settle down into something that consents to be clearly defined, but it has clear implications. What went before was an echo of the old model in which a few elite individuals provided content, and the vast majority of consumers received that content in a relatively passive mode. This new model carries with it the clear connotation that every user has the clear potential to be not only a recipient but a contributor, and to be part of not only a global collection of information but an active global conversation. The tools, business models, consumer products, and habits that go to fuel this change already exist but are evolving so rapidly as to appear a blur. One specific example of such a tool is the wiki.

#### WHAT'S A WIKI?

Wikis (the word is supposedly Hawaiian for “quick”) are collaborative editing environments. Their purpose is to allow two or more people working from anywhere to

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jointly create and edit one or more web pages, with the multiple types of content (text; images; hyperlinks; video; etc.) normally found on the web being their raw material. The best of the wikis provide tools which make these operations as simple as using a word processor, thereby putting collaborative editing within the reach of almost anyone with a computer and an Internet connection. As MacFadyen (2006) puts it:

[Wikis]... are radically new because they permit multi-directional information dissemination (rather than core-periphery dissemination) via the Web, because they permit rapid and multilingual growth of Web-based information resources, and because their integrity is maintained not by policing of borders but by participant cooperation.

Since collaborative editing of web pages enables the user to modify the very building blocks of the Web (rather than just reading pages created by an elite few), wikis fit squarely into that poorly defined territory we're calling "Web 2.0".

Wikis are actually older than one might think. They trace their roots to 1994 and the work of Ward Cunningham, but have only entered the public consciousness in a major way within the last three years. By the far best-known wiki is the "Wikipedia" (<http://www.wikipedia.org>), a free online encyclopedia created by Jimmy Wales. Many people who look topics up on the Wikipedia are unaware that it is simply an enormous version of an online collaborative workspace usable by anyone.

Anyone can create a wiki for free by visiting a public "wiki farm". One popular example is Peanut Butter Wiki (pbwiki) at <http://www.pbwiki.com>, whose name originates with the claim that it is as easy to use as peanut butter. PBWiki is the source of the wiki used later in this article as a class example.

## **REVIEW OF THE LITERATURE**

Education is about learning. As Chickering and Gamson (1987) pointed out, interaction among students is a powerful catalyst for improving learning outcomes. While there are many possible forms of interaction among students, collaborative writing and editing is one that lends itself well to a wide variety of disciplines. Writing in and of itself may be considered a mode of learning (Emig, 1977), and the use of writing within a "shared information workspace" for collaborative learning is a potentially powerful tool (Nicol, Littlejohn, & Grierson, 2005).

In using a wiki for educational purposes students are asked to design and create both the structure and the content of online information. This is very much in the constructivist mode. As Farabaugh (2007, p. 42) observed, "Vygotsky's idea of deliberate structuring of meaning through language links the old (writing) with the new (Internet) technology", and as Nicol, Littlejohn and Grierson (2005, p. 46) stated "It is the generation of 'knowledge structure' at the level of concepts and ideas that is essential for learning and the development of expertise". The fact that the students rather than the teacher are providing the structure is critical. As Jonassen, Beissner and Yacci (1993) pointed out years ago, where effective learning is concerned it is not the structures created by teachers that matter – it is the knowledge structures generated by the students.

The idea of using a wiki as a tool in education is relatively new in the public consciousness. While one can find literature describing their use for administrative purposes within education (e.g. Brewer & Milam, 2006; Chase, 2007; & Warlick, 2007), our focus here is on having students (and/or teachers) use wikis as part of their learning process.

