Wikis, collaborative learning and peer assessment: Effectiveness, implementation and impact

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From slate boards to television to digital media projectors, the use of technology has been a critical part of teaching and learning in classrooms throughout history. Research and academic study guided the introduction of these technologies but for the most part, these technologies conformed to the broadcast style of learning where the teacher or technology was the transmitter of information and the student was the receptor of knowledge (Tapscott, 2009). However, as the digital generation has evolved, the emergence of Web 2.0 technologies has given educators a wide array of new tools to assist students in the acquisition of knowledge. These technologies support a more interactive approach to learning, where students are encouraged to collaborate and discover as a group. One such technology is a wiki. A definition from the most famous wiki, Wikipedia, defines it simply; “A wiki is a collaborative web application” (Wiki (disambiguation), Aug 9, 2009). Expanding on this, a wiki is essentially a website where multiple users are encouraged to collaborate by adding and editing information on a given topic or subject. A key component to the effectiveness of a wiki is its simplicity. They are accessed using a web browser and require no additional software or hardware in order to be accessed by multiple users. A successful wiki requires collaboration and the involvement of many people working to build knowledge in a specific area. This has the potential to dramatically impact education, as students are able to work together to build knowledge and develop ideas.

Collaborative learning shifts the responsibility for learning from a group leader to the group members, which actively involves all group members in the learning process (Stewart, 1988). Wikis and collaborative learning also lend themselves to peer assessment. This form of assessment, where students give input and feedback on the work of their peers, can enhance student’s higher order thinking skills while improving motivation (Tsai, Liu, Lin & Yaun, 2001). This essay proposes that using wikis in classrooms can enhance the use of
both collaborative learning pedagogy and peer assessment, both of which are have been shown to be highly effective tools in increasing student achievement.

Collaborative Learning

Collaborative learning is a movement that emerged in the 1960’s and gained support in education through the 1970’s (Bruffee, 1984). Smith & MacGregor (1992) define collaborative learning as “an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product” (p. 10). The educational benefits of collaborative learning were first discovered through research in the field of medicine, where small groups of students working collaboratively were able to learn the process of patient diagnosis better than students working individually (Bruffee, 1984).

In the field of education, collaborative learning has been shown to be an effective way of developing higher order reasoning and problem solving skills while improving student motivation (Smith & MacGregor, 1992). It has been shown that collaboration “promotes and improves learning, and is an important factor in academic achievement, personal development and student satisfaction (Elgort, Smith & Toland, 2008, p. 197). Collaborative learning is an important teaching tool because the learning is interactive. Students no longer passively receive information from the teacher; they actively participate in the learning process. This heightened level of interaction increases stimulation for both the teacher and students, which increases motivation by having them more actively engaged in the subject matter (Rada, Acquah, Baker & Ramsey 1993; Smith & MacGregor, 1992). Rada et al (1993) studied the effectiveness of collaborative learning using computers and found
“that grouping does not reduce, but frequently improves achievement and attitudes when learning from the computer. Learning in small groups is often more effective than learning alone, in both traditional, and computer environment” (p. 225).

The key components of effective collaborative learning involve beginning with problems and allowing students to gather facts, share ideas and reach a common understanding as a group. They are engaged in the process because they are able to experience and discover knowledge in an interactive environment. For an individual, listening to and clarifying the ideas of others is equally as important as their own contributions (McKinley, 1983). The process of collaborative learning is successful when students are able to exchange thoughts and ideas freely and offer constructive feedback to group members.

Peer Assessment

An integral component of collaborative learning is peer assessment or peer learning (Prins, Sluijsmans, Kirschner & Strijbos, 2005). Peer learning is described as a process “which involves students teaching and learning from each other. It involves a sharing of ideas, knowledge and experiences and emphasizes interdependent as opposed to independent learning” (Keppell, Au, Ma & Chan, 2006, p. 453). Peer assessment can be a formal process whereby grades are assigned based on student evaluations, or it can be completed through an informal process where students discuss assignments, projects and tests in a more casual setting (Keppell et al., 2006). The latter is a form of formative assessment, which is an effective way for students to gauge their learning in relation to that of their peers. Effective peer learning creates a mutually beneficial environment where both the assessor and the assessee gain from the interaction. There is no power struggle in
formative peer assessment as the high stakes nature of evaluation is eliminated. “The reciprocal nature of the activity is key as students do not hold power over each other by virtue of their position or responsibilities” (Keppell et al., p. 454). Two central mechanisms exist on which effective peer assessment can be based, individual accountability and positive interdependence. “Individual accountability refers to the extent to which group members are held individually accountable for the jobs, tasks or duties, central to group performance or group efficiency … Positive interdependence refers to the extent that the performance of a single group member depends on the performance of all other members” (Prins et al., 2005, p. 420 – 421).

