
University students' experiences of their use of wikis in collaborative learning

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Abstract

This paper presents the findings from a survey of university students about their experiences in the use of wikis as a tool in collaborative learning. The study targeted only students who had had prior experience in the use of wikis in collaborative learning. Although the survey instrument was designed with a number of key areas of investigation, this paper presents only the findings of the students' experiences of their use of wikis. This includes questions about their proficiency level with wikis, whether they were adequately prepared for working with wikis, their experiences and their suggestions of how wikis could be better utilised in teaching and learning practices.

The findings suggest that participants have had positive learning experiences, including the ability to work together as a team, contributing to a shared knowledge, and having a better understanding of the subject matter. The exception was in the area of orientation to the wiki learning environment, in particular, strong evidence was found of very little, or a lack of, appropriate preparation of participants for collaborative work in wikis. The findings highlight the importance of clearly articulating the design, the learning intentions and the expected outcomes of collaborative learning using wikis (or any technology for that matter), not only at the onset but throughout the learning activity.

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Introduction and background

The ability to work as part of a team and having a well-developed set of interpersonal skills were listed by employers among the top ten skills/attributes sought in university graduates (Victoria University of Wellington, 2016). They were also identified as core transferable skills valued by employers in the workplace by the University of Dublin (Curry, Sherry & Tunney, 2003), and the Graduate Careers Australia's (GCA) survey of employers in Australia and New Zealand (Graduate Careers Australia, 2006, 2015). So, in over a decade of research, evidence suggests that teamwork is rated highly as a graduate outcome.

The University of South Australia (UniSA) has developed a set of seven graduate qualities (GQs) as the outcomes it seeks for its undergraduates. One such GQ is dedicated to developing teamwork, i.e. "a graduate of UniSA can work both autonomously and collaboratively as a professional." Further, each graduate quality has associated indicators. For teamwork, they are as follows.

A graduate will:

- work in a self-directed way
- use logical and rational argument to persuade others, to negotiate with others
- work collaboratively with different groups, identify the needs of others and build positive relationships
- provide leadership within a team context by understanding responsibilities for organisation, planning, influencing and negotiating
- work in a team (cooperate with all team members, share ideas, forgo personal recognition, negotiate solutions when opinions differ, resolve conflict, recognise strengths of other team members, share responsibility, convey a shared vision for the team, display a commitment to make the team function effectively).

(University of South Australia, 2010)

The indicators are very important in that learning objectives and activities can be designed to assist with the development of that specific graduate attribute.

The project "Developing a teaching and learning framework for students' collaborative work in wikis" was funded by a university teaching and learning priority grant. The focus of the project was to investigate how wikis could reinforce and develop the graduate attribute of "working collaboratively" through "teamwork" by examining how students worked collaboratively in wikis. This paper focuses on exploring the experiences students had when they used wikis as a platform for collaboration.

Literature review

Effective student participation in collaborative knowledge creation and sharing is an important learning outcome for higher education courses. It contributes to students feeling that they are becoming members of a professional community of enquiry (Lipman, 1991). Current higher education literature identifies the importance of cooperative and collaborative learning through groupwork at both undergraduate and postgraduate levels. According to Barkley, Cross and Major (2005), collaboration promotes and improves students' learning; in fact, it is an important factor in academic achievement, personal development and student satisfaction. Encouraging active learning and collaboration through groupwork is also an important aspect of UniSA's teaching and learning framework and graduate qualities.

Increasingly technology is being used to facilitate collaborative learning activities in higher education. Wikis are viewed as making collaborative learning and groupwork possible; its uses have been known to encourage students to engage in flexible teaching and learning environments (see for example, Chu et al., 2012, Ku et al., 2013). As an online platform, wikis "allow[s] one or more people to build up a corpus of knowledge in a set of interlinked web pages, using a process of creating and editing pages" (Franklin & van Harmelen, 2007, p. 5). The technology supports on-campus students and those who are geographically dispersed to learn collaboration through groupwork, by making it possible for individual students to contribute to a jointly assessed outcome. Wikis have been used for a wide

range of learning activities and provide students with multiple opportunities to demonstrate collaboration, organisation, cooperation, cognition, and emotion (Biasutti, 2011; Cole, 2009; Sheehy, 2008) depending on the academic's teaching approach and the course learning objectives.

Wikis have multiple uses in teaching and learning activities in higher education. Aside from the use of Wikipedia as a source of information, students can use the software to brainstorm and share ideas, and list, categorise and share information with other students. More importantly, wikis have been identified as central to cooperation and collaboration in the learning experience. While cooperation emphasises the organisation of tasks amongst learners, collaboration requires that tasks be completed together. Collaborative writing is a learning activity supported by wikis where students collaborate to create products such as glossaries, manuals or reports (Ben-Zvi, 2007). Collaborative writing also encourages students to reflect, share knowledge and think critically about their shared writing activities (Hadjerrouit, 2011). The development of meaning when students co-construct knowledge and reflect on the changes they make to the knowledge base they are creating (Tetard, Patokorpi & Packalen, 2009) is another outcome of collaboration in wikis. Other services to which wikis have been put to work include intercultural learning and communication (Wang et al, 2013) and the use of wikis to aid reflection on epistemological beliefs (Cho & Huang, 2014).

While the valuable role of wikis for collaborative learning is well documented, there is a need to understand students' experience of using wikis for learning which could inform the design of future wiki learning environments and consequently impact student participation. Canole, de Laat, Dillon and Darby (2006a, b) reported that student frustrations with wiki applications could be attributed to the misuse of the technology or to the academic's oversight in providing appropriate support for the technology itself. Poor participation in formal wiki learning environments have been linked to students' differing views (to those of academics) of the use of wikis in learning environments when compared with their own (the students') personal use of wikis for social purposes (Cole, 2009); student frustration with the technical issues related to wiki applications or with academics' knowledge of the wiki tool (Canole et al., 2006a, b); and student reluctance to engage in the instructed use of wikis for groupwork (O'Shea et

al., 2006). Elgort, Smith and Toland (2008) reported that using a wiki did not guarantee that individuals would work together as a group and that the use of wikis was not enough to counteract some students' preference for working alone rather than as part of a team. Neumann and Hood (2009) reported no evidence that the wikis improved learning outcomes over and above similar work conducted on an individual basis.

In other words, there is an emerging plethora of academic literature discussing the use of wikis in learning. Despite this literature, there is a shortage of empirical data regarding students' experience in using wikis in their learning. Thus, this paper presents some aspects in this gap of the literature. To learn about the student experience, we examine students' demographic information as well as their perception of their readiness for using wikis for groupwork.

Methodology

Two research approaches were used: a qualitative exploratory approach to "build, elaborate, extend or test theory" (Neuman, 2006, p. 35) from which a set of concrete ideas can be used to inform teaching and learning practices; and action research to facilitate a change in teaching and learning practices using wikis more effectively within the UniSA university environment. Both approaches require the participants to reflect on their use of wikis in collaborative learning, the learning outcomes and processes by which they should be adequately prepared for a virtual collaborative learning environment.

An internet survey was designed to gauge students' views on their experiences of using wikis in collaborative learning. The survey was designed with a range of key areas of investigation, but for the purpose of this paper, the focus will be on exploring the experiences students had when using wikis as a platform for collaboration. The survey design utilised closed and open questions as well as Likert scale items to indicate students' level of agreement (a five-point scale of Strongly Agree to Strongly Disagree) with various statements. Likert scale items are known for having a high degree of validity and reliability as well as providing a single score from a set of specific statements (Sarantokas, 1998). However, one of their drawbacks is that respondents are limited in terms of elaborating, or expressing their

views, on aspects of their experiences not expressed in the given statements. Having said that, the Likert scale items still give a clear indication of the experiences of students, given the range of learning activities the wiki was used for.

One of the defining criteria for selecting participants for the survey was that they must have had prior use of wikis in a groupwork assessment or project, regardless of the type of wiki and their proficiency level using the software. At the time leading up to the survey, the use of wikis was not yet fully supported by the university's online management system (Moodle); hence teaching staff wishing to use wikis were recommended a range of wiki software and advised that they also had to provide the necessary technical support for their students.

The participants were given the details of the project, including their right to withdraw anytime during the study. Their response to the anonymous survey indicated their approval and consent to take part in the survey.

Results

The results are reported in four sections. Section 1 presents the characteristics of the participants, including their level of proficiency in use of wikis. Section 2 gives the participants' opinions of the processes being put in place to prepare them to use wikis, and what they actually use the wiki for. Section 3 presents the participants' experiences and learning outcomes, perceptions and suggestions for how wikis could be better used. Section 4 provides a summary of the findings of students' experiences in the use of wikis.

1 Characteristics of the participants

A total of 70 students completed the survey in 2010; the majority of participants were female (76%) and enrolled full-time (61%). Most of the participants (89%) identified themselves as international students. In terms of their wiki proficiency level, 63% described themselves as "beginners", 31% classed themselves as "intermediate" users, and a small percentage were identified as "advanced" (6%) or expert users. A point to note in reading the results here is that the majority of the participants considered themselves novice and intermediate users (94%) of the software, hence their

responses may not be regarded perhaps as highly refined, as would be expected of advanced users; however, the data provide interesting insights of their experiences of wikis, given their program of study and year level as well as the purposes of their wiki learning activities. So in general, the data was collected mainly from female international students, with low to moderate level of proficiency in the use of wikis.

2 Preparedness for use of wikis

In this section, the participants were asked their opinions of the processes (if any) which were put in place to prepare them for a wiki learning activity, in addition to identifying their main use of wikis. But first, a Likert scale was used to rate the following statements about the role of the instructor in explaining the purpose and expectations of students in their wiki learning activity.

Table 1: Student responses (%) regarding instructor explanation

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The instructor clearly explained the purpose of the wiki	13	27	23	11	26
The instructor clearly explained the level of contribution expected of me	16	32	19	10	23

In both statements, less than 50% were recorded as agreeing (Strongly Agree and Agree combined), with 40% and 48% respectively. Of concern here is the high percentage who were undecided together with those who disagree (Neutral, Disagree and Strong Disagree combined), thus indicating that the instructor could have done a better job in articulating the purpose and expectations of the learning activity.

The participants were also asked in an open-ended question to describe how the wiki was used in their learning activity. Common themes were grouped together as presented in Table 2 below. Almost a third of the participants

used wikis to share resources, while the remaining uses are indicative of how wikis have been utilised in many projects. In particular, the uses of wikis by participants reflect the collaborative nature of the learning activity, e.g. monitoring, communication, group discussion, social and peer review.

Table 2: Student responses (%) regarding uses of wikis

Use	%
Platform for sharing resources	31
Monitoring tool to check on student's progress in written assignments	17
Communication tool between the instructor and students	15
Group discussion tool to share ideas and discuss course content	15
Collaborative tool to work together on group assignment	13
Social tool - to get to know other students in the course	6
Peer review tool	4

In a multi-response question, participants were asked to select specifically what they have used the wikis for. Table 3 presents the three most frequent and the three least frequent uses of wikis.

Table 3: Student specific responses (%) regarding uses

Use	%
<i>Most frequent uses</i>	
Contributing ideas	44
Sharing useful resources	34
Storing course/assignment/project information	31
<i>Least frequent uses</i>	
Collecting and organising background research	13
Planning a project	11
Tracking the progress of a group project	10

It is interesting to note that the uses of wikis for “contributing ideas” and “sharing resources” aligned with the intended use and intention of the wiki technology, whilst the least frequent uses are indicative of a more advanced level of uses of wikis such as planning and tracking a project.

3 Participants' learning experiences of wikis

This section presents the results of the participants' experiences, their learning outcomes and perception of wikis. In relation to their perception of wikis, they were asked to comment on what they like or dislike about wikis as well as making suggestions on how wikis could be better used in a learning activity.

Learning experiences in wikis

Using a Likert scale, the participants were asked to rank 10 statements about their learning experiences in wikis.