Da Lio, Fraboni and Leo (2005) used a wiki to facilitate a newly formed “academic community of practice”. Specifically, they attempted to create a culture of collaboration among Italian public school teachers over a broad geographic area, and they employed a wiki to serve as the common meeting ground for the teachers. In a project lasting approximately a year they found what they described as “low effectiveness”, which they attributed both to teacher unfamiliarity with the technology itself and teacher unfamiliarity with this style of collaboration in general (though they did suggest that they felt both were likely to improve over time.) At about the same time, Engstrom and Jewett (2005, p. 14) were conducting a curriculum project involving eleven geographically dispersed classrooms, for which a central goal was to engage students in inquiry-based learning. They grouped the schools into teams that “represented a mix of geographic, cultural, and economic diversity” (p. 14) and set up wikis as well as a number of other online tools for the students’ use. They reported limited success, partly due to the absence of any existing culture or literature that might have guided them in administering the wikis (issues such as who had editing permissions under what conditions proved problematic), and they noted that the teachers in the project had more difficulty using the wiki than the other electronic communication tools in the project – some of which were also new to them.

Some two years later, Farabaugh (2007) reported on the use of a class wiki to help build community within a large, diverse student body and structure discourse within a “writing to learn” environment (this was a college Shakespeare course). Whether the two years was long enough for wikis to become more of a known quantity, or whether other factors were at work, Farabaugh described a successful outcome spanning four semesters. He was pleased with both the community of learners and the “writing to learn” artifacts created by the participating students.

#### *WHY MIGHT ONE USE A WIKI IN EDUCATION?*

Wikis are collaborative online editing environments. As such, they lend themselves to collaborative educational activities – especially those that require students to work together across geographic or temporal boundaries. In other words, they’re good for group projects when the students involved are not in the same place at the same time. As such, they’re useful when students are assigned to work in small groups outside of regularly scheduled class time, and they’re perfect for use with online classes.

Everyone who participates in the creation of a wiki can edit the contents, but these changes are tracked and it is always possible to revert to an earlier version. This creates a “low risk” editing environment and also allows attribution. Attribution is helpful in an educational setting for assessment and evaluation purposes – it becomes easy to give students credit for their work.

Since a wiki is really just a web site, it has a URL and can be viewed even by individuals who did not participate in its creation (though in the absence of a password these individuals cannot modify the contents). As a web site it is automatically a distribution medium for the final product, whether the intended audience is simply the set of those who created the wiki or a broader public audience.

#### *EXAMPLE*

ETE 567 is a graduate education course focused on the use of telecommunications in education. Some sections of the class are entirely web-based; others are “hybrid” versions with some in-class time supplemented by extensive web-based activities. Both involve reduced (or totally nonexistent) learning time spent in a traditional class setting – but as a

graduate class, ETE 567 requires considerable interaction among the students on a reasonably sophisticated level. Bold (2006, p. 6) chose to use a wiki in such a setting “as a desired component to replicate the expected collaboration of graduate students in on-campus settings”. One of the authors made the same decision and has used a wiki as part of the course structure in this class for the past five semesters, spanning two web-based and three hybrid sections. The wiki is created free at <http://www.pbwiki.com> and is used as the venue for a class project in which all members of the class participate in designing and creating a summary of the major course content addressed during the semester. This particular project spans the entire 15-week semester.

*Why was a wiki selected?* This course is intended to function as a community of learners. The activities of the class incorporate a number of different small-group activities and involve extensive discussion of numerous topics. Given that an instructional goal of the course is to have students work collaboratively in the creation and evaluation of educational materials, the wiki serves as an ideal venue for collaborative editing. It provides an easy-to-use and flexible context in which all members of the class can readily contribute and modify both structure and content of the summary. Since most of the work on the wiki takes place during time periods spread across a full week, students are unlikely to encounter the wiki’s unwillingness to allow simultaneous editing (though the class does experience simultaneous editing elsewhere through the use of Google Docs). There are also two fringe benefits in this particular situation. First, students gain firsthand experience in the creation and editing of wiki-based materials, and second, all members of the class are left at the end of the class with a fine summary of the semester’s work that represents the best everyone working together had to offer.

