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Foreword

Wikis in Collaborative Learning: Exploring the Role of Authority and Invention

I was delighted to be invited to write this invitation to the volume, The Wiki Way of Learning. I have not worked in collaborative learning for several years, so I was pleased that the authors saw useful connections between my work and theirs. I was also delighted to have the opportunity to reflect on our work exploring wikis for learning, with some degree of separation.

Starting Out: Are All Threads Considered Equal?

I became interested in wikis for education as a result of earlier work in collaborative learning. For several years at Georgia Tech, my colleagues and I were exploring a tool called CaMILE (Collaborative and Multimedia Interactive Learning Environment). CaMILE was at first a Macintosh stand-alone application, and later became a web application. Basically, CaMILE supported threaded discussion lists, with some minor supports for multimedia content.

When we moved CaMILE to the Web in the late 1990s, an accident of implementation became an interesting feature to explore. Each individual
threaded discussion had its own unique URL. This feature allowed us to link to a threaded discussion space from any particular content of interest to students. For example, a page describing a homework assignment could be linked to a threaded discussion space for questions and comments about that assignment. In a list of problems for students to use in reviewing for an exam, each problem could be linked to its own threaded discussion space for students to use in collaboratively solving the problem and comparing solutions. We called this “anchored collaboration,” because the collaboration space was anchored to something to talk about. It was unusual in the early days of the Web to think about collaboration spaces linked to items, while it is commonplace today in blogging, and in services such as Reddit and Slashdot.

Jennifer Turns and I did a comparative study of two sets of classes to understand the impact of anchored collaboration. One set of classes used CaMILE with anchored collaborative discussions, and the other set of classes used USENET discussion groups, which were a separate discussion space and not anchored. The USENET discussion groups supported threaded talk, but not tied to any particular topic. The classes we studied were on the same or similar subjects, and were all at the same undergraduate level (e.g., students would take these courses all in their first or second year). What we found was that the anchored discussions tended to be longer (e.g., had more commentators and more notes posted) while still staying on-topic (Gudzial and Turns, 2000). Our claim was that the anchoring helped students to figure out the role for the collaboration, and kept all the related discussion in the same thread. Since we believe in the power of discussion to support learning, we would predict that more discussion on-topic was likely to result in more learning.

But as we analyzed our data, we recognized another important attribute about the anchors. All the anchors were created by the teacher, the authority figure in the course. Only the teacher could create an anchor (something that students cared about, linked from the home page of the course) and link it to some CaMILE discussion. That left us unsure about our claim. The anchored discussions were not just anchored. They were highlighted (by selection and reference) by the teacher. Were the longer, on-topic threads a result of the anchoring, or a result of responding to the recommendations of an authority figure?

Within the technology of CaMILE, there wasn’t an easy way to test the question of anchoring versus authority. But then, my students and I discovered Ward Cunningham’s WikiWikiWeb. Here was a technology in which all authors have the same authority (i.e., all words, all pages, look the same), have the same rights to create pages with the same visibility, and discussions could develop on or around any page. In a wiki, no one can tell if you’re the teacher.
FROM AUTHORITY TO FLEXIBILITY

We started developing the Swiki (Squeak Wiki) in 1997, and Jeff Rick completely rewrote the code and made it his own in the following years. As we used the Swiki in less technical contexts (still many years before Wikipedia and common understanding of a “wiki”), we looked for a name that didn’t involve explaining Hawaiian words. One of the teaching assistants called it a “CoWeb” for “Collaborative Website,” and we used that with our less technical audiences. To all the computer science classes, it was still a “Wwiki.”

We never did try to measure the amount of discussion from teacher-created pages (as anchors for discussions) versus student-created pages, because the answer was obvious from daily use. Discussions created by the teacher were far more likely to be visited and populated than discussions started by students. Students could tell (by tone, by explicit signature, by location in the site) which pages were written by teachers. In fact, most attempts at student-created discussions went without a single response, and those attempts were fairly rare. Our Swikis still reflected the authority structure of the classroom. For the most part, the teacher directed the students’ attention, and the students took those cues to direct their attention.

