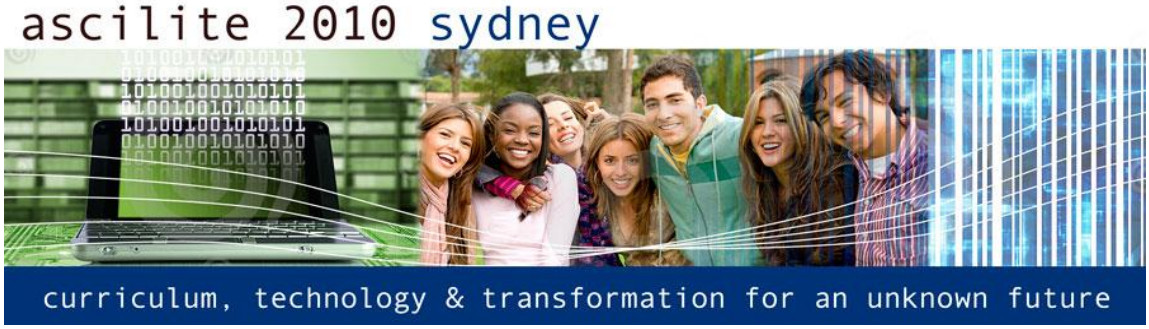

The wiki factor: Scaffolding online learning in groups

Charlotte Brack & Marie-Paule Van Damme
Faculty of Medicine, Nursing and Health Sciences
Monash University

We have used Web 2.0 technology to transform undergraduate group work, in higher education, preparing students for ways in which people will work together in the future. This was implemented within Leapfrog Biology, an intensive four week online program developed for students who have not completed year 12 biology and who are entering first year medical studies. We used wikis to facilitate both the process and the product of online collaboration. This paper presents the evolution of the educational design of the online environment and the underlying pedagogy with a focus on online group work and the scaffolding of collaborative learning. Student activity in group wikis, assessed from edit trails and discussion posts, was analysed quantitatively in terms of participation and qualitatively in terms of the nature of student contributions. Scaffolding of learning in groups and ways groups were selected are described and related to student activity.

Keywords: wikis, Web 2.0, collaboration, online learning, group learning, support, scaffolding

Introduction

Web 2.0 technologies are obvious choices for online collaboration and have been increasingly used for student group work in higher education. They provide online environments with significant benefits from a pedagogical perspective as they enable students to be in control (bottom up control) rather than teachers (top down design) (Dron, 2007). While shared online documents (such as Google documents) all offer collaborators opportunities to create a product, wikis have several features which add value in learning and teaching contexts. As Judd, Kennedy and Cropper (2010) describe, these include notification of page edits (RSS) and page comments associated with edits. From a learning perspective this helps students keep track of progress and see the rationale behind the contributions of their peers, and from a teaching perspective enables the nature and progress of group work to be monitored. For example, distinctions between cooperative and collaborative behaviour in groups can be made (Trentin, 2009). The discussion feature of some wikis further enhances the edit comment feature with its potential to reveal the negotiations among group members, facilitating distinction between posting and dialogue allowing further analysis of the group process.

In working in groups online students need support and guidance in the use of the environment as well as in team work and in the group activity (Minocha & Thomas, 2007; Dennen & Weiland, 2007; Brickell & Herrington, 2006). Students needed support: in the use of technology; for socialisation; to engage in dialogue rather than message posting; to refine group processes; for clarifying problems and checking ideas. Some support, that which is anticipated, can be static and built in to the environment, and some needs to be dynamic allowing feedback to learners ‘in-the-moment’. Saye and Brush (2002) describe these as hard and soft scaffolds. In this paper we describe our use of technology for scaffolding online collaborative learning for students, and consider the effects on student activity. We also consider the effect of group selection on student engagement.

Background

More than 50% of students entering undergraduate medical studies at Monash University have not completed year 12 biology. To address this disadvantage we designed and developed a bridging course based on the Victorian year 12 curriculum, which we called Leapfrog Biology evoking the idea of leaping through basic biology into first year medical studies. We first ran Leapfrog Biology in 2006 and now offer it annually. While not compulsory, students in the target cohort are strongly advised to enrol. The course is scheduled prior to the start of first semester, at which time students are committed to employment and vacation activities, with many unable to attend the campus. We have used online technologies to create better access to quality educational practices with a range of individual and group opportunities for these geographically disadvantaged students.

Our previous experience using wikis for assessed group work indicated that the ability to monitor individual contributions was a significant factor in increased student satisfaction with group work (Brack, Stauder, Doery, & Van Damme, 2007). While Leapfrog Biology was not graded, the transparency of contributions motivated students (Brack & Van Damme, 2009). From 2006 to 2008 the course was entirely online, but in 2009 we introduced an additional 2 hour face-to-face orientation session to help students deal with the short time lines (especially for group work) effectively (Brack & Van Damme, 2009). In 2010 we developed selection of groups in response to feedback from students indicating concern in relation to non-contributing members.

Learning design

Leapfrog Biology is an intensive 4-week online program incorporating individual self-directed learning activities and a collaborative online project, designed around three theme-based modules (Brack & Van Damme, 2009). The group project is underpinned by the social learning theory of Vygotzky (1978) which values peer interaction and knowledge sharing. A pedagogy based on active learning is incorporated through student engagement in authentic activities (Honebein, Duffy & Fishman, 1993) to provide real-life contexts in relation to medical science. Each group of students creates a website (wiki) the best of which is used as a resource for first year medical students. The group project called The Nobel Factor has two phases both guided by questions and carried out in a wiki: (1) a debate; and (2) the creation of the wiki. In pedagogical terms the context of learning in the former is dialogic and in the latter co-constructive (Bower, Hedberg & Kuswara, 2009). Research on Nobel prize winning discoveries on stem cells underpinned both phases. Our use of wikis for student group work aligns with the framework for Web 2.0 learning design described by Bower et al (2009). Prior to 2010 all students who enrolled in the course were allocated to a group of 10 to 12 students, but groups had on average 6 to 7 active participants. While this was a more manageable number for group work, students reported feeling disconcerted that there were ‘silent’ members of their group (Brack & Van Damme, 2009). To alleviate this in 2010 we allowed students to select groups on the basis of the time they anticipated they could commit.

Individual activities, resources and support are offered to students via the Learning Management System (LMS, Blackboard). We chose Wikispaces for group work in preference to other wiki platforms for two main reasons: firstly, for the discussion configuration with fields for posts (presented in reverse chronological order) and a subject line allowing identification of the author onscreen and threading; and secondly, for its ease of use and independence of the LMS facilitating ownership by students. Some other wiki platforms incorporate discussion as a wiki page which has an advantage in archiving of the site (saved with the wiki), but a disadvantage in that it is harder to follow a thread. Wikis were only accessible to group members and teachers. Teachers monitored wikis but did not intervene. Support for group work was given via the LMS. Table 1, indicates types of support as students were expected to access them, and types of scaffolding according to Saye and Brush (2002).

Table 1: Types of support and scaffolding

Type of support	Type of scaffolding
1. Face-to-face session for introduction to course and technologies, group work sign up.	soft
2. Instructions for group work in LMS site included how to: work as a group (e.g., timelines, roles/ responsibilities, problem solving, conflict resolution); set up wikis; and use features of wikis to record the group process as well as the product.	hard
3. Online chat (synchronous) helped students solve technical and group work problems.	soft
4. A discussion space (asynchronous) within the course LMS site was for students' queries.	soft
5. Guiding questions for the debate to help identify issues, describe contexts, formulate opinions based on evidence and debate relative importance of issues and ideas.	hard
6. Questions posed in modules linked the group project with biology addressed in modules.	hard
7. Monitoring wiki contributions with feedback given to keep projects and students on track.	soft

Student activity

Students were regarded as 'active' if they made 5 or more significant contributions to the group process via the wiki discussions, and/or the wiki pages, the product, via contributing to content. A contribution was regarded as significant if it advanced the group work with a new idea or improved an existing one. The content of a wiki page was considered significant if it was developed over greater than 5 contributions or edits.

Results

In 2010 there were 109 students enrolled in Leapfrog Biology, of whom 63 signed up for group work (58%) forming 9 groups, consistent with previous years (58 $\pm$ 4, n=4). Figure 1 shows the home page of a wiki, and Figure 2 shows a debate discussion. In the first phase of the group project students used the wiki discussion for the debate. In the phase of wiki creation they also used the discussion for project management activities.

