Teaching and learning online with wikis

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Wikis are fully editable websites; any user can read or add content to a wiki site. This functionality means that wikis are an excellent tool for collaboration in an online environment. This paper presents wikis as a useful tool for facilitating online education. Basic wiki functionality is outlined and different wikis are reviewed to highlight the features that make them a valuable technology for teaching and learning online. Finally, the paper discuses a wiki project underway at Deakin University. This project uses a wiki to host an icebreaker exercise which aims to facilitate ongoing interaction between members of online learning groups. Wiki projects undertaken in America are outlined and future wiki research plans are also discussed. These wiki projects illustrate how e-learning practitioners can and are moving beyond their comfort zone by using wikis to enhance the process of teaching and learning online.

Keywords: Wiki, online learning, collaboration, icebreaker

Introducing wikis

Ward Cunningham used the word wiki (the Hawaiian word meaning quick) to name the collaborative tool he developed for use on the Internet in 1994. Wikis are fully editable websites. Users can visit, read, re-organise and update the structure and content (text and pictures) of a wiki as they see fit. This functionality is called *open editing* (Leuf & Cunningham, 2001). All a user needs to edit and read a wiki, is a web browser. Consequently, the wiki has great potential as a tool for online collaboration. Wikis abound on the internet. A well known wiki is Wikipedia an online collaborative encyclopaedia, where anybody can edit and update the site content as they see fit (Wikipedia, 2004). The homepage of Wikipedia is depicted in Figure 1.
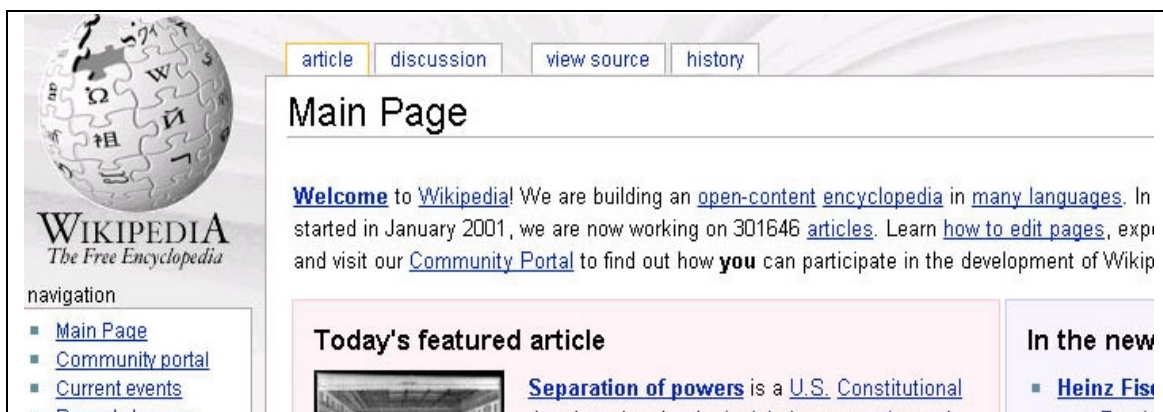

Figure 1: The Wikipedia wiki encyclopaedia home page

Wikis can be used to facilitate computer supported collaborative learning, CSCL. CSCL, first noted in the early 1990s, is the development of collaboration by means of technology to augment education and research. CSCL promotes peer interaction and facilitates the sharing and distribution of knowledge and expertise amongst a group of learners (Lipponen, 2002). Collaborative learning exercises are student centred and enable students to share authority and empower themselves with the responsibility of building on their foundational knowledge (Myers, 1991). Students can use wikis to create a set of documents that reflect the shared knowledge of the learning group. Wikis can also be used to facilitate the dissemination of information, to enable the exchange of ideas and to facilitate group interaction.

How wikis work

Wikis have two different writing modes, or styles of usage. The first is known as *document mode.* When used in document mode contributors create collaborative documents written in the third person. Authors leave their additions to the wiki document unsigned. As time passes, multiple authors edit and update the content of the document and gradually the content becomes a representation of the shared knowledge or beliefs of the contributors (Leuf & Cunningham, 2001). The second wiki writing mode is *thread mode.* Contributors carry out discussions in the wiki environment by posting signed messages. Others respond leaving the original messages intact and eventually a group of threaded messages evolves (Leuf & Cunningham, 2001).