What we discovered as we made Swikis available across campus was perhaps even more interesting—an enormous diversity of applications were invented by the faculty and teaching assistants around campus (Gudzial, Rick, and Kehoe, 2001). This was a striking result. The history of educational technology development is rife with interventions that don’t get adopted, barely get adopted, or get adopted and used for only a small percentage of their potential applications. The Swikis were not only being adopted across campus, but a surprising variety of applications were invented for their use.

Today, when most people think “wiki” they think “Wikipedia.” Creating an encyclopedia is a clear application for wikis. Our Swiki-using faculty invented such interventions as:

- A glossary of medical terms (e.g., for diseases and for bones in the body), developed across several semesters
- An annotated bibliography for a research group
- Exam review questions with a collaborative space for sharing answers
- A text-based adventure game

Swiki evolved rapidly during the first few years of its use, in response to requests from students, teachers, and teaching assistants (Gudzial, Rick, and Kerimbaev, 2000). We moved away from some of the original WikiWiki ideas. For example, we created the ability for users to “lock” pages (Anyone with a
particular password could unlock and edit the page). That was important, for both students and teachers, so that pages containing details like homework assignment specifications could be trusted as coming only from an authoritative source. In this way, Swiki became a wiki engine designed explicitly for classroom use.

THE DEEPER QUESTION OF WIKIS IN EDUCATION

Studies of educational uses of wikis touch on deep questions about the system and practices of schooling. These questions are not unique to wikis. Wikis serve as a lens to draw attention to these issues.

Philosophers and educational researchers as far back as John Dewey have argued that schooling should be democratic. Dewey argued that a democratic people should express their individuality. Wikis are probably among the most democratic of educational interventions. Anyone can edit any page and say anything. Yet, our experience is that use of wikis still reflected power structures within the classroom. Most classrooms are not democracies—the teacher runs the classroom, and controls what expression can occur. In the Swikis, what the teacher did was more valued than any student’s contribution, and what the teacher posted or created was paid the most attention. It is not really surprising that the technology reflected the classroom structure—wikis are just a technology. They don’t change the nature of students and teachers, but they give us a lens to see it. Is it a problem that classrooms are not more democratic? That question existed before wikis, but wikis make the question more visible.

As an educational technology, wikis are unusual for their rate of adoption and for the creative applications that teachers invented for them. As a contrast, consider that tablet computers are being adopted at a rapid rate today, but new uses are rarely being invented for them. New education applications of tablet computers for learning require literally creating new “apps.” Creating new apps requires knowledge and skill for application development. Wikis can be adapted for new uses with little technical knowledge or skills.

Why do wikis inspire the invention of new applications by teachers? In general, what features of any technology inspire teachers to invent with it? A possibility is that a successfully adapted technology is one that extends an existing pedagogical tool. One of our teachers once called the wiki a “shared whiteboard.” They feel like a familiar medium, with the added advantage of being shared on the Web. Do wikis get adopted for new applications because there is a sense of familiarity about them?

Wikis in their current forms are primarily textual media, and they are inherently public. Everyone can see everyone else’s pages. Uses of wikis in schools, then, are a form of writing across the curriculum. Even if the wiki...
is being used in computer science or engineering classes, its use turns the students’ activities into a public form of communication. Thus, the wiki is a modern Internet technology that serves to enforce some of the oldest goals of liberal education: basic literacy and the ability to communicate to the public.

WHAT WE DON’T KNOW ABOUT WIKIS IN EDUCATION

There is still much to learn about the role of wikis in learning and teaching. Teachers want to know what the best practices are for the use of wikis to support learning in the classroom. What does it mean to teach with a wiki, as an analogy to teaching with a whiteboard or a PowerPoint slide show?

For students, interaction through a wiki is different than other forums for learning. Unlike the classroom, a wiki is a written medium, and is highly distributed. Every enrolled student can be contributing (reading and writing) in the wiki, all at the same time. Students have enormous freedom in the wiki. It’s less structured than even a threaded discussion space. How do students perceive these affordances? Do they use them well in order to support learning? Should we be teaching students how to use a wiki well?

I hope that this book serves as a guide toward some of these questions. The authors of this volume are exploring the range of questions related to how we think about wikis for learning and how to use them well. I am sure that you will come away from this volume with new appreciation for the power of wikis to support education.

REFERENCES


Planning Projects and Solving Problems Collaboratively are crucial skills nowadays, and both require managing the information flood, being able to understand different perspectives, and working with different digital tools. The Wiki Way of Learning focuses on creating and managing learning processes using collaborative technologies. The book provides a theoretical approach along with hands-on examples about how to set up, run, and evaluate collaborative technology-enhanced learning lessons and curricula from the primary school level to adult education.

The introductory chapters focus on the theoretical background of participative technologies, the archetypical properties of wikis for collaboration, and the concept of higher-order learning in the form of knowledge building and learning in the field of tension between open minds and openness in education.

The following chapters underpin and illustrate the theoretical findings with practical examples of different uses of wikis from primary school education to courses on the university level around the world. The book also addresses how wikis can help structure and enhance collaboration in project-based learning settings with over 100 participants, how wikis can be used in German, history and science education, issues of evaluation and assessment.
of student learning in wikis, and what is the added value of the use of a wiki when a whole school uses the same wiki. Practical and pragmatic guidelines are offered addressing these themes. Finally some hands-on hints are given to teachers and lecturers about how to start their projects and lessons using wikis for collaboration.

TARGET AUDIENCE FOR THIS BOOK

The book is aimed primarily at lecturers and teachers at all levels who want to promote collaboration using digital media, and who are looking for inspiration, theoretical backgrounds, successful practical examples, and specific details regarding the design and implementation of technology-enhanced collaboration.
1
The Wiki Principle

WHY ARE WIKIS RELEVANT?

Wikipedia (http://wikipedia.org), Wikileaks (http://wikileaks.org), WikiPlag (http://de.wikiplag.wikia.com/wiki/WikiPlag_Wiki). What began as a tool to document software projects more than fifteen years ago has developed, since that time, into a widespread application for the collaborative creation and editing of texts. Thanks to a few simple basic principles, volunteers can create the world’s largest encyclopedia together, Wikipedia. More and more companies and interest groups are now using wikis or wiki-like tools for the joint preparation of documents.

The first wiki was launched on the Internet by software developer Ward Cunningham in 1995. It was intended to be used for software development, as a documentation tool for design patterns, and became a popular tool in the developer community. The inspiration for the name wiki came from the label “wiki wiki” on the express buses at the Hawaii airport, which means “quickly, quickly” in Hawaiian. Ward Cunningham’s wiki was by far the easiest and fastest tool for editing web pages at that time.

With this quick and easy way of editing web pages, Cunningham fulfilled World Wide Web (WWW) inventor Berners-Lee’s original vision of
collaborative hypertext. At the beginning of his work on the WWW, Berners-Lee had already foreseen that web pages could be both read and edited with a browser (Berners-Lee and Fischetti, 1999). However, in the first phase of the Web, the roles of producing and consuming on the content of web pages continued to be strictly separated.

In retrospect, this first phase of the World Wide Web is now known as Web 1.0. Wikis can be seen as a pioneer and archetype of Web 2.0, which is the second phase of the WWW. In Web 2.0, the roles of producing and consuming content are merged to become “prosuming.” The Internet is increasingly being used as a substitute for local computers and for storage media. Instead of clearly defined programs, services that continuously evolve are used in a network (O’Reilly, 2005). Some experts postulate that these technical changes are accompanied by a cultural shift toward a higher level of cooperation. Don Tapscott and Anthony D. Williams have described such forms of cooperation and its consequences for different areas of business and society in their books Wikinomics (2006) and Macro-Wikinomics (2010).

