

Collaborative Learning the Wiki Way

By Mary E. Engstrom and Dusty Jewett

Today's tech-savvy students are ahead of many of their teachers when it comes to using technology to support learning. This situation is creating a "digital disconnect" between students' use of technology in and out of school (Levin, Arafeh, Lenhart & Rainie, 2002; NetDay, 2004). Students in grades 6-12, dubbed "the great communicators" because of their reliance on and comfort with electronic communication tools, report learning about technology on their own or through informal networks outside of school (NetDay, 2004). Calls for new models of education that incorporate the use of information and communication technologies as part of the basics of a 21st century education address this disconnect (Learning for the 21st Century, 2002).

One such model, *Under Control: The Damming of the Missouri River*, was designed to engage middle school students in a real-world geographic issue: investigating the long term environmental, economic and cultural impacts of the 1944 Pick-Sloan Plan, which resulted in the construction of six dams on the Missouri River during the mid-1900s. This topic was selected because the Missouri River is one of the most important physical geographic features in South Dakota and the region. A wiki, a set of expandable web pages that can be edited by anyone within the learning community, was used in the *Under Control* project to promote critical inquiry and collaborative problem solving across the eleven geographically dispersed classrooms that participated in the curriculum project.

This article describes (a) the rationale for using a wiki, (b) the organizational and managerial structure employed, and (c) the professional development program provided to teachers preceding and during project implementation. Finally, lessons learned are presented along with recommendations for using a wiki in a large, student-centered curriculum project.

Why wiki?

A central goal of the *Under Control* project was to engage students in inquiry-based learning, whereby they would collaboratively research and analyze divergent points of view around contemporary Missouri River issues and then

craft a policy statement for river management. To promote students' ability to view and discuss river issues from more than one perspective, schools were grouped into teams that represented a mix of geographic, cultural and economic diversity. A communication and knowledge building tool was needed that could serve this purpose with relative ease of use by teachers and students.

Wikis are collaborative environments by design, and can serve a variety of purposes for collaborative online projects. Wikis are commonly used as personal information managers (PIMs), knowledge bases or knowledge management systems, content for academic instruction, sites for collaborative authoring of a document or project development, and collaborative communication forums (Mattison, 2003; Thoeny, 2005). Webopedia (n.d.) defines "wiki" as follows:

A collaborative Web site comprised of the perpetual collective work of many authors. Similar to a blog in structure and logic, a wiki allows anyone to edit, delete or modify content that has been placed on the website using a browser interface, including the work of previous authors. In contrast, a blog, typically authored by an individual, does not allow visitors to change the original posted material, only add comments to the original content.

Because they are organized by content, rather than chronology, wikis are often used to promote collaborative content creation and editing (Goodwin-Jones, 2005; Tonkin, 2005). One feature of most wikis is the edit trail built into their structure, referred to as a version control system, which creates a complete log of every change made to every wiki page. Thus if a student inadvertently deletes the content on a wiki page, that content is saved as an edited version along with a user identifier, date and time stamp. Some wikis also allow for limited access or membership through a registration process. The Twiki software program (Theony, 2003) was selected for use in the *Under Control* project because it offered the features mentioned above, which allowed us to limit access to the site to only those students and teachers participating in the project. This ensured that the privacy of

the middle school students would be protected. In addition, the teachers were given editing access to all wiki pages, but students' editing access was limited to their small group page(s). Another feature of wikis is that they do not allow multiple users to edit the same page at the same time. If that happens, one user's edits will be deleted. Twiki employs a page locking system, so a notice appears if another user is editing the page when you select the "Edit" button on that same page. This feature also played into the selection of Twiki for the *Under Control* project. This project represented the initial use of a wiki for both the project developers and the teacher and student participants.

Organizing and managing the wiki

Prior to focusing on how best to organize the wiki users, there was a need to ensure that student use of a wiki was permissible according to the terms of any Acceptable Use Policy that might be in place in any of the 11 school districts. Teachers were instructed to visit with their building principals about the use of the wiki in the project and verify that this type of online collaboration was acceptable. Secondly, there was a need to make sure that project participants had adequate access to computers with high-speed internet connectivity. To that end, teachers were also instructed to let their principals know that the three-week unit would require them to have frequent, if not daily, access to the internet. Once those assurances were in place, the focus shifted to organizing and managing the wiki users.