Table 4a: Student responses (%) regarding experiences using wikis (5-point Likert scale)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I felt confident about writing on the wiki	16	26	26	13	19
I felt confident about providing feedback and/or editing other members' writing on the wiki	9	35	27	13	16
I felt confident about receiving feedback and/or having my writing edited by other members of the wiki	12	25	29	22	12
The members of the wiki were willing to share their ideas, comments and findings	11	37	28	17	7
I felt my contribution was valued by other members of the wiki	8	27	40	13	12

All members of my group made a fair contribution to the wiki	4	21	41	19	15
I was able to schedule times in my course workload to contribute to the wiki	6	31	44	6	13
My instructor provided feedback on the wiki throughout the course	7	13	41	13	26
My instructor supported the wiki by providing learning activities	7	24	37	16	16
Participating in the wiki was a positive experience	14	23	40	6	17

For ease of analysis, the categories Strongly Agree and Agree have been combined in Table 4b to indicate the percentage of agreement of the participants in each statement, and a similar approach was applied to obtain the percentage of their level of disagreement. Highlighted figures are the highest percentage per statement.

Table 4b: Student responses (%) regarding experiences using wikis (Agree, Neutral, Disagree)

	Agree	Neutral	Disagree
I felt confident about writing on the wiki	42	26	32
I felt confident about providing feedback and /or editing other members' writing on the wiki	44	27	29
I felt confident about receiving feedback and/or having my writing edited by other members of the wiki	37	29	33
The members of the wiki were willing to share their ideas, comments and findings	48	28	24
I felt my contribution was valued by other members of the wiki	35	40	25

All members of my group made a fair contribution to the wiki	25	41	34
I was able to schedule times in my course workload to contribute to the wiki	37	44	19
My instructor provided feedback on the wiki throughout the course	20	41	39
My instructor supported the wiki by providing learning activities	31	37	32
Participating in the wiki was a positive experience	37	40	23

The majority of the participants agree with the first four statements (42%, 44%, 37% and 48% respectively) in relation to feeling confident about their group learning interactions in wikis. The fourth statement, "The members of the wiki were willing to share their ideas, comments and findings", recorded the highest percentage of participants (48%) who agree that in their wiki learning experiences, there was a strong indication of a willingness to share with members of the team.

It is concerning, though, to see that the majority of the participants were undecided or unsure of their learning experiences, especially so in the last six statements, with the highest (44%) in the statement "I was able to schedule times in my course workload to contribute to the wiki." The result here indicates that participants may have considered the wiki exercise as extra workload, and also not a serious learning activity. This is also reflected in Section 2 results where participants stated that the learning intentions and expectations of the wiki activity were not clearly explained to them.

Participants were also undecided about whether their contributions were valued by others, and whether members were making a fair contribution to the groupwork as in the statements "I felt my contribution was valued by other members of the wiki" and "All members of my group made a fair contribution to the wiki". These beg the question of the need to be clear about the expectations in terms of the learning interactions in wikis. Feedback from instructors was rarely provided throughout the course as indicated in the statements "My instructor provided feedback on the wiki throughout the course" and "My instructor supported the wiki by providing learning activities". Again, the result resonates with the fact that the purposes and expectations of the learning activity were not clearly explained. In the

statement "Participating in the wiki was a positive experience", although a high percentage of participants remained undecided (40%), there was a significantly higher percentage of agreement (37%) that they had a positive learning experience in wikis than those disagreeing (23%).

Learning outcomes in wikis

In terms of learning outcomes resulting from the participants' use of wikis, Table 5 records the most to the least frequently cited outcomes. Although a high percentage of participants were undecided about some aspects of their learning experiences in wikis, most stated that they have contributed to a shared knowledge, have a greater understanding of the subject matter and have developed their ability to work as a member of a team. Even in the least cited learning outcomes, it is crucial to note that some participants have developed specific skills in the process.

Table 5: Student responses (%) regarding learning outcomes

Learning outcome	%
<i>Most frequent learning outcomes</i>	
I have contributed to a shared knowledge.	33
I have gained a greater understanding of the subject matter.	21
I have developed my ability to work as a team member.	18
<i>Least frequent learning outcomes</i>	
I feel more confident about receiving feedback from my peers.	13
I have a better understanding of ethical behaviour online.	12
I have developed my problem-solving skills.	11
I have become more willing to accept new ideas.	11

Perceptions of wikis: likes and dislikes

Respondents were asked in an open-ended question to identify aspects that they like and dislike about their use of wikis; their responses were grouped into themes. Most liked the wikis learning activity because of the convenience of being able to contribute to the learning activity anytime and anywhere, having exposure to new ideas, having all the useful information being stored (hyperlinked) in one place, and they have developed their ability to work as a team.

Apart from the lack of clarity about the purpose of the wiki activity, and the lack of contribution from members of the group, one of the most common dislikes is the “clunky editing” feature of wikis, compounded by participants getting excessive email notifications from their team’s wiki. Further, having the wikis marked as a group assessment was a sore point for many participants. They felt that their grade was lowered by other members of the group who didn’t contribute to the wiki fairly. One respondent reported that they spent a lot of time editing other members’ contributions and that they were penalised because the quantity of their contributions was less than other members. Finally, a participant reported that they found it difficult to make meaningful contributions to the wiki after some members had already covered the topic much more “comprehensively”, leaving no more aspects to comment on. Some participants also found editing other members’ contribution an intimidating experience.

Suggestions as to how wikis could be better used in collaborative learning

In an open-ended question, participants were asked to suggest ways in which wikis could be better used in their learning activity. A range of responses were being offered, including making the wiki a vital part of the course (meaning an assessment attached to the learning activity in wikis) to ensure students participate, providing an outline of the potential of wikis, and making the learning purposes and expectations more explicit.

Providing timely and ongoing feedback in wikis was also suggested for the instructors to be able to assure and encourage students in their collaborative learning. Further, the participants suggest a better wiki environment should be developed, including exemplars of best practice in collaborative learning, and giving ample time for newcomers to try out the wiki learning environment.

4 Summary of findings

Planning a learning activity with the use of wikis must take into account a number of factors; uppermost is clarity of the learning intention and expectations, including division of labour for individuals and team, as well as the expected outcomes of the learning activity.

Participants in the study have used wikis mostly for sharing of resources and contributing ideas, and these are in alignment with the intended use of the

software. With regard to the learning outcomes, the participants noted that they have contributed to a shared knowledge, have a greater understanding of the subject matter and have further developed their ability to work as a team. The learning outcomes have certainly contributed to developing the necessary indicators of the university's graduate quality, i.e. for graduates to be able to work both autonomously and collaboratively as a professional.

Whilst most participants had confidence in contributing to and giving feedback to their peers, and therefore have had positive learning experiences, others were unsure of the value of their own contributions and that of their team in wikis. Further, the role of the instructor in providing feedback and supporting students in the learning activity was questionable as most remained undecided. Students suggested that wikis could be better used as a vital part of the course, linked to an assessment for example, and making the learning intentions and outcomes more explicit. Further, the study suggests that instructors must provide timely and ongoing feedback, thereby contributing to more successful collaborative learning outcomes.

On a cautionary note, the findings of this study should not be generalised to mean that they are applicable to the wiki learning experiences of all higher education students, but should be taken as important notes to consider, in particular, when preparing students for collaborative work using wikis.

Discussion

The findings of the study confirmed that wikis, if their use in learning activities are properly planned and managed, can contribute to students' positive learning experiences and better collaborative outcomes. In reference to the development of the relevant graduate quality in this project – a UniSA graduate will have the ability to “work both autonomously and collaboratively as a professional” – the findings have shown that this has been achieved. In particular, two of the attributes associated with this graduate quality “work collaboratively with different groups” and “work in a team”, were amongst the most frequently cited learning outcomes identified by the participants.