As regards the significance of the wiki as the archetype of a new tool and a new approach to the Internet, only a small part of this book will be devoted to the concrete wiki tool. Technology and concrete tools are subject to constant change. The initial unique concepts of wikis, meanwhile, have found their way into many other tools and web services. What remains from the concrete tool are the wiki’s inherent universal characteristics, which are very suitable for teaching and learning in an information society, and will be described herein.

WHAT MAKES A WIKI?

In a speech about the design principles of wiki, the wiki inventor Ward Cunningham asked rhetorically: “How can so little do so much?” (Cunningham, 2006). He explained, from his perspective, the design principles of the wiki based on the shortest known program, which implements the basic functions of a wiki in 222 characters of Perl-Code.

```perl
#!/usr/bin/perl
use CGI::all; path_info=~/\w+/;$_='grep -1 $& *.h1($&)
.escapeHTML$t=param(t)
||'dd<$&;open F">$&";print F"$htt\S+\[A-Z]\w+
{2,}/a[href,$&],$/eg;
print header,pre"$_<form">",submit,textarea t,$&.9,70
```

www.alastore.ala.org
This snippet is not easy even for computer scientists to interpret. It visualizes one of the most important wiki features: a reduction to the essentials. With these 222 characters, the basic functions of a wiki are wholly defined.

An easier definition of the wiki for those who are not computer scientists is as follows:

A Wiki is a web service with version control on the Internet, in which everyone can create and modify web pages, link them as hypertexts, and be informed about content changes on request, without additional tools or HTML knowledge. (Based on Döbeli Honegger, 2007)

Currently, over 100 Wiki variants are available. They have inherited most of the basic ideas of Ward Cunningham’s original wiki, but offer more or less degrees of additional functionality, and differ in the technical details that are most relevant to their operation, but not to the use of the wikis. The most common wiki features are:

- **Full-text search.** All pages of a wiki can be searched in full text.
- **Ref-by-function.** On each wiki page, other referenced pages of the wiki are shown.
- **List of changes.** A wiki server delivers a list of the most recently added or modified pages. This information is also available as an RSS feed or by periodic e-mails.
- **Version control.** A wiki server logs every change to a wiki page and provides comparisons between the different versions or lists them on a complete page history.
- **User management.** Some Wiki servers require user registration and record the name of the user who creates or modifies the page.

**Wikis and Wiki-Like Tools**

Between 1995 and 2000, a wiki was practically the only way to edit a web page directly in the browser. Today, many web services allow the direct manipulation of websites, and are usually even easier to use than traditional wikis. In particular, a class of Wiki-like tools has been developed. These tools largely forego the hypertext functions and instead focus on the work of simple linear texts. Table 1.1 shows the relevant differences between classic wikis and newer wiki-like tools.

**Read and Editing Modes**

At first glance, a wiki page is hardly different from a traditional website (see figure 1.1). Most of them have a navigation bar with important links on one
**TABLE 1.1**
Differences between classic wikis and wiki-like tools.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Classic Wikis</th>
<th>Wiki-like Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document structure</td>
<td>Hypertext consisting of multiple documents linked to one another</td>
<td>Single linear document</td>
</tr>
<tr>
<td>Read and edit</td>
<td>Separate</td>
<td>Together</td>
</tr>
<tr>
<td>Versioning</td>
<td>After each save</td>
<td>After each letter typed</td>
</tr>
<tr>
<td>Presentation of page history</td>
<td>Comparison between different versions</td>
<td>Film-like playback of development process</td>
</tr>
<tr>
<td>Dealing with editing conflicts</td>
<td>Preventative hard or soft blocks Attempts to resolve conflict when editing conflict occurs No conflict resolution</td>
<td>No editing conflicts</td>
</tr>
<tr>
<td>WYSIWYG-Editor</td>
<td>Partial</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**FIGURE 1.1**
A Wiki page in view mode (http://wikiway.ch).

The left sidebar contains important links and the toolbox that allows users to create a new topic, browse the index, search, view changes, settings, and statistics or add the page to the RSS feed. The central part of the page includes the actual content consisting of text, images, or other content. The “Edit”- or “Modify”-buttons at the left top of the page and in the navigation bar at the bottom enable the user to switch from the view to the edit mode (figure 1.2).
edge of the page, with the actual information in the central area of the page. This look is called the view mode.

The page can be recognized as a wiki page only at second glance. Somewhere on the page is a link or button labelled “Modify” or “Edit.” In a classic Wiki, the page will enter an editing mode upon clicking this link or button (see figure 1.2). The first wikis did not have a graphical text editor. All formatting and graphical elements had to be entered with special codes, as shown in figure 1.2. More modern Wikis provide a graphical editing mode, as is common today in various word processing programs (see figure 1.3).

![FIGURE 1.2](http://wikiway.ch).

A wiki page in user mode (http://wikiway.ch).

The center of the page includes the editor, in which the users can modify the content with the help of an integrated text editor. The buttons at the bottom of the page allow the user to save and close with or without notification, to save while editing, to cancel, and to preview the page. The editor used in this example does not provide any graphical editing support (WYSIWYG). The users have to use special codes to enter graphical or formatting elements.
Although most wikis today provide a graphical editing mode, the text editing mode still enjoys great popularity among wiki professionals. Since the main formatting rules are well known and there is little to format, working in the text mode is usually faster, because you can enter the commands using the keyboard and not have to change continuously between the mouse and keyboard.

The editing of a wiki page is completed by storing or discarding the changes made, after which the user is returned to the view mode.

Wiki-like tools usually do not distinguish between these two modes. You are always in the edit mode, and the pages can be modified at any time and by multiple users simultaneously (see figure 1.5).
FIGURE 1.4
Switching between view mode and edit mode in a classic wiki.

FIGURE 1.5
Edit mode of a wiki-like tool.

The graphical editor (WYSIWYG) in the center of the page allows multiple users to simultaneously modify the content with the help of the graphical text-processing functions. Unlike a normal wiki, a Wiki-like tool is always in the edit mode.

Version Management and Editing Conflicts

In a classic wiki, switching between view and edit modes (see figure 1.4) also serves as the basis for version management and for dealing with potential editing conflicts. The active saving system in a classic wiki means that new versions of the page can be stored. With version management, users can go back to each saved version, and can compare several versions of the same page (see figure 1.6).
Wiki-like tools lack not only the switch between viewing and editing modes, but very often also lack an explicit command to save the document. Wiki-like tools automatically save after every single change in the document (i.e., after every single keystroke), but they do not give clear information about when the editing process has been completed. Different wiki-like tools handle this in different ways. While some tools show the history of a document, much like a film playback, others attempt to recognize and display different versions based on temporal interruptions (see figure 1.7).

Since every single letter change is saved by the wiki-like tools and is tracked in the web browsers where the relevant document is displayed, simultaneous editing of the document becomes possible. In classic wikis, editing conflicts occur when multiple users access a document at the same time, because one user’s saving process might overwrite the changes made by another. Classic wikis use different strategies to tackle this problem. Some of them lock the document from further editing when one user enters the edit mode. This prevents an editing conflict, but also rules out the possibility of simultaneous editing. Other classic wikis only warn the users about a possible editing conflict upon saving, and leave the next steps to the users themselves. A third

FIGURE 1.6
Comparison of different versions in a typical wiki.

The page shows a typical feature of version management used to compare different versions of the document stored in the wiki.
The Wiki Principle

Type of classic wiki tries to integrate the changes from different users into the document automatically, while indicating potential conflicts directly.

WHAT MAKES WIKIS SPECIAL?

The program has an attitude. The program wants everyone to be an author. So, the program slants in favor of authors at some inconvenience to readers. (Leuf and Cunningham, 2001)

Just like all tools, Wikis influence our thoughts and actions. Tools do not stipulate that we use them in particular ways, but they would suggest so. We would be reluctant to use a hammer to paint the wall, or a screwdriver to drive in a nail. Similarly, wikis also suggest certain ways of use. Wikis focus more on the content and less on the format of a text. The development process is of equal weight as the result. Wikis emphasize three design principles: simplicity, openness, and user activation (Döbeli Honegger, 2005).