Several things needed to be taken into consideration in determining how to organize the wiki users. With 11 teachers and nearly 400 students participating in the project, there was a need to organize the students into small research groups of four to six students each in order to minimize the number of users attempting to edit a given wiki page at the same time. In other words, it was determined that if a research group was kept small and was also given its own wiki page(s), the likelihood that each of the four to six geographically dispersed students in that group would attempt to access the same wiki page at the same exact time would be minimized. This reasoning would not have held if all of the participating schools had identical class schedules, as some K-12 distance consortiums do, or if all of the students in a given class elected to investigate the same river issue (described later). Fortunately, those issues didn't present themselves.

First, each teacher was placed into one of four school teams. School teams were purposely formed to encourage students to consider the river issues from multiple perspectives, while also striving to maintain a fairly consistent student population across each team. After students determined the river issue that they wanted to investigate (River Flow, Natural Habitat Reduction, Tribal Water Rights or Sedimentation), teachers emailed that information to the project developers who then created the small research groups. Figure 1 illustrates this organizational structure. Because students were allowed to self-select one of four river issues to investigate, there was some variation in the number of small research groups for

each of these four topics. The two largest school teams, which were comprised of approximately 140 students each, had a range of six to eight small research groups per river issue. Thus the teachers in these two school teams needed to supervise 24 to 32 wiki pages. Project developers also assumed the role of managing all of the small research group wiki pages. Students' editing access was limited to their small group page(s). In other words, if students navigated to the wrong school team and/or the wrong small group, they would not be allowed to edit that page. Teachers, however, were given editing access to all wiki pages.

Organizing the content of the wiki pages for each small research group was a fairly easy process. An environmental

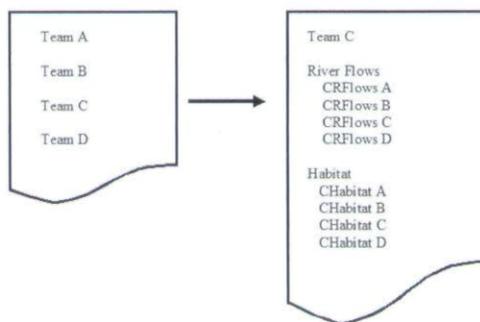


Figure 1. An example of the organizational structure created in the wiki for one school team.

problem solving process, adapted from Heathcote (1997), was embedded into the research and inquiry process utilized in the *Under Control* unit through the prompts placed on each small research group's wiki page(s). One

set of critical inquiry prompts was used for all river issues. An example of the prompts used in the second week of the project is as follows:

Week Two Research Findings:

1. How do different beliefs and values lead to different views toward the managing the Missouri River?
2. In what ways has human alteration of the Missouri River system changed the environment along this major waterway?
3. What economic influences are evident in this issue?
4. How does culture and experience influence people's perception of the Missouri River system and its resources?
5. How have problems related to this issue developed over time?

Figure 2 (see next page) is a screen capture of one small research group's wiki page that illustrates the interactions between students during the first week of the project.

The project developers actively managed the wiki site from the time that the teachers first accessed it in a summer professional development program through project implementation and completion — a span of about four months. This involved troubleshooting minor issues through emails and phone calls, cleaning up edits that weren't separated into paragraphs, tracking general use of the wiki and, on occasion, assisting a class at their school site. Near the end of the *Under Control* project, the strict editing access for students was lifted so that they could view other teams' findings and respond to them.

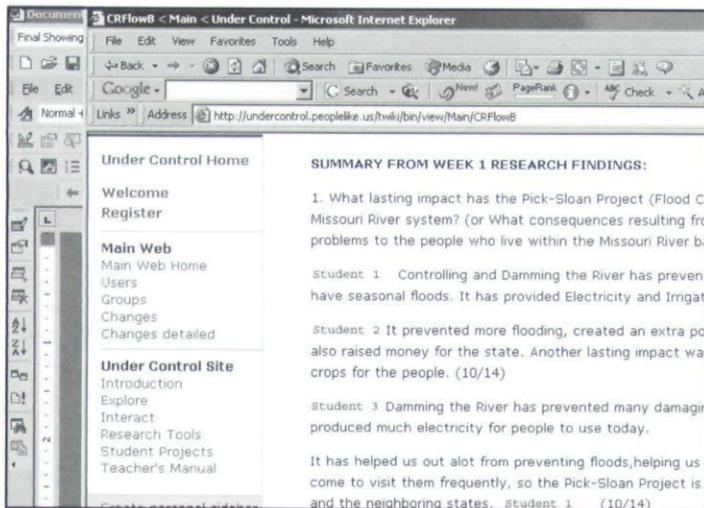


Figure 2. An example of students' interactions on their wiki page during the first week of the project.