Despite the participants having positive learning experiences in using wikis, one of the major findings is the lack of adequately preparing students for

learning in the wiki environment. In preparation for working in wikis, Jones (2007) is concerned that such technologies may “be employed on the basis of novelty rather than for sound pedagogical reasons”. West and West (2008) assert that “simply making a wiki available to students ... is not enough”, suggesting that a pedagogically sound wiki design and integration require preparation, planning and management. In addition, West and West suggest that “framing and scaffolding wiki content can facilitate and direct group collaboration and lead to more positive learning outcomes”.

Choy and Ng (2007) in their study of students and tutors who participated in a wiki, suggested that they would have benefited from more guidance and support to get familiar with the wiki environment, through establishing a community of online learners. Palloff and Pratt (2007) present a model of an online community which relies on collaboration and community-building, exploring the notions of what social presence is like online in order to achieve successful outcomes. They suggested that guidelines for online engagement be established, noting also a minimum participation requirement, and creating opportunities for students to reflect on their learning experiences. Further, we suggest that such guidelines be co-created and endorsed by both instructors and students, thus ensuring that both parties have the same understanding of the purposes and expectations of the learning activity. In the learning engagement and interaction, individual and group responsibility should also be clarified, so a fair share of the work is allocated to each student and team.

Whilst participants in the study expressed some level of discomfort in editing other students' work in wikis, it is important that learning expectations should be established and clearly articulated throughout the wiki activity. Similarly, Ben-Zvi (2007) found that peer editing was considered “rude” by students, as this is the role of the instructor as the only authority to provide feedback. He gradually overcame students' reluctance by having a whole-group discussion about “norms” of learning expectations and interaction. To allay the fear of editing other people's work, Barkley et al. (2005) developed the notion of “positive interdependence”, which means that the success of an individual is linked to the success of the group. Additionally, the advantage of using wiki technology as a platform for conducting group assessment is that it can make the quantity and quality of each group member's contribution more transparent, potentially

encouraging participation and making it easier to mark groupwork. This would counteract some commonly known problems with groupwork, such as attempts by some students to dominate groupwork, on the one hand, and attempts of other students to get away with the least among of work possible, on the other. The use of wikis in group projects is predicated on its ability to encourage a more equal participation from all team members, since on a wiki a record is kept of every contribution to the learning activity.

It is clear from this study that designing learning activities in wikis requires careful planning from the onset to the conclusion, taking into consideration an appropriate model of online community, the purpose of the design, expected outcomes, learners' proficiency in the use of wikis, level of complexity of the task, and the timing of the learning activity. Guidelines on social interaction and learning engagement should be established by both parties of the wiki learning activity to ensure successful collaborative learning takes place.

Conclusion

In this study, most participants used wikis to support collaborative activities such as contributing ideas, sharing useful resources, storing information and for group discussion. More complex collaborative uses such as peer review and writing collaboratively were uncommon. Participants also reported that the use of wikis gave them a greater understanding of the subject matter and allowed them to contribute to a shared knowledge. Participants liked the collaborative aspects of wikis, the ready access to useful information and resources, and the convenience of being able to contribute to the wiki anytime and anywhere. They disliked some technical features including the "clunky editing" features, and some found editing the work of others in the group to be intimidating.

In relation to the purposes of their use of wikis, most participants were uncertain, which significantly reduced participants' engagement and the likelihood of the wikis being successful. Instructors were encouraged to provide a comprehensive planning of the wiki learning activity, and to clearly convey the purpose of the wiki to their students, including the relevance of the learning interactions as expected from individuals and group. These findings indicate that a significant proportion of participants

would benefit from greater preparation on aspects of collaboration. The literature suggests that the preparation process might include exercises to build community, allowing participants to establish a social presence, providing guidelines for engagement, developing participants' skills in constructive criticism and placing an emphasis on collaboration rather than competition.

From the participants' experiences, wikis play a vital part in enabling collaborative work in teams. Their concern is to do with appropriately preparing them for the use of wikis, thereby suggesting that much should be done about preparing for and planning a wiki learning activity. In doing so, the process should identify the type activity, establish and explain wiki goals and learning outcomes, prepare students for collaborative work, provide support and scaffold aspects of the learning activity in order to build students' confidence in the wiki environment.

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