



Wiki-based interventions: A curriculum design for collaborative learning

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This paper reports on the first phase of a wiki-based project in higher education in Thailand. The wiki innovation was focused on promoting collaborative learning. Previous literature on wikis shows that merely using a wiki, without teachers' support and without critical consideration of the approach to teaching and learning, does not impact significantly on the nature of student collaboration and hence on learning. This paper discusses the nature and value of the design based research for the development of interventions implemented in the wiki project to promote collaborative learning. These interventions focused on shifting thinking, learning and knowing in designing activities which responded to practical problems of wiki use. Discussion is provided on the benefits of design based research, and in particular the interplay between teacher and learner that impacted on the design for students' collaborative learning.

Keywords: Wiki, interventions, collaborative learning, design based research

Introduction

The nature of wikis as a Web 2.0 application allows multiple users to jointly create and edit shared information on wiki pages. The educational use of wikis has been recognised, and has been implemented increasingly in higher education to promote collaborative learning (Guo & Stevens, 2011; Pifarre & Staarman, 2011). Wikis allows users to develop a shared group project, encouraging a belief that a wiki can enhance social interactions and particularly peer-to-peer collaboration, improving learners' critical skills in writing, editing and refining of their learning (Mason & Rennie, 2008), and in addition developing essential attributes of graduate students that are valued in the workplace (Hernández-March, Martín del Peso, & Leguey, 2009).

While wikis offer such potential for enhanced pedagogical environments, they also pose challenges to learners and teachers (Waemusa, 2011). Learners, for example, need to be aware of and to be trained with the skills in building knowledge collectively through the process of shared and distributed authorship (Davies & Merchant, 2009). In order to address these skills, students require prior training in techniques for collective work (Ramanau & Geng, 2009). It follows that the collaborative construction of knowledge is not a learning experience that can be left to develop spontaneously, or organically. Design of the wiki space and use allows for intentional collaborative experiences. For instance, the collaborative process might need to be designed to require active contributions from members (Jacobson, 2008). In addition, wikis may be challenging to teachers. To use wikis in educational practice, teachers may need to change their roles to, in particular, focus on the role of facilitator and moderator in a collaborative learning environment (Wheeler, Yeomans, & Wheeler, 2008). These roles require a well-organized design activity which, it is argued here, supports the development of new learning technology through the inclusion of student, tutor and course designer perspectives in the design of the learning environment.

This paper is part of the study which examined how a wiki can promote collaborative learning in Thai higher education. The research context was *Cross-Cultural Communication*, a compulsory course for third year students majoring in Language for Development programme at the Faculty of Liberal Arts, Prince of Songkla University in 2012. In a blended learning environment, the students were required to post their group project on the wiki in Moodle, the university learning management system (LMS). In this study, the choice of using Moodle wiki was influenced by the institutional preference. Like other wikis in different platforms, the Moodle wiki has some basic functions but provides manageable tools for course designers (Cole & Foster, 2008) to design the learning environment with flexible interventions on the same platform such as an integration of different communication tools (i.e. Chat and Forum) in offering choices of interaction spaces for learners.

The focus in this paper is to explore the connection between the design and the research of the course by explaining the key interventions that were designed and implemented in order to grow the collaborative learning environment. First, the paper identifies the nature and purpose of design-based research (DBR). It then applies the process of DBR in the identification of practical problems of wiki use in promoting collaborative learning, and identifies possible solutions. The paper finishes with thoughts on the value of DBR for the development of the pedagogical interventions.

Design-based research

To design the learning environment driven by collaborative learning, teachers can incorporate a DBR approach into their practice. DBR involves theory-driven design of learning environments with implementing interventions in authentic settings (Design-Based Research Collective, 2003).

DBR as a research approach can help teachers to develop possible interventions of wiki use in enhancing collaborative learning by emphasising the learning context in wiki use (Naismith, et al., 2011; Ruth & Houghton, 2009). Based on the work of Brown (1992) and Collins (1992), DBR is a research approach which incorporates “empirical educational research with the theory-driven design of learning environment” (Design-Based Research Collective, 2003, p. 5). It can help teachers to identify and understand “knowledge about developing, enacting, and sustaining innovative learning environments” (Design-Based Research Collective, 2003, p. 5). Furthermore, DBR enables teachers as both researchers and practitioners to work in authentic settings while proposing design principles for future implementation (Reeves, 2000, p. 12). With the implementation of interventions in the learning context in order to augment collaborative learning, teachers can benefit from DBR by gaining insights of collaborative learning through learners’ experience of wiki use.

As such, the value of DBR becomes evident because it can help teachers understand “how, when, and why educational innovations [with wiki use] work in practice” (Design-Based Research Collective, 2003, p. 5). Judd, Kennedy, and Cropper (2010), for example, found that providing a wiki space for learners did not ensure that collaborative learning would take place among learners. They suggested a crucial role of a teacher in designing a curriculum and facilitating learning processes in a wiki-learning environment. A study of a DBR developed wiki learning space proposed that the learning context should be addressed to enhance collaborative learning (Naismith, Lee, & Pilkington, 2011). They found little evidence of collaboration in the wiki because students worked collaboratively using other technologies and offline.

A curriculum design: A focus on the collaborative learning context

An underlying principle of a curriculum design essential for enhancing collaborative learning effectively is the learning context with the focus on process-oriented interaction (Ruth & Houghton, 2009; Naismith, et al, 2011). Such orientation requires DBR in the curriculum design with the interplay between teachers and students. In their study of wiki use in higher education in Australia, Ruth and Houghton (2009) examined how students conceptualised wiki use in a classroom environment to complete a research project. Wiki implementation, they argued, needs to pay attention to the principle of how we come to know something to make sense of the world. In other words, to implement a wiki, teachers need to focus on the “interacting with learning processes” (p. 135) for knowledge construction rather than the body of the knowledge. Thus, wiki implementation should adopt a more complex understanding “of *thinking, learning and knowing* [emphasis added]” (Ruth & Houghton, 2009, p. 135) to facilitate collaborative learning. Following Ruth and Houghton (2009), wikis require joint interaction of teachers and learners to think, act and know during wiki use; and in addition teachers need to focus on group interaction processes rather than individual performance.

Through the lens of DBR principles which connects learning theory, design artefact with practice, practical problems from previous wiki-based studies were analysed and filtered to design possible interventions as

solutions to learning conditions that are productive as the learning theory suggests (Design-Based Research Collective, 2003). The results are shown in Table 1 below.

Table 1: Practical problems in wiki use and possible interventions

Practical problems	Possible interventions
Holding conventional ideas: not knowing the nature of collaborative learning (Wheeler, et al., 2008), mismatched learning attitudes for wiki use (Grant, 2009).	To provide a prior orientation (An, 2010; Wheeler, et al., 2008); to encourage learners to adopt positive attitudes towards wiki use (Guo & Stevens, 2011) by raising students' awareness about the wiki nature prior to their use (Wheeler, et al., 2008)
Technical problems: a lack of digital skills, not directly transfer digital skills to the academic setting (Ramanau & Geng, 2009)	To give a prior training (Ramanau & Geng, 2009), e.g. 'sandbox playing' (Gee, 2005), exploring the wiki functionalities together
Low level of active participation (Grant, 2009)	To give hard and soft scaffolding (An, 2010); to facilitate collaborative process (Jacobson, 2008) by providing and encouraging communication during interactions (Su & Beaumont, 2010); To provide negotiating mechanisms as reciprocal scaffolding among learners, e.g. using sentence openers (Pifarré & Staarman, 2011); to integrate a wiki activity with assessment (Judd, et al., 2010); to integrate with asynchronous and synchronous communication tools (An, 2010; Pifarré & Staarman, 2011; Su & Beaumont, 2010)
Activities performed in cooperation, not genuine collaboration: division of labour (Naismith et al., 2011)	To design a wiki activity in line with actual collaborative learning (Naismith, et al., 2011); to base a wiki activity on negotiation (Bruffee, 1999); to provide an ill-structured problem solving activity (An, 2010); to shift the authority of knowledge to learners (Ruth & Houghton, 2009); to model activity accomplishment with timely feedback (Grant, 2009); to have students get into groups of five (Bruffee, 1999)
Activity assessment focusing on individual performance rather than group process	To use process-oriented assessment (Tharp, 2010)

By understanding the underlying principle of the interventions above, we can focus on the context for collaborative learning. Naismith et al (2011) propose a context for wiki use to support collaborative learning which includes activity design and instruction, assessment procedures, teachers' support as scaffolding, learners' digital literacies with technology (such as wikis), social interaction skills, group dynamics and attending to issues of time and space as they affect the collaborative processes. To understand collaborative processes as social interaction, they note that collaborative activities are time consuming because they need the group working together either in physical or online space. Therefore, a proper balance of both physical and online spaces in the curriculum design should be carefully considered.

Communication among group members is another focus in the wiki curriculum design. Naismith et al (2011) note that ineffective communication among group members could impede collaboration which resulted in insufficient and difficult negotiation among them. The lack of effective communication could stem from several problems, for example, a lack of leadership, clash of ideas or personality, a lack of endurance, excessive information, time management, or unmatched attitudes for collaborative learning. Teacher support should help students' communication to achieve their project goals.

Ineffective communication among group members may result from group size (Naismith, et al., 2011). Bruffee (1999) argued that a group of five would be the optimum group size of students for a collaborative project because it could nurture collaborative processes best by providing effective group dynamic and optimal workload shared by members.

Discussion and conclusion

This paper identifies practical problems in the experience of wiki use, with possible solutions to augmenting collaborative learning for curriculum design. The DBR approach helps teachers to examine "broad-based, complex problems critical to human learning and performance" (Reeves, 2000, p.11). In addition, when the teachers engage in DBR, they can document the implementation of a design, reflect on their research and develop design principles. Through the development of design principles, in the context of this research, the value of teacher and learner interactions in collaborative use of a wiki became evident.

As facilitators and designers of learning, teachers can examine problematic situations and support collaborative learning process, while learners may reflect emerging problems during the project. Hence in this research

project the interplay between teacher and learner impacts on the iterative process of design. For example, during the wiki project, an intra- and inter-group commenting activity as part of the peer assessment before and after the midterm examination was implemented, followed by a consultation activity. With engagement in evaluation and reflection, the teacher could identify problems and refine possible interventions for implementation afterwards such as encouraging students to have a leading role among group members to boost effective communication. The preliminary findings indicated that with such interventions students showed learning process and development toward collaborative learning, for instance building a sense of collective community by a joint effort of understanding, being aware of and being able to identify cultural concepts through language use as anticipated in the course learning outcomes.

These preliminary findings do show enