COMMENTARY

Applying Wikis to Project-based Modules

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ABSTRACT

In this experiment, we explore applying Wikis to a project-based engineering module. We focus on managing multiple student project groups and engaging students using Wiki platforms. Education experiments were conducted in a project-based module to determine the feasibility and effectiveness of using Wiki tools for such purposes. The results suggest that Wikis are effective tools for lecturers to manage multiple student project groups and engage students. The collected data indicated that students' learning improved and there was an increase in their interest in the module topics.

INTRODUCTION

New information technology (IT) tools, such as Wikis, blogs and podcasts, were originally developed for business applications. These IT tools functioned as online platforms which allowed multiple participants to collaborate and contribute to the content or project. Among these tools, Wikis are collaborative platforms whose content can be edited by multiple participants. Users can monitor the daily changes and contributions made by all participants on their Wiki pages. Education researchers have found that Wikis are also valuable tools within the education domain, as they support various types of online educational practices (Parker & Chao, 2007). Their functions, such as flexible access control, collaborative authoring, threaded discussions and edition tracing, are attractive to educators in terms of pedagogy implementations. They are mainly applied in courses which call for a student-centred online learning space where students could perform online collaborative tasks. For instance, a Wiki has been applied in a language course where students are required to collaborate online for their group course work (Ramanau & Geng, 2009). Students think they benefit from the application of Wiki platforms in their learning. However, it has been observed that they encounter difficulties when it comes to figuring out how to use the functions provided by the Wiki platform. Also, Wikis allow users to engage in dialogue and share information among participants in group projects, or to engage in learning with each other to construct their knowledge. However, thus far there have only been a few attempts made to use Wikis for class management and student engagement. For instance, Wikis have been employed as part of a blended learning approach in a first year statistic course (Neumann & Hood, 2009) and a postgraduate course (Salaber, 2014) to improve student engagement. The results from these examples indicated that student engagement can be improved when the Wiki is applied. When Wiki platforms were employed in an engineering course, where students had to provide their reflections about the course in an online learning journal (Bailey et al., 2005), it was reported that there were improvements in student engagement and students' learning experiences were enriched. However, another study has cast doubt on the feasibility of using Wikis to enhance student engagement, in this case a course where students are required to create a module-level knowledge repository on Wiki pages (Cole, 2009). Due to the low participation rate for this study, it is not clear if Wikis can be used for this purpose. In addition, only one study (Arriba, 2016) on applying Wikis to monitor and assess student group work for class with large size has been conducted so far. The results of this particular study show that Wikis can facilitate the collaborative learning for large classes.

It is common for compulsory core modules to have a large class size[1], and it can be a challenging task to engage them effectively. It is also necessary to engage students taking project-based modules, particularly engaging them beyond the classroom to assist their learning. In such modules, students are typically divided into small groups and work together on their projects. When the enrollment numbers are high, there is greater diversity in terms of student background and there are more project groups. Traditional ways of teaching may no longer be effective enough to engage students and manage the class. It also becomes more difficult for the lecturer to monitor the progress of individual groups and students due to limited contact sessions and clashes in time schedules. The continuous assessments (CAs) can provide students with progress indicators at only certain stages of their projects, by which time it is often too late for the lecturer to intervene if the CA results indicate that students are having problems with the module.

This study reports an example of how a university in Singapore chose to implement Wikis with Year One students in a project-based engineering module with a large enrollment. The study aims to explore the feasibility of using Wikis for student engagement and managing multiple student project groups for this module. Wiki platforms allow students to join in the discussions and share their ideas. The features within the Wiki, such as their flexible access control, allow users the choice of sharing content with whole class or keeping them within the group. This is important when multiple groups are competing with each other and one group may not want to disclose their work to other groups. The lecturer can also use Wikis to monitor the progress of different groups and join their discussions. It is hypothesized that Wikis can promote student engagement and be an effective management tool for such project groups.

EXPERIMENT SETTINGS AND METHOD

The experiments were conducted in the module which was offered during both semesters in AY2014/2015. Each semester has 13 weeks and the class sizes were around 120 for both semesters. After going through the lectures which cover the fundamentals and introductory lab sessions, the students had to work in groups of 5 to design and implement a laser wireless communication system within seven weeks. In each semester, there were 22 to 25 project groups that had to design and implement working systems and compete with each other. Their performances were evaluated by CAs.

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[1]   In this study, we refer to classes with large enrollments as it has been observed that it is hard for lecturers to interact with each student individually during the sessions and keep track of any progress they may make in their learning.

The in-house Wiki platform, Wiki.nus, fits our needs as students can access it with their campus ID. Compared with other Wiki platforms, Wiki.nus is free of charge and the university's Computer Centre can provide the necessary technical support. Pages on Wiki.nus, called space, were created by the lecturer for this module. A common space was set up for the whole class to discuss project-related topics. Each group also had their own space to discuss and prepare the report, which was only accessible to group members. Short videos on how to use Wiki.nus and other relevant technical tools were also uploaded on to the common space. Each group had to prepare their project reports and post their discussions on the space. Each student was also required to contribute a certain number of individual posts of reasonably good quality. Since the Wiki platform is online, the lecturer can easily monitor student participation within each group, monitor their progress for the project, and interact with students online using a flexible schedule. The participation records were taken and used by the lecturer to identify the "quiet" students who might potentially be slow learners. The lecturer was also able to observe the activities of each group within their group spaces and look out for those with technical and team management issues. For individual students or groups which may be facing difficulties, the lecturer will arrange face-to-face meetings with them.

The experiment was repeated in two semesters with the same settings, except that the online interaction between students and the lecturer on the Wiki space was intentionally reduced and delayed in Semester 2. This was done to find out if the level of student engagement and learning would be affected if the lecturer had a higher workload and less time to meet students. About one third of students in both semesters were randomly invited to join the experiment. The number of project groups that participated in two semesters were 7 and 8, respectively.

To collect information on students' perception of whether the application of Wiki.nus affected their learning, a survey was designed and administered in the last week of both semesters. Also, the final grades of all students taking the module, which were based on the project CAs and a midterm quiz, were collected and analysed to determine whether students who were in Wiki groups performed better than those who were not.

RESULTS AND DISCUSSION

Students' responses on the advantages of applying the Wiki tool in this study are shown in Figure 1 below. The legends Sem 1 and Sem 2 indicate the data from Semester 1 and Semester 2, respectively. Based on the results reported in Figure 1, most students in Semester 1 (62.1%) and Semester 2 (59.3%) consider the Wiki space a convenient channel to interact with lecturers.
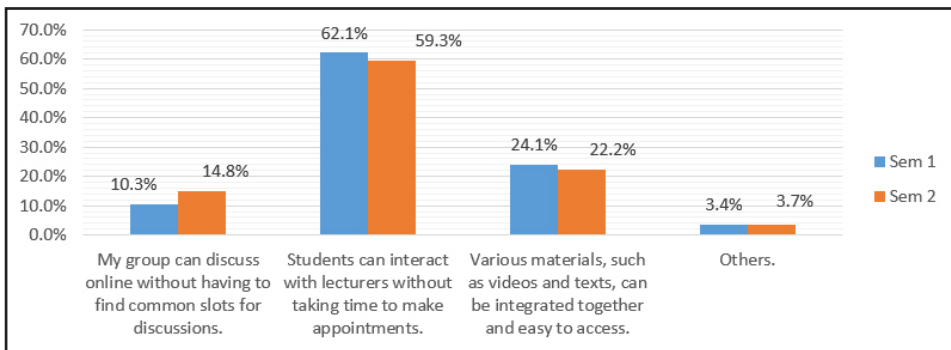

Figure 1. Students' responses on the main advantages of applying Wikis in this module.

Relatively less students considered the Wiki space a depository for related materials (Semester 1: 24.1%, Semester 2: 22.2%), and a platform which facilitated peer discussion (Semester 1: 10.3%, Semester 2: 14.8%). Some students also thought it helped them to write down their ideas. The data from another two survey questions, as shown in Figures 2 and 3 as well as Table 1, offered some insights into this observation.
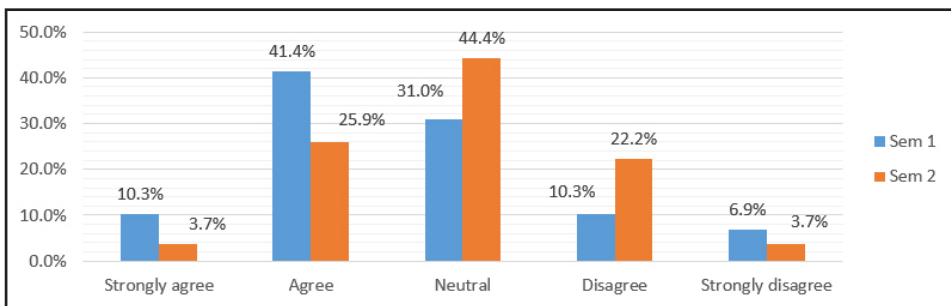

Figure 2. Students' responses to the survey question "Do you think you benefit from the peer discussions on the project wiki space for your project design and implementation?"
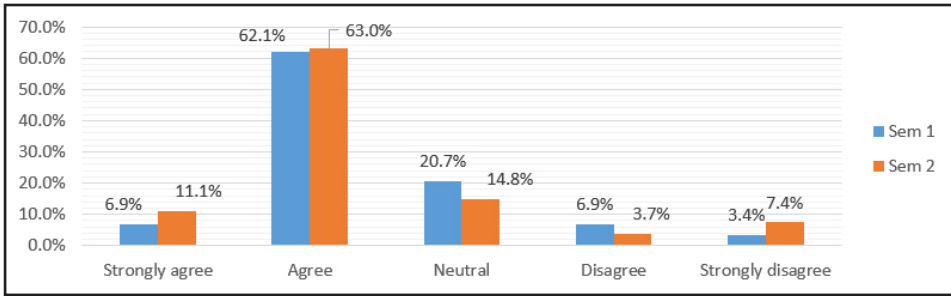
Figure 3. Students' responses to the survey question "Do you agree the interaction between students and teaching staff on the project wiki space are helpful to your project design and implementation?"

Table 1

Data means and standard deviations for Figures 2 and 3*

	Data for Figure 2		Data for Figure 3	
	Sem 1	Sem 2	Sem 1	Sem 2
Mean	2.621	2.963	2.379	2.333
Standard Deviation	1.049	0.898	0.862	1.000

*Values for "Strongly agree" and "Strongly disagree" would be 5

Students considered the Wiki space more as a new channel to interact with the lecturer than a peer discussion space, especially in Semester 2, when online interaction between students and the lecturer was reduced and delayed. This may be due to the main objective of applying Wikis in this module, which is to monitor the progress made by the project groups and provide guidance to the groups and individual students. Nevertheless, as shown in Figure 4, a small portion of students (Semester 1: 27.6%, Semester 2: 18.5%) felt they had difficulty following the discussions on the Wiki space. This could be due to their lack of related technical knowledge which would have enabled them to understand the content and context of some discussion threads. The majority of students who used Wikis for their project work perceived that the interactions and discussions which occurred in the Wiki space inspired their interest or thinking about the module's topics (Semester 1: 17.2%+51.7%, Semester 2: 14.8%+48.1%). This may be attributed to them having to demonstrate their ideas to others and discuss with their peers. In having to go through this process, students had to reflect on related knowledge, think about meaningful links and review how their ideas developed. This is exactly the sort of meaning-making process which can lead to effective learning.
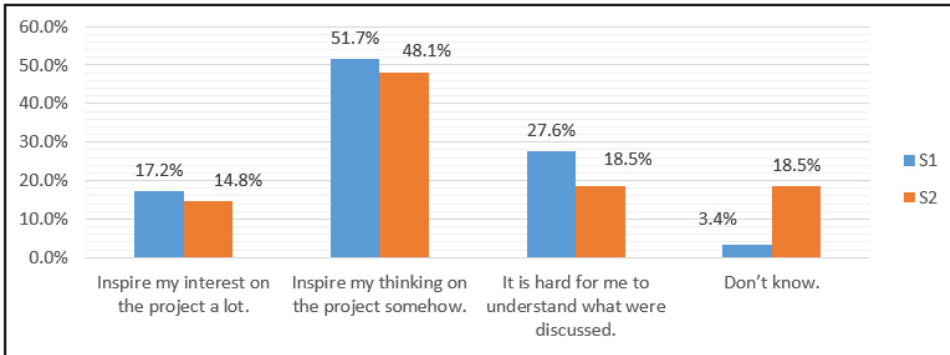
Figure 4. Students' responses on "How the discussion and interaction affect students' learning in this module?"

The results based on students' grades are shown in Table 2. For students in Wiki groups and those that were not, their percentages in three grade categories are listed.

Table 2
Comparison of students' performance data

Grade categories		Semester 1	Semester 2
Percentage of A- and above	Students in Wiki groups	34.21%	34.15%
	Students not in Wiki groups	27.87%	34.28%
Percentage of B- to B+	Students in Wiki groups	63.16%	53.66%
	Students not in Wiki groups	57.38%	48.57%
Percentage of C+ and below	Students in Wiki groups	2.63%	12.20%
	Students not in Wiki groups	14.75%	17.14%

According to the data shown in Table 2, students in Wiki groups performed better than those that were not in such groups, in terms of students that scored B- and above. Based on the results, the student performance data showed improvements in learning for groups using the Wiki platform. Also, bear in mind that the online interaction between students and the lecturers was intentionally reduced and delayed in Semester 2. The data in Table 2 show the difference in academic performance between participating students in two semesters. It would seem that the online interaction between students and the lecturer contributed to the improvement. The results indicate that online engagement through discussion on Wikis helped students to learn from each other and also helped the lecturer identify the common problems which

needed further guidance. In one discussion thread, students discussed how to design the training frame[2]. They proposed design ideas and received peer feedback. In this discussion, there were 25 follow-up posts and students were engaged in thinking about this design problem.

The participation data collected in the intermediate stage of the project and the project demonstration marks for all participating groups in the two semesters are listed in Table 3.

Table 3

Online participation data and project demonstration marks

Group		1	2	3	4	5	6	7	8
Sem 1	Average number of posts	5.5	5	3	2	6.02	0	4.02	
	Demo marks/ rank	85.7/2	87/1	84.7/3	76.7/7	83/4	77/6	80.7/5	
Sem 2	Average number of posts	0.8	1.6	2.6	2	4.06	0	1.2	1.3
	Demo marks/ rank	65.9/7	86.2/3	84.4/4	79.6/5	94.5/1	77.3/6	89.4/2	62/8

Table 3 shows the average number of posts of reasonably good quality per student in every group[3], their final project demonstration marks (out of 100) and rank within the participating groups in the same semester. It shows that student participation in Semester 2 was less than in Semester 1, which may be due to reduced levels of online interactions between the lecturer and students in Semester 2. This coincides with the data in Table 2, and shows that frequent and regular online interaction between students and module lecturer is important for promoting student engagement. In Table 3, groups which displayed a low average number of posts for both semesters are highlighted in red. For these groups, face-to-face consultations with the lecturer were arranged to provide customised guidance. For example, Group 7 only had an average of 1.2 posts in Semester 2; the low participation was due to management issues within the group. After meeting with the lecturer, they managed to resolve these issues and fulfilled the project requirements in their

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[2]   This discussion thread can be found at https://wiki.nus.edu.sg/display/EE1003module/EE1003+Monday+group+common+space.

[3]   The average number of posts per student for each group had to be taken into consideration instead of average number of posts per group. This is because some groups had 1-2 more members than other groups due to the number of students allocated to the lab session.

final demonstration. This improvement is reflected in their high demonstration mark and ranking (89.4/2). Meanwhile, Group 6 in both semesters displayed zero number of posts. Although they claimed they preferred discussing their project using other tools such as SMS, it was found that the low participation was due to their lack of teamwork and negative attitude towards their project. It ultimately affected their performance in the final demonstration. It was also noted that the Wiki tool should be complemented by face-to-face consultations. From the data listed in Table 3, with the exception of Group 7 in Semester 2, all the groups which displayed low average number of posts, scored relatively low marks for their final demonstrations. This shows that the Wiki platform is an effective tool for monitoring student project groups and identifying "weak" groups at an earlier stage.

Finally, students are supposed to work collaboratively on their project reports within their Wiki space. However, only a few groups managed to do so. According to the students' feedback, they responded negatively to preparing their reports this way. This may be because they were not comfortable about allowing their peers to review and modify their unfinished work (Parker & Chao, 2007). They were also hesitant about modifying their peers' writings on the Wiki pages.

CONCLUSION

The results of this study show that Wikis are useful tools for enhancing student engagement and managing multiple student project groups in project-based modules. When Wikis are integrated with such modules, monitoring the progress made by such project groups and engaging students becomes more manageable than the traditional approach. The data collected also show that applying Wiki tools may improve students' performance. Their learning experience have also improved as their interest in the module topics increase through the use of Wikis. It is also noted that face-to-face sessions are still necessary. Wikis are effective tools which serve to complement and enhance current teaching and learning approaches for modules with multiple student project groups. To encourage student engagement, the lecturer needs to join the online discussions frequently and regularly.

Besides the main findings, the following issues should also be considered when Wiki tools are integrated in a module for similar purposes. For instance, integrating IT tools in modules involves creating new channels for lecturers to engage students. Simply adding them to modules would not be effective in improving student learning. It is also recommended that students be equipped with introductory knowledge on Wikis and be given some basic training on how

to use them. The teaching staff may also need proper training on how to use and manage the Wiki platform and pages. To encourage students to participate in these online discussions, it is important to promote it among the cohort so that they are interested in it and feel it is worth their efforts. Having the module lecturer join in the online discussions regularly could be one way of attracting them. Examples shared on the module's Wiki space can also be a discussion topic during the contact sessions.

ACKNOWLEDGEMENTS

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