Wikis have two states, *read* and *edit*. Wikis are in *read state* by default. *Read state* means that the wiki page looks just like a normal webpage, as is shown in Figure 2. When the user wants to edit the wiki page, they must access the wikis *edit state*. To edit a wiki, a user points their Internet browser to the wiki URL (eg.http:// www.wikipedia.org/) and clicks an edit button or link featured on each wiki page. Wikipedia provides a tab style format at the top of each page which contains a clickable link entitled 'edit this page' which users can click to access Wikipedia's *edit state*. The 'edit this page' tab is shown in bold at the top of Figure 2.

Figure 2: Users edit Wikipedia articles by clicking the 'edit this page' tab

Most wikis use a version of *wiki syntax* that helps users to format wiki content (eg. bold, underline and hyperlink text formatting). Users need to learn a set of basic mark up or syntax rules. Wiki syntax rules may vary depending on which wiki is being used. Some wikis, such as Wikipedia, do not require the user to know wiki syntax. Rather, an editing toolbar is provided so the user can type in their content and format it by clicking on the toolbar.

Figure 3 shows Wikipedia in edit state, the content in the text editing area has already been formatted using the editing toolbar. Consequently, it contains wiki syntax such as square brackets and apostrophes as well as text content. Once a user has added their contribution to the text editing area they click on a save button in the edit page to update the wiki content and return the interface to read state.

Comparing wikis

Each wiki has a unique set of features which can make it more suited for inclusion in an e-learning environment. This section highlights several administrative issues that can influence the selection of an appropriate wiki. It also provides a brief overview of common wiki features and discusses how these features can be used for teaching and learning online.

Figure 3: Wikipedia in edit state

Wiki clones and administrative considerations

Simply put, wikis are a collection of program files or scripts which run on a web server. There are many different wikis, called wiki clones which can be downloaded free of charge on the Internet. Wiki clones are written in a variety of programming languages. The reason for this is that wiki code is available under the GNU General Public Licence, meaning the code is freely available to be reviewed and adjusted by developers. As a result, developers can translate the wiki code into their preferred programming language, which enables them to manipulate the code with ease. Many wiki clones are written in PHP, a common Internet scripting and programming language. However, wikis are written in a variety of languages including Perl, Ruby and Java, to name a few.

Wikis have a variety of features, such as user authentication, which are useful in an e-learning setting. However, not all wiki features are enabled by default upon installation. Implementing advanced features sometimes requires the location and manipulation of individual lines of program code in the wiki source files. Consequently, wiki administrators need to be familiar with the programming language that their wiki is written in. This will allow them to change administrative and installation settings with ease. Some wiki clones, such as MediaWiki store wiki site content in a database (MediaWiki, 2004). Others store wiki site content in flat files, as is the case with PMWiki (PMWiki, 2004). Wiki administrators should be familiar with the storage format used by their wiki so they can implement backup and recovery procedures and perform administrative and installation tasks.

Comparing wiki features

Table 1 compares several features of three different wikis written in PHP. These wikis were considered for use in the Deakin University wiki project, discussed later in this paper because the wiki administrators were familiar with PHP. The sample presented here is by no means exhaustive, but it is included to compare and contrast the features that impacted on the wiki selection process: edit style, image support, authentication and tracking.

Table 1: A comparison of wiki features

Wiki Clone	Edit Style	Image Support	Authentication	Tracking	Sophistication
MediaWiki	Toolbar	Uploads and inline	Supported	User and IP	Moderate
PMWiki	WikiSyntax	Uploads and inline	Page password protection	IP	Basic to moderate
PhPWiki	WikiSyntax	Inline	Not supported	IP	Basic

The edit style of most wiki clones (including PMWiki and PhPWiki) is such that users must know wiki syntax to edit effectively. However, wiki syntax can be confusing to novice users. MediaWiki provides an

editing toolbar for users to format their posts, making editing a wiki relatively simple for a novice because they do not need to learn wiki syntax rules.

Not all wikis support the upload of images. Depending on the nature of the planned e-learning exercise this functionality could be a key issue in the selection of a wiki clone. When uploads are supported, as is the case with PMWiki and MediaWiki, users can place a copy of an image on the server that hosts the wiki, for use in their wiki posts. An alternative to this, inline images, requires the user to include a reference to an image stored on another server in their post. PhPWiki only supports the use of inline images.