Lesson 1: Instructional issues

While a strong majority of the participating teachers agreed that their technology knowledge and skills increased as a result of implementing the *Under Control* project, teachers had more difficulty using the wiki than the other electronic communication tools available in the project, some of which were also new to them. Teachers expressed concern that students in other classrooms weren't responding to their students' edits (postings), but they didn't attempt to model or facilitate an exchange of ideas, questions and feedback across school teams on the wiki pages. For example, one teacher stated, "The kids are used to instant messaging and want quick responses." Another teacher recognized the need to model the inquiry process and stated, "In the future, we need to respond to the groups so more gets shared, not just posted." In retrospect, this modeling was missing from the project's professional development sessions and will be emphasized in the next iteration.

Lamb (2004) contends that the beauty of wikis is that their structure is "shaped from within — not imposed from above" (p. 40). One teacher demonstrated this organic process inherent in wikis by posting the draft river management policy statement created by his class and inviting others in the learning community to provide feedback on it. This is illustrated in Figure 3. The project developers responded to this action by loosening the editing restrictions placed on students, so that any student within this school team could edit the wiki page containing the draft policy statement. Unfortunately, the policy statement was posted late in the project, when most classrooms had completed the research and analysis phase of the unit, and the posting did not elicit any responses.

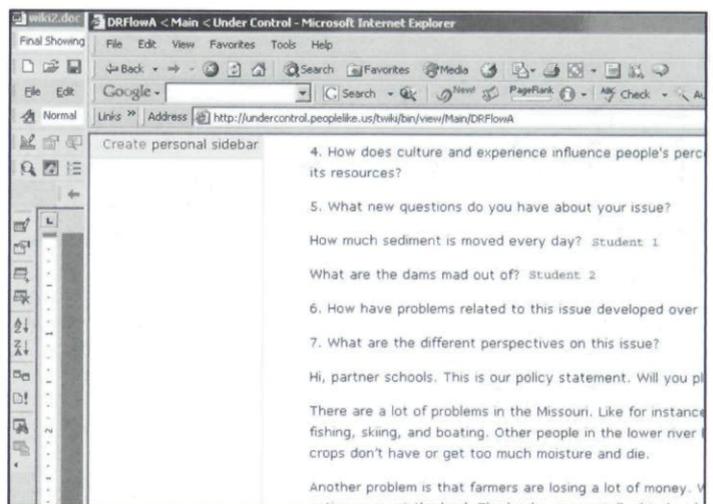


Figure 3. Draft river management policy posted to the wiki by one small research group.

While all teachers reported having used the Internet for basic research projects with their students, and almost one-half of the teachers reported having prior experience in using inquiry-based learning, it became clear that the teachers could benefit from more practice in prompting students' critical

Professional development program

Teachers who were selected for participation in this project attended a three and one-half day Summer Institute at the University of South Dakota. The teachers were introduced to the unit first-hand, collaboratively inquiring into one of the four river issues and posting research findings on the wiki page(s). Over the course of the Institute, approximately eight to ten hours were spent in collaborative, hands-on learning with the wiki. This allowed teachers to become comfortable with the wiki environment and also allowed the project developers to note (and troubleshoot) issues that arose.

Teachers were further supported by another day-long professional development seminar just prior to project implementation. This session provided a detailed review of the wiki site, and addressed log-in issues as well as entering, editing and saving information. Teachers were reminded to release the edit lock when done editing a wiki page. They were also shown the organizational structure (wiki pages and links) that was set up for students to navigate to their correct School Team (A, B, C or D) and then to their correct river issue group (River Flow, Natural Habitat Reduction, Tribal Water Rights or Sedimentation). Additionally, teachers were shown how to enter their students' WikiNames into the WikiUser list, in the event that they wanted to do that themselves rather than have the project developers do so.