*Does it work?* It has been the experience of the instructor that it works well, though it could work even better (more on that shortly). That is to say, the experience does contribute to building a sense of a community working together, even within the Web-based sections of the class where most students never meet their classmates in the flesh. The wiki does in fact provide a functional site where students can design and write collaboratively, and it makes the process highly visible. There is no question that it provides first-hand experience for all students in the class, or that it generates a substantial course summary website that can be used at later times as needed.

*How do students react?* Other than having accessed Wikipedia, wikis are a sufficiently novel type of activity at this point to be unfamiliar to most of the students in the class. Upon being told that they will be creating a wiki as a group the typical initial reaction is a combination of skepticism and trepidation. They express concern about a number of different aspects of the activity. Typical concerns include the technical skills that might be required; the necessity to work as a group, and the type and complexity of content that might be appropriate (the latter two are not unique to the wiki environment and will not be directly addressed here).

There is a bit of a learning curve involved for each class. Addressing this requires at least one brave student willing to take the plunge (usually but not always one of the younger and more digital students in the class), and a willingness on the part of the instructor to demonstrate and provide guided hand-on practice in the use of the wiki. Once the group has walked through the process with their own keystrokes and seen that one student stepped forth without dying in the flames, the general level of anxiety about the medium dissipates quickly.

The next obstacle is student disbelief that they really are being asked to provide both the structure and the content for the material in the class wiki. This is consistent with the findings of Bold (2006, p.7), who described this phenomenon as having students who were “insecure about the process”.

While the blocks of content within the ETE 567 class are known, the way in which the content will be summarized is entirely up to the individual student handling each block – and to the rest of the class responsible for editing the sections after their initial creation. The typical reaction is to repeatedly ask the instructor for a template or an example from an earlier semester, either believing that there really is “one right way to do it” in the eyes of the instructor, or preferring not to do the cognitive heavy lifting of crafting an elegant summary, or both. When little in the way of templates or examples (beyond the most basic) is forthcoming, the students begin to hack their way through the thicket of content. Inevitably the work done by that first brave student becomes, for better or worse, the template for those that follow... until first one student and then another notices shortcomings with whatever that first classmate created and begins to question it. Farabaugh (2007, p. 55) also observed this situation:

Students... are sometimes diffident about taking on the ‘scaffolding’ of their written work. They retain the idea that the professor is the only authority on all classroom matters and are occasionally resistant to assignments that ask them to structure their own wiki work. ‘Where are we supposed to put things?’, one student asked in a survey. Typically, reticent students read the wiki that their braver fellows had made.

This is the signal that the class is about to begin overcoming the next obstacle: reluctance to edit classmates’ work (either content or structure). Although this activity is introduced in the course syllabus as one that *requires* all students to make at least two substantive edits in the work of others, the initial reaction is consistently one of viewing authorship as private territory. The breakthrough commonly comes when students begin to realize that the early-stage wiki has no consistent structure and often no table of contents, making it difficult for most viewers to find most of the contents. When the instructor suggests that a table of contents could provide such a structure should one of the students care to create it, several of the more wiki-comfortable students usually make a dash for the keyboard and the quickest one provides his or her version of a working table of contents with links to all sections of the wiki. The results are sufficiently pleasing to all that most students begin to grasp the idea that they really are both allowed and encouraged to make modifications to the structure as well as the content of the wiki.

The major remaining obstacle is a clear sense of what level of detail and what type of content are appropriate to include in this class summary being generated through group authorship. Some students are obsessed with detail; others lack the skills necessary to summarize well; and some provide the minimum possible information in the knowledge that their classmates are responsible for improving on what they have done. The level of detail and type of content provided by that first brave student inevitably serve as a strong influence on those who follow, and in practical terms as the semester goes on and students become increasingly willing to edit the work of others the epic summaries get trimmed back and the minimalist summaries come to be enhanced until some rough equilibrium is achieved. The requirement that all students edit at least two other entries in a substantive way seems to play a large role in this balancing process.

When the end of the semester is reached and the wiki is complete, students are generally pleased and impressed with the scope of what they have created. Looking back, they speak not only of having become more comfortable with using the wiki as a tool but also of valuing the summary document that they have helped bring into being.