Most wikis support tracking of wiki edits or updates. Tracking is useful for wiki administrators as it allows all wiki updates to be monitored and student participation to be assessed. Tracking is usually implemented as a 'recent changes' page accessible from the wiki's homepage. This page has a list of all the wiki pages that have been edited in a specified time period. When users are able to login to a wiki and be authenticated, the recent changes page will attribute the changes to a specific user name, rather than the more common method of listing the anonymous user's IP address. Of the wikis reviewed only MediaWiki supported full user authentication and tracking.

Because MediaWiki users can be authenticated they also have access to a signature tool and a personal user page on the wiki. The signature tool appears as an icon in the wiki editing toolbar. If the signature tool is clicked when the wiki is in edit state, a signature (wiki username) is added to the editing text area. The signature is actually a hyperlink that when clicked, accesses a personal wiki user page. Signatures and user pages can aid students in building an online identity in the wiki environment.

Wikis comprise many and varied features that contribute to their sophistication. Of the three wikis contrasted in Table 1, MediaWiki was considered to be the most sophisticated largely due to its editing style. However, MediaWiki's support of authentication, signatures, user pages, tracking and images also contributed to its being chosen for use in the Deakin University wiki project.

E-learning at Deakin University

Deakin University, in Victoria, Australia offers dual mode delivery of higher education degrees to students. Approximately half of Deakin's student body completes some or all of their degree through distance education (Calvert, 2001). Deakin comprises several campuses throughout Victoria. A given subject may be offered simultaneously at multiple campuses, as well as off campus (Augar, Raitman, & Zhou, 2004).

The School of Information Technology has many units that are offered at two campuses and in both on and off campus mode. Inline with University policy to promote online education, students completing a degree in Information Technology must complete an entire subject online (Deakin_University, 2003). This is achieved through Deakin's e-learning environment, DSO, Deakin Studies Online (Coldwell, 2003).

DSO is facilitated by WebCT Vista and provides bulletin boards, synchronous chat rooms, whiteboards and the like for communication and collaboration. Static course content is delivered in HTML, PDF or PowerPoint formats. DSO also provides tools for management of assignments, assessment as well as class management (Coldwell, 2003). Deakin is continuously developing its e-learning environment to enhance the experience of all distance and on campus learners (Augar et al., 2004).

Previous research

Ongoing research at Deakin University uses anonymous student surveys to evaluate student attitudes about learning online using DSO. Participants in a 2003 survey had completed a third year Information Technology subject called 'Computers, Society and Professional Ethics' entirely online (Augar et al., 2004). For most students this was their first experience of learning in an online environment. Results showed that 50 per cent of students found the experience unsatisfactory, as shown in Figure 4. Many cited frustration with technology and lack of interaction with peers and instructors as contributing factors to their lack of satisfaction.
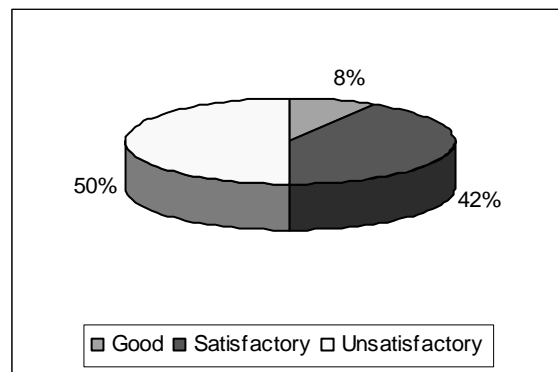
Figure 4: Students' view of learning online

Additional survey questions related to the students' participation in the asynchronous discussion forums which acted as online tutorial classes. Students participated in discussion groups of approximately 10 members. They talked about the content of prescribed readings and completed group tasks like compiling documents based on the results of their discussions. Only 42 per cent of students surveyed indicated that all group members participated in the discussions. Of the students that did participate in discussion, almost half joined in on a weekly basis, as shown in Figure 5.
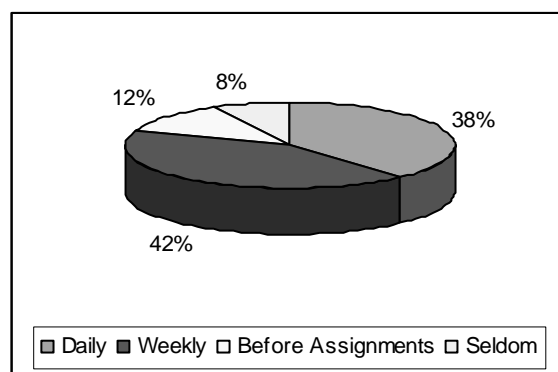
Figure 5: Dialogue frequency

The first task completed by students as part of the unit was the publication of a single page biography in their discussion forum. It was envisaged that group members would read the biographies and use them to as a means to get to know their fellow group members, facilitating ongoing interaction throughout the duration of the unit. However, rather than lively interchange of ideas and construction of knowledge in the discussion forum, many students added a single post just before the deadlines and no real discussion or interchange of ideas occurred.

Using wikis to break the ice
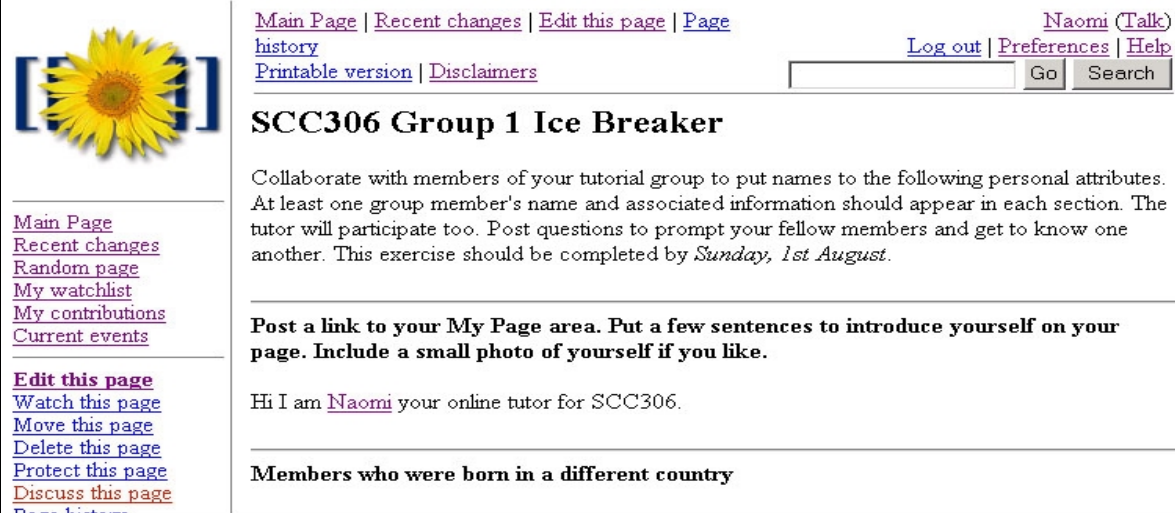
In an attempt to remedy the lack of interaction noted in online discussion groups in previous years, a traditional icebreaker exercise used in classroom situated tutorials at Deakin University was adapted for use on a wiki. The premise for developing the icebreaker exercise was to explore new ways to help students get to know the other members of their online learning groups. Future research aims to evaluate whether the icebreaker exercise encouraged ongoing interaction throughout the duration of the semester.

The icebreaker exercise

In a classroom situated environment the icebreaker exercise consisted of a list of questions printed on a piece of paper. Sample questions include: 'Find someone who has the same colour car as you?' or 'Find someone who speaks a language other than English.' Students must list the name of at least one other class mate under each of the questions. Usually there are about 15 different questions, 20 students and the activity takes about 20 minutes to complete. Students get up and circulate in the classroom, asking each

other questions, to try to locate people who match the criteria outlined in the questions. In completing the exercise they introduce themselves to their other classmates. Because all students are participating the exercise creates a non threatening way for students to introduce themselves to others in the class. Observation indicates that students respond well to the exercise, establishing new friendships that continue throughout the semester.

The success of this classroom situated icebreaker led to the adaptation of the exercise for use on the School of Information Technology Wiki, or SITWiki. Students participated in wiki groups comprising approximately ten members. Each group had their own icebreaker document on the wiki to complete as a group. Questions similar to those used in the classroom situated exercise were included in the icebreaker document. Students had two weeks to update the document in thread mode so that every question had at least one group member's name underneath it. The icebreaker document was seeded with information about the group's tutor (online group teacher or facilitator). This was done to introduce the tutor to the group, and to model appropriate wiki usage and social presence to group members. A partially completed example is shown in Figure 6.

Figure 6: The SITWiki icebreaker exercise

Signatures and user pages

Students were encouraged to sign their posts using the SITWiki signature tool, so that other group members could attribute the posts to the appropriate person and get an appreciation of their character. Students were also encouraged to include a photo of themselves and a few brief sentences about themselves on their user page. Tutors also completed this task to model the process of constructing an appropriate online identity. An example of a tutor's user page is shown in Figure 7.

Wiki security and tracking

Possible problems faced when using wikis for e-learning include inappropriate posting of content and unintentional deletions. Several precautions were taken by SITWiki administrators to ensure that problems relating to the security of wiki content could be avoided if possible and could be rectified if they did occur.

The first step was the development of a set of four clear usage guidelines. Powazek (2002), advises that usage guidelines should be short, simple and written in a positive tone. Consequently, the SITWiki Commandments were developed and are depicted in Figure 8. The guidelines encouraged users to be considerate of others and be active and friendly in their wiki posts. The SITWiki Commandments appeared in a disclaimers page that is a default feature in MediaWiki. A link to the disclaimers page appears on every page in the SITWiki. In addition a link to the SITWiki Commandments was placed

above the 'save button' within the editing interface. This ensured that users were reminded about the usage guidelines every time they made a post on the wiki.

Figure 7: The SITWiki user page for Naomi Augar

In addition to the usage guidelines, tracking and authentication mechanisms was implemented to deter students from making inappropriate posts and deletions from the wiki. Because students had to login to edit the wiki, every post or edit could be attributed to an individual student. A note asking students to be aware that usage could be traced back to them was also included as a footnote to the SITWiki Commandments to deter intentional misuse. SITWiki included a rollback feature which could be used by administrators to repair any deletions or misuse as required. The SITWiki database was also backed up nightly to prevent loss of data in case of system failures.

Figure 8: SITWiki Commandments

The wiki icebreaker in review

SITWiki hosted 451 users who actively participated in the icebreaker exercise. Sixty eight per cent of active participants added some text to their user page. All users signed their posts and 92 per cent used the signature tool to do so. However, the remaining 10 per cent of students did type their name in plain text to sign their posts.

Many students added their picture to their user page, a total of 87 pictures were uploaded and displayed by wiki users. A popular icebreaker question asked users to add a post to tell the group if they had pets.

Some students chose to upload a picture of their pet instead of a picture of themselves. Many linked the images of their pet to their posts responding to this question, other students added a picture of their pet to their user page.

Virtually all students participated actively and introduced themselves to each other by answering the questions. The School of IT at Deakin University has a very culturally diverse student body, so questions relating to culture were devised bearing this in mind. The students were very candid in disclosing information about their cultural background, such as where they were born, what languages they spoke and what countries they had lived in.

Overall the wiki proved to be a good technology for online collaboration. All participating students completed the exercise to a satisfactory standard, proving they could use the wiki in the process. Throughout the two week duration of the icebreaker exercise there was no misuse or intentional deletions from the wiki indicating that the security measures taken were adequate and effective.

The wiki technology itself proved to be robust, supporting close to 500 users over a period of two weeks with no service outages. When the SITWiki was installed it was seeded with icebreaker documents for 50 student groups, several tutor user pages and many help pages; approximately 100 pages in total. Throughout the two week duration of the exercise the number of pages increased steadily each day to a final tally of over 1000 pages. Every day the wiki had between 1000 and 2000 page views, or hits. The editing statistics depicted in Figure 9 mirror this trend of consistent usage over the two week exercise. Each day the wiki was edited approximately 150 times and there were over 2000 wiki edits in total.
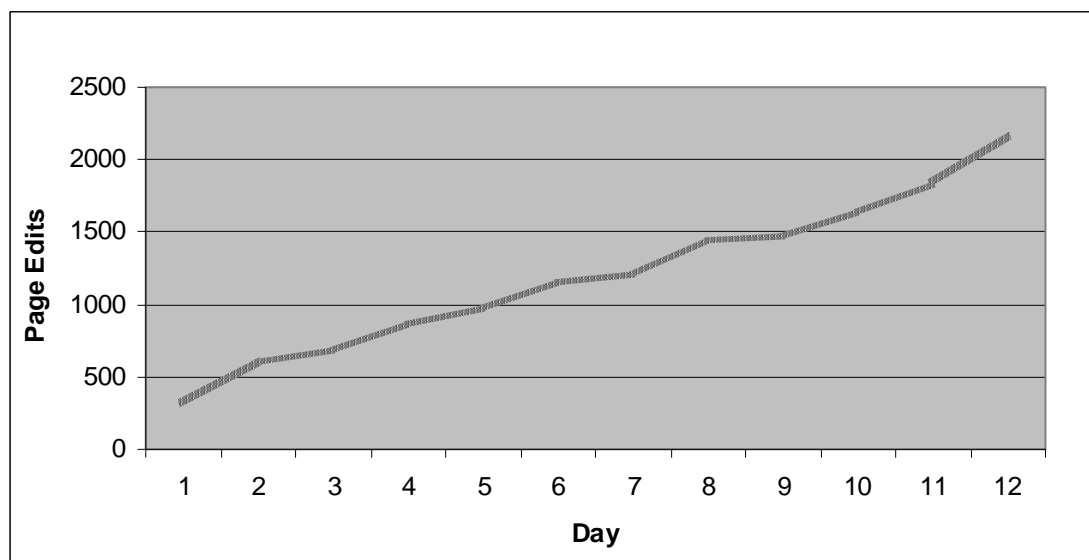

Figure 9: SITWiki page edits

A goal of the icebreaker exercise was to have students return several times to the wiki to read the new posts from their group members over the two week exercise period. Observation of usage by staff during the exercise combined with the data presented here indicates that the goal of consistent, repeat wiki usage by students was met. Surveys will be used to gauge whether the students felt that the wiki was an effective e-learning tool at the end of the 13 week university semester.

Future research

The wiki exercise presented here is purely social in nature, but it illustrates a possible use of wikis in an e-learning environment. Another project underway at Deakin University at present encourages students working in project groups to use a wiki to disseminate information to their fellow group members, such as the time of future group meetings and the like. There is no structured task for students to complete on the wiki (as was the case with the icebreaker exercise). Students are able to use the wiki as they see fit to facilitate the completion of their assigned projects. Users of these project group wikis are not

authenticated. Research aims to observe whether the lack of authentication and a structured exercise impacts upon the students' motivation to participate in the wiki environment.

Wikis have also been used at Georgia Tech in America to facilitate CSCL. The Georgia Tech wiki, known as *CoWeb* was used to enable students to create documents as a group, to review articles and post comments, to create informational resources similar to Wikipedia and to disseminate information amongst the student body (Leuf & Cunningham, 2001). Whilst wikis can be used in both thread and document mode, they are primarily designed for the creation of collaborative documents, in document mode. The collaboration that takes place in the shared virtual space of the wiki over a period of time means that wikis are touted as potential community building tools (Leuf & Cunningham, 2001).

Future research at Deakin University aims to use wikis document mode to enable students to collaborate in the creation of information repositories. The goal of this research is to further explore the e-learning potential of wikis and to gauge the community building potential of wikis in the process. Similarly, a survey to be completed by SITWiki users at the end of the current university semester shall be used in conjunction with discussion analysis techniques to evaluate whether the icebreaker contributed to ongoing student interaction throughout the duration of the unit.

Conclusion

This paper introduced wikis and explained how they work. It highlighted the fact that many wikis exist, each having varying sets of functionality and features. A brief analysis outlined the features that make some wikis suitable for use in an e-learning setting. Selecting a wiki that is easy to use is important; for instance wikis that support a simple edit style, by including an editing toolbar, are easier to use than those requiring the knowledge of wiki syntax. However, additional features such as authentication and tracking are required for wikis to be suitable for teaching and learning online. Authentication enables all wiki edits to be traced back to the author, enabling the assessment process. Tracking helps to secure wiki content against possible misuse and intentional deletions.

Finally, wikis were used successfully to enable hundreds of students to participate in a collaborative icebreaker exercise at Deakin University. This project illustrated how e-learning practitioners can use wiki technology to enhance social interaction amongst students online. However, wikis can also be used for the dissemination of information to the student body, for building information repositories or for the collaborative production of documents.

Wikis are freely available, reliable and relatively easy to use. However, they are not yet widely implemented in the education arena. Projects such as those underway at Deakin University at present illustrate how e-learning practitioners can, and are, moving beyond their comfort zone by using wikis to enhance both teaching and learning online.

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