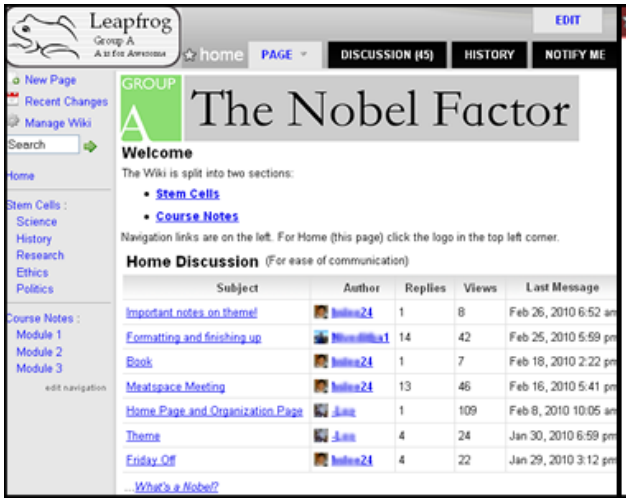

Figure 1. A wiki home page

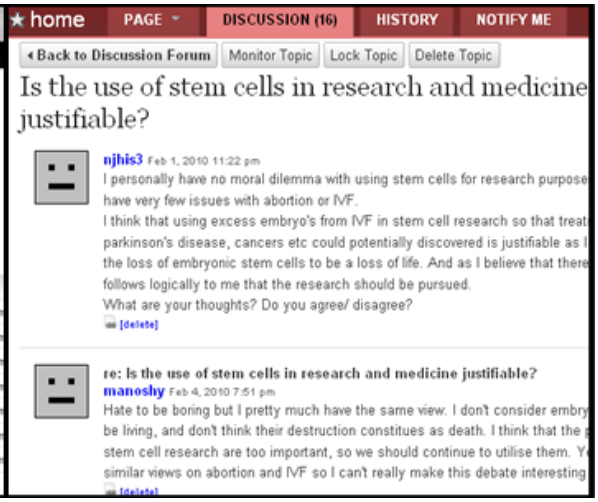

Figure 2. Discussion in a wiki

Group wiki activity is shown in Table 2.

Table 2: Group wiki activity

Anticipated time commitment	Group	Members		No. of wiki pages			Discussion posts	No. of threads
		Total	Active	Set up	Populated	Significant		
greater than 15 hrs	A	4	3	11	11	11	55	11
	B	6	5	8	8	8	39	5
	C	5	1	0	0	0	7	1
	D	5	1	8	0	0	16	3
5 to 15 hrs	F	8	2	1	1	0	4	1
	G	8	5	6	6	4	28	1
	H	8	2	9	9	3	33	9
	J	9	8	7	5	5	13	4
less than 5 hrs	E	10	8	8	8	8	60	7

Six groups completed group work and produced wikis. Members of the 3 groups (C, D, F) not completing group work engaged in discussion planning their wiki but did not implement their plans. One group (D) went as far as setting up the site structure but did not populate pages. Group H had 2 active members (out of 8), and while their wiki had a large number of populated pages, slabs of content were added by a single member with no evidence of development. As in previous years there were 2 wikis which stood out in terms of breadth and depth of content, originality, writing skills, and presentation (site structure, navigation, graphic design). The outputs of these 2 groups, A and E, were comparable in terms of quantity (number and length of wiki pages, and discussion posts) and quality of process (discussion) and product (wiki), although the number of active members differed. Both wikis were used as resources for first year students during semester one. Self selection of groups had no significant effect on the proportion of students engaging in group work across the course or within groups. Online chat, discussion and email indicated that students' committments changed in the pre-semester period with some students able to commit more time and others less.

Students used the support listed in Table 1 from 1 to 7, in the following ways.

- In the face-to-face session (1) students met other members of their group and asked questions.
- Students unable to attend the orientation session used the guidance in the LMS site (2) to 'get started'.
- Ninety one students doing group work (84%) joined a chat session (3) at least once. We discovered the problems students had with technology and responded with advice immediately. Sessions were lively, focussing on issue related to setting up wikis but issues ranging from social to scientific were raised. Sessions were generally dominated by peer learning with students answering questions of others.
- Students infrequently used the LMS discussion (4) to ask questions about content; they reported that this was because they didn't know the 'right questions to ask'.
- All active groups structured their wikis around the debate (5) and questions asked in modules (6).
- From discussion posts and histories in the wikis (7) we identified some students' misconceptions of the science, and immediately ameliorated their learning. We also gave feedback on managing group work.

Discussion and conclusion

Scaffolding of online collaborative learning in Leapfrog Biology has evolved in response to student feedback and from observation taking advantage of Web 2.0 technology. The discussion and page edit histories of wikis allowed us to monitor the collaborative processes as well as products, enabling us to give timely and targeted support. The debate guidance helped students to engage in dialogue in their discussion leading to negotiation of knowledge and understanding of stem cells. In this first phase of the group project students worked collaboratively; they then moved through a phase of negotiating tasks and generally moved to a cooperative mode where each student took responsibility for a different subtopic. This balance was important as it provided early support for metacognitive processes, for clarifying problems and checking ideas, all of which were necessary for effective wiki building. Soft

scaffolds were particularly effective in socialisation and creating a sense of community and help students to refine the group process.

The grouping of students during a face-to-face orientation session gave members a valued opportunity to meet before working together online. The selection of groups based on anticipated time commitment was a strategy aimed at teaming students with similar input enabling groups to be more balanced in terms of contributions. These changes did not have an impact on the pattern of student activity online, but enabled groups to become more productive earlier. The group projects offer students opportunities to get to know some others in their course, both students and teachers, and give them experience in collaborative learning as well as a basic knowledge of biology. Scaffolding which recognised the value of the collaborative process as well as the product helped students develop negotiation skills. This in turn helped students to transcend the disadvantages of geographical distance giving them better access to quality educational practices.

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Author contact details:
Dr Charlotte Brack is a Senior Lecturer at the Faculty of Medicine, Nursing and Health Sciences Monash University, Australia. Email: Charlotte.Brack@monash.edu

Dr Marie-Paule Van Damme is a Senior Lecturer at the Faculty of Medicine, Nursing and Health Sciences Monash University, Australia. Email: marie-paule.vandamme@monash.edu

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