*Suggested changes?* The wiki is working reasonably well in its current form. As students experience using and editing the wiki, they begin to internalize the realization that this is really just a web site, and as such can contain all of the types of content found

on any other web site. More adventurous students begin to incorporate hyperlinks, graphics, tables, audio and video as the class goes on. However, the fifteen week semester is too short to allow everyone to discover these possibilities and integrate them into their wiki summaries. Since the course in question is, after all, a course in telecommunications in education, the instructor is considering requiring all students to incorporate some of these elements within their summaries. To do so will require additional documentation – and having the students themselves create this documentation (within a wiki, of course) is an obvious class project for the near future.

On a deeper level, the instructor needs more practice in prompting students' critical thinking skills in the context of the wiki. Just as Engstrom and Jewett (2005) noted, the (required) edits made to most of the wiki pages primarily reflect surface-level thinking rather than deeper and more significant modifications in structure or content. This is most likely due to the combination of an instructor new to the use of the wiki and students who have seldom been prompted for critical thinking and revision in other contexts.

The instructor is also considering requiring all students to design and scaffold a wiki-based project of their own for possible use with their students – something many of the students now undertake in the form of creating a WebQuest based in the wiki.

#### *INTEGRATING WIKIS WITH OTHER ONLINE TOOLS*

For some classes, a wiki may be the only online tool in use. For others it may be one of many. As Bold (2006, p.5) noted “Graduate education in an online environment frequently means relying on a course management system (CMS) but also calls for additional interactive components”. The particular class from which these examples are drawn makes use not only of a class wiki but also of a CMS (Blackboard CE6), a social bookmarking site (del.icio.us), and an electronic portfolio (ePortfolio).

When students are asked to make use of multiple online resources a common reaction is confusion. When used carefully, bookmarking can help students keep track of multiple URLs – but many students are unwilling to use non-local bookmarking and local bookmarks are unique to one computer, making them useless at other locations. Where possible, integrating the class online resources helps students avoid losing their resources.

Since a wiki is really just a web site, every wiki has its own URL. Such a URL can readily be linked. For example, a link can be placed within a course management system leading directly to the class wiki, so that students need not keep track of a separate URL for the wiki. In the class from which these examples were drawn, the instructor has placed a link to the class wiki in the course tools menu of CE6. The students in the class have not yet decided to add a link inside the wiki leading directly back to CE6, but that's the next obvious step. Likewise, a link may be placed inside CE6 (and/or the wiki) leading to the class social bookmarking site at del.icio.us, and a bookmark can be placed on the del.icio.us site leading back to either or both. This maximizes the ease with which students and instructor can move back and forth among the online resources. The instructor has also added a link to the ePortfolio to the course tools menu, but since the ePortfolio structure is not editable it is not possible to add a link within the ePortfolio structure leading back to the class (though individual student artifacts submitted to the ePortfolio can contain live links leading back to any of the class-related URLs.)

#### *RECOMMENDATIONS*

Interaction among students is well-documented as having the potential to improve learning outcomes across a wide range of disciplines, and wikis are one way of using online connectivity to encourage interaction among students. Since wikis allow one to

combine the concept of “writing to learn” with this online peer interaction, they have the potential to be powerful engines of learning in that they provide a venue where students write collaboratively to create and refine their own knowledge structures.

This is not to say that the process is easy, either for the students or for the instructor. Use of a wiki in this way requires not only that both students and instructor have the basic technical skills required to go online and carry out the text, hyperlink, and image manipulations required to construct and edit a wiki, but also that the instructor be prepared to model and guide the appropriate types of “deep” cognition and the resulting substantive edits of both structure and content in the growing collaborative document. In other words, it’s easy to do a shallow wiki but hard to do an in-depth wiki for the same reasons that it’s easy to write a shallow essay but hard to write an in-depth essay. The wiki, however, casts this dilemma in group terms rather than individual terms and adds collaboration to the list of skills required for mastery.

The authors’ recommendation, then, for those considering the use of a wiki for educational purposes is to start slowly. Begin with the basic mechanical skills of creating and modifying the online structure. At the same time work on higher level thinking skills in the familiar contexts of classroom discussions and individual assignments, where the focus can be on the types of cognition which are more demanding but more important. Blend the skills of collaborating (in person) into the mix, articulating and practicing the specific behaviors which make for good group process. Then, as instructor and students alike are reasonably comfortable and competent with the wiki environment, with deeper cognition, and with working collaboratively in person, consciously take the plunge and begin to model the use of the wiki environment itself to collaboratively explore the domain of higher level thinking in the discipline at hand. Start small. Provide plentiful guidance – focused more on the substance than on the superficial appearance of the work. Allow plenty of time. Finally, step back and roundly congratulate one another on the final product – but far more so on the process which led there.

## DISCUSSION

On one level, wikis are less flashy than many of the tools and applications touted as exemplars of “Web 2.0”. They lack the instant impact of posting photos on Flickr or browsing YouTube videos; they require more thought and planning than appending commentary to a high-profile blog, and more focus than tagging a social bookmark. However, wikis are very much in the mainstream of the Web 2.0 ethos in that they turn the Web into a fully collaborative environment, placing both structure and content in the hands of the user rather reinforcing a “couch potato” ethic of web browsing. They are less flashy because their roots are deeper and they grow more slowly, and because in a real sense they have the potential to incorporate and subsume so many other Web 2.0 functions within their own borders. They require more effort because their payoff is larger; it is no coincidence that by far the best-known wiki in the world is the Wikipedia. While it is unlikely that wikis will ever be the most popular form of activity on the Internet, as we enter the mainstream of a Web 2.0 era they are clearly one of the most powerful.

## REFERENCES

- Bold, M. (2006). Use of wikis in graduate course work. *Journal of Interactive Learning Research*, 17(1), 5-14.

- Brewer, S., & Milam, P. (2006). SLJ's technology survey 2006: New technologies--like blogs and wikis--are taking their place in the school media center. *School Library Journal*, 52(6), 46-51.
- Chase, D. (2007). Transformative sharing with instant messaging, wikis, interactive maps, and flickr. *Computers in Libraries*, 27(1), 7-8, 52-54, & 56.
- Chickering, A. W., & Gamson, Z.F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3-7.
- Da Lio, E., Fraboni, L., & Leo, T. (2005). TWiki-based facilitation in a newly formed academic community of practice. Retrieved October 10, 2007, from <http://wikisym.org/ws2005/proceedings/>.
- Emig, J. (1977). Writing as a mode of learning. *College Composition and Communication*, 28 (2), 122-28.
- Engstrom, M. E., & Jewett, D. (2005). Collaborative learning the Wiki way. *TechTrends: Linking Research & Practice to Improve Learning*, 49(6), 12-15, & 68.
- Farabaugh, R. (2007). 'The isle is full of noises': Using wiki software to establish a discourse community in a Shakespeare classroom. *Language Awareness*, 16(1), 41-56.
- Jonassen, D. H., Beissner, K., & Yacci, M. (1993). *Structural knowledge: Techniques for assessing, conveying, and acquiring structural knowledge*. Hillsdale, NJ: Lawrence Erlbaum.
- MacFadyen, L. P. (2006). In a world of text, is the author king? The revolutionary potential of wiki (open content) technologies. In F. Sudweeks, H. Hrachovec and C. Ess (eds), *Proceedings, Cultural Attitudes Towards Communication and Technology 2006*. Australia: Murdoch University.
- Nicol, D., Littlejohn, A., & Grierson, H. (2005). The importance of structuring information and resources within shared workspaces during collaborative design learning. *Open Learning*, 20(1), 31-49.
- Warlick, D. (2007). The executive wiki: Wikis can be a multitasking administrators' best friend. *Technology & Learning*, 27(11), 36 & 38.