Wikis are simple. The first principle in the invention of wikis was simplicity. Ward Cunningham described wikis as “the simplest functional online database.” With his invention of wikis in 1995, Cunningham massively simplified the editing of web pages and set a
foundation for future online text editors. Wikis require neither special programs nor browser applets, nor detailed technical knowledge such as HTML syntax rules. What they require is only a web browser, which is available on any computer. The graphical editor becomes available by simply clicking a button, and the most essential design options can be defined with only a few special characters.

Wikis are open. The first wiki created by Cunningham did not have any reading or writing restrictions. Cunningham assumed that any possible vandalism in a wiki could be contained easily by the majority of the well-intended users. This has been confirmed, by and large, to this day. Wikis do need to be protected from automatically registered advertisements. This is particularly true for highly exposed wikis such as Wikipedia, which requires additional protection mechanisms. Otherwise, though, an open wiki can be easily operated without the risk of being defaced or abused.

Wikis are welcoming. Wikis are not primarily intended for passive consumption. They encourage visitors to take part in the writing process. This is achieved mainly by the already mentioned design principles of simplicity and openness. Be it a typo on an external page or the submission of your own idea, wikis allow for an immediate correction, or the extension of a text, without facing big hurdles, consent, or preliminary work from a third party. The focus on active participation goes so far in favor of active users that the drawbacks for passive users are tolerated. Due to the additional options for editing and the limited choices of layouts, wiki pages are often less attractive than read-only pages—a wiki feature which is often criticized.

Classic wikis and wiki-like tools differ from other word-processing programs that allow for the creation of perfect-looking documents, due to the fact that classic wikis and wiki-like tools usually place more emphasis on the content and the editing process, rather than the format and the end product.

Wikis are content-focused. You can certainly format and structure texts with a wiki. Headings, as well as numbered and unnumbered lists, are available in practically all wikis, and characters can be made bold or italic. The simple capabilities are there, but so far most wikis do not offer complex formatting or design capabilities, since wikis focus more on the content and less on the format of a text.

Wikis are process-oriented. The link available on each wiki page for editing is an expression of the idea that a text is never finished and can be modified at any time. Version management of wikis provides access to all the development stages of a text, from the beginning to
the current date. In addition, specialized wiki pages, as well as RSS feeds and e-mail alerts, make keeping up with the changes easier.

**HYPOTHESES**

The references with the numbering system a00000 refer to the hypotheses in “Beats Biblionetz,” http://beat.doebe.li/bibliothek/index.html. Some links lead to sites written in German, while others connect to English articles and references:

- a00618 http://doebe.li/a00618
  Wiki promotes motivation in education and training
- a00619 http://doebe.li/a00619
  Wiki promotes the ability to assume responsibility in education and training
- a00653 http://doebe.li/a00653
  Wiki promotes media competence of students in school
- a00709 http://doebe.li/a00709
  Features of good teaching 02: intensive use of learning time
- a00742 http://doebe.li/a00742
  Revision of texts promotes their quality
- a00732 http://doebe.li/a00732
  Writing on the computer facilitates the revision of texts
- a00890 http://doebe.li/a00890
  Collaborative writing can promote learning
- a00889 http://doebe.li/a00889
  Wiki is very suitable for collaborative writing
- a00984 http://doebe.li/a00984
  Learning is an active process
- a00985 http://doebe.li/a00985
  Learning is a self-directed process
- a00986 http://doebe.li/a00986
  Learning is a constructive process
- a00987 http://doebe.li/a00987
  Learning is a situational process
- a00988 http://doebe.li/a00988
  Learning is a social process
- a01138 http://doebe.li/a01138
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- a01139 http://doebe.li/a01139
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