Lessons learned and discussion

The lessons learned from this initial use of a wiki to support inquiry and collaborative problem solving among middle school students can be grouped into two categories: instructional issues and technology-related issues. Both of these will be discussed from the perspective of changes that will be made to improve the professional development program of the *Under Control* project prior to its next implementation.

thinking through the use of information literacy skills. This was evidenced in the edits made to most small research groups' wiki pages, which primarily reflected surface-level thinking. This was also evidenced during a debriefing session after the project's end. Most of the teachers reported that their students researched the river issues on their own or in small groups, without much support and facilitation in the inquiry process from them (the teachers). As one teacher stated, "The students are used to looking for a straight answer to a question. They don't know how to delve into the research, what questions to ask themselves, and how to synthesize information; these are things they need to be taught and we need guidance with."

In future professional development programs for the project, all three of these issues will be addressed. First, the project developers will model the practice of interacting with project participants on the wiki in an effort to prompt critical thinking and thinking from multiple perspectives. It will also be explicitly stated to teachers that they can and should prompt students' thinking in this same manner. Second, access restrictions will be loosened earlier in the project, after the first week's research findings have been posted and discussed. This will allow all of the small research groups within a given school team to access the wiki page(s) of other teams investigating the same river issue. In addition, teachers will be encouraged to post students' draft river policy statements to promote collaborative writing, another effective use of a wiki (Goodwin-Jones, 2003; Lamb, 2004). Finally, the professional development sessions will be restructured to provide teachers with practice in prompting students' thinking and decision-making skills with the use of information literacy skills. McKenzie's (1997) Questioning Toolkit will be used for this purpose.

Lesson 2: Technology-related issues

Most teachers in the project utilized a computer lab for student access to the internet (and the wiki) in the *Under Control* project. The computer lab model usually promotes a learning context of one-on-one computing, with the teacher directing the entire class or moving around to assist individual students as needed. Because of the editing constraints involved in using a wiki in a large project such as this one, the traditional use of the lab model did not prove to be effective. Wikis do not allow multiple users to edit the same page at the same time. Thus those teachers who conformed to the traditional lab model discovered that some of their students were locked out of the page that they wanted to edit because a classmate had already begun editing that same page. Those teachers who arranged their students into small, cooperative groups of three to five students, based on the river issue selected for investigation, expressed the most satisfaction with the wiki. These teachers reported that their students, working in cooperative groups with self-assigned roles such as "wiki recorder," "research note-taker," "discussion facilitator," and so on, did not experience the problem of being locked out their wiki page.

Another technology issue that arose dealt with access to computers with Internet connectivity. Two teachers were

limited in their ability to have students participate in the project because of a lack of access. In one case, the teacher could only gain access to the school's computer lab for two days during the three week unit, due to a high demand for use of the lab by other teachers in the building. In another case, the technology available in the building was not working and there was no technology support person available to address the problems.

These access issues are not unique to this project. Norris, Sullivan, Poirot and Soloway (2003) contend that a lack of access to technology is still a real problem in K-12 schools and is the reason that technology has not had more of an impact on teaching and learning.

Future professional development programs for the project will address the technology-related issues in two ways. First, teachers will be placed into cooperative groups, according to the river issue, to model this instructional strategy. A variety of technology configurations (computer lab, classroom with four computers, laptops) will be used when accessing the project site and wiki to allow for explicit discussion of instructional strategies that work for each configuration. Second, the project developers will interact directly with the principals and technicians at the school sites involved in the project, in an effort to ensure adequate access to and support of the needed technologies. This leadership support is key to making information and communication technologies a part of the basics of a 21st century education.

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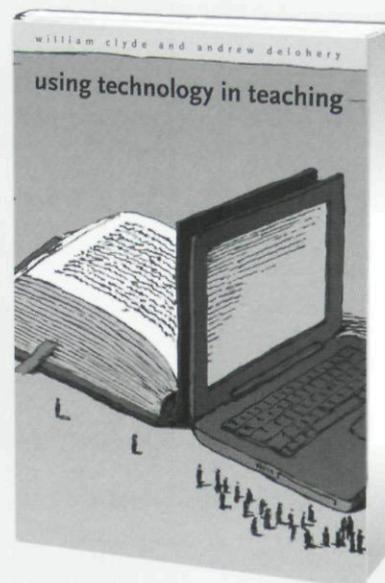
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