Peer assessment is a highly effective teaching tool because it assists students in identifying their strengths and weaknesses and the feedback helps to guide them towards the achievement of specific learning goals outlined in the activity (Prins et al., 2005). Peer assessment has also been found to be effective in improve student writing skills and is linked to improvements in teamwork and interpersonal skills (Keppell et al., 2006; Xiao & Lucking, 2008). Students enjoy feedback from their peers as it allows them to judge their own level of understanding and abilities, however students can have difficulty accepting criticism (Davies, 2000). Effective peer assessment can cause students to take more care in their own work as they know that their peers will read it and it can allow students to be more self critical by looking at their work from the point of view of an assessor (Davies, 2000). Some of the challenges of peer assessment are that students can be dishonest in giving feedback because of the social relationships of the group, and that a lack of trust between group members can cause students to be hesitant to give constructive feedback at all (Prins et al., 2005; Xiao & Lucking, 2008). In order to avoid these challenges it is integral that students be supported in, and explicitly taught, the skills of assessing their peers.
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As stated previously, a wiki is a web-based application that allows any authorized user to add, edit or delete content, as well as add new pages (Clyde, 2005). Some wikis are available to everyone (ex. Wikipedia), while others require moderator authorization by use of a password. All wiki software is available through an ordinary web browser and thus it is a highly accessible technology for schools and teachers. With their ease of use, wikis are a valuable teaching tool for the classroom of today, however, when used effectively, wikis have the ability to directly support and enhance the use of collaborative learning pedagogy and formative peer assessment, which makes them an indispensable resource for the classroom teacher.

In a typical high school classroom, collaboration is hindered by several restraints. Time is the first barrier, as the teacher and student are only available to meet for a certain time period each day. This creates the second barrier of population, whereby only the teacher and students available during the specified time period are able to take part in the collaboration. Thus, a high school science class that may have two or more sections is unable to collaborate and share ideas, which devalues the learning experience. The use of a wiki solves this problem by allowing multiple users from multiple classes the ability to access and contribute to the learning at any given time.

Achterman (2006) describes five features of wikis that make them effective means of facilitating collaboration in the classroom: ease of use; spaces for students to create products individually, in small groups, and as a whole group; ability to create a nonlinear document structure through hyperlinks; a built-in mechanism for reflection and metacognition; a means of tracking individual, small group, and whole group progress through an assignment (pp.
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20–21). These five features describe how a simple web-based technology can have a significant impact on learners through the application of collaborative learning.

A key feature of wikis is the ability to track and monitor individual participation in the group collaboration, which creates accountability as students have instant access to the level of participation of all group members. The web-based structure of wikis allows for asynchronous communication where students have the ability to access group work at any time, which fosters cooperation over competition (Parker & Chao, 2007). A wiki demonstrates the ability to effectively support and enhance collaborative learning in the classroom through many of its inherent functions. “Wikis can serve as a knowledge platform for a community of practice where members of the community can share their knowledge with the group, put up interesting pieces of information, work together, discuss issues, etc. Wikis are characterized by some of the elements fundamental to a successful community of practice, including a virtual presence, a variety of interactions, easy participation, valuable content, connections to a broader subject field, personal and community identity and interaction, democratic participation, and evolution over time” (Parker & Chao, 2007, p. 58). Wikis also support collaborative learning by transferring organizational ‘housekeeping’ tasks from the teacher to the group, which fosters a sense of ownership and control over group learning (Elgort et al., 2008).

Research on the effectiveness of wikis in supporting collaborative learning has shown positive results both in terms of researcher observation and student feedback. In studying the use of a wiki as an instructional tool, Aharony (2009) found “The majority of the interaction on the wiki centered on content-related comments and contained both collaboration among the students and use of deep levels of cognition. This finding is encouraging, as it reflects the profound levels of discussion and interaction that may take
In their study on the use of wikis in secondary social studies, Heafner & Friedman (2008) concluded “Wikis also mediated a more collaborative and communicative learning environment in which students initiated questions, answered peer questions, engaged the teacher in individual dialogue, and conversed with peers about their wikis both socially and as part of the final critique of the project. Students frequently made comparisons of images, showcased visuals, and commented on peer wikis” (p. 296). Student feedback has also demonstrated support for wikis in classroom as students felt that “wikis encouraged better individual participation and were a good tool for collecting and organizing information for group projects” (Elgort et al., 2008, p. 208). This research demonstrates the positive effects of wikis in supporting collaborative learning in the classroom.

The use of a wiki is also highly effective in supporting the effective implementation of formative peer assessment. When using a wiki as writing tool students are required to review and reflect upon their work and the work of others. They are then required to offer feedback to other group members or they are able to develop new ideas built upon the ideas of others. A major advantage of this “is that it encourages students to take responsibility for their own learning by communicating with other students, providing feedback to other students and receiving feedback from other students within the group setting” (Keppell et al., 2006, p. 462). In order to support peer assessment, a wiki must be able to support its two central components; positive interdependence, the linkage of individual success with group success; and individual and group responsibility, the equal distribution of work and participation. Wiki technology creates positive interdependence “by making it possible for individuals to contribute towards a joint assessed outcome” (Elgort et al., 2008, p. 195). A wiki creates an environment where a student’s individual success is tied to their participation in the group, and the development of ideas by the group. Thus, the student’s individual
success is directly related to the success of the group, which is a key component of effective peer assessment and collaboration. Individual and group responsibility is also supported by wikis as they create a transparent and accountable structure for group work that solves two of the main challenges of participation in groups; the attempts to dominate group work by some and to avoid group work by others (Elgort et al., 2008).

Bennett (2002) argues that the incorporation of technology into assessment is an inevitable consequence of society’s shift from traditional skills to technological ones. He states, “Knowing how to do intellectual work with technology—to model a problem using a spreadsheet, create a presentation, use data analysis tools, find information using the Internet, or write and revise a paper with a word processor—is becoming a critical academic skill … Perhaps more important for assessment, however, is that technology is also becoming a medium for learning and work … Writing presents a good example: More and more, students are using the computer to complete composition assignments; however, research suggests that testing these students on paper underestimates their proficiency” (Bennett, 2002, p. 7–8). Wikis provide an engaging, interactive and collaborative medium for teachers to provide this technologically rich learning environment for students that will give them the critical skills needed for success in the current digital landscape. Wikis also provide the technology for teachers to shift their assessment practices to a model that greater reflects the way in which students learn. Bennett correctly identifies the need for caution in beginning the transfer to using technology for assessment; “Given the dangers, one can see why some states chose to begin the transition with low-stakes assessment” (Bennett, 2002, p. 14). Wikis create an environment that lends itself to low-stakes assessment and formative peer assessment is an excellent starting point from which to begin this paradigm shift. If collaborative learning and problem solving are seen as integral skills
needed for success outside of the classroom, students need to be assessed using this pedagogy in order to develop and improve their competencies and skill sets.

**Implementation**

When planning the implementation of wikis in the classroom there are several key considerations that must be taken into account. The first is the type of wiki that will be used in the classroom. In the collaboration wiki, the focus is on the creation of a single document by anyone who is authorized to contribute. This wiki uses the contributions of group members to create a final product that incorporates ideas from all members of the group (Clyde, 2005). The discussion wiki tracks an individual’s contribution to the discussion in a form similar to a conversation with the resultant product looking more like a weblog or blog (Clyde, 2005). There are benefits and disadvantages to both types of wiki and it is the teacher’s expectations that will determine which type of wiki is to be implemented.

The teacher must also consider their expectations for the finished product. Is the emphasis for the activity on the finished product or is the process of learning, sharing and collaborating more important? How will you assess student work? Rubrics can be developed to clearly define expectations with regards to participation and the final product and how will peer assessment be used (summative vs. formative)? Teachers must also consider access to technology, as not all students will be able to access the wiki page outside of school. Content coverage is an important consideration, especially if students go in a different direction than what was intended. The teacher must then decide whether to intervene and return students to the desired content area or allow them to explore the area they have chosen. There are several ways in which a teacher can implement wikis in the classroom including: using a wiki to develop research projects; summarizing ideas from
classroom or independent reading activities; creating concept maps or links between ideas; presenting information; and group authoring on a single document (Parker & Chao, 2007).

There are also several key considerations for administrators with regards to the effective implementation of wikis. Providing support for teachers in this process, through the allocation of time and/or resources, can allow them to collaborate with other teachers which further enriches the learning environment for all involved. Admin must also ensure consistent access to technology, in this case computers and Internet access, which will allow the activity to run smoothly. There are some safety and privacy concerns with regards to wiki use that administrators must consider. These include parental permission for students to publish work on the Internet, enforcement of the school network etiquette policy and ensuring that student privacy is respected during the process. Administration is also responsible for ensuring that a link to curriculum objectives is present in all activities and they should work with teachers to connect this technology to the appropriate objectives.

**Deficiencies and Problems**

Although the use of wikis has shown a positive impact on collaborative learning and peer assessment, there still exist some challenges in regards to their use. One of the biggest issues relates to the posting of information to the wiki site. “All contributors should be aware that editing of content is a natural and discursive feature of the wiki, and that collaborative learning requires negotiation of meaning and frank exchange of ideas. Students should understand that once the ‘send’ button has been pressed, the idea no longer belongs exclusively to the originator, but now becomes the property of the whole learning community” (Wheeler et al., 2008, p. 994). Students must be made aware of the fact that when they post something to a wiki site it is available for all members of that wiki to see and
interpret. This level of accountability can create an atmosphere of trust and respect as the wiki develops but create challenges if comments do not adhere to this expectation.

Teachers also face challenges as wikis require them to release the locus of control for student learning and this can be a difficult process for both the teacher and students. Assessment poses a challenge because even though peer assessment has been shown to be an effective method of improving students learning, it does promote some degree of controversy as students (and/or parents) may disagree with this process.

Conclusion

The use of wikis in the classroom enhances the use of both collaborative learning pedagogy and formative peer assessment while having a significant impact on learners. Collaboration enables students to gain control over the direction and content of their learning and has been shown to increase student motivation and achievement. Formative peer assessment is an important tool in providing immediate, relevant feedback to students, which promotes deeper cognitive understanding of concepts and an increased use of higher order thinking skills. Wikis give teachers the ability to support both of these important pedagogies in a simple, accessible and interactive format that meets the needs of the digital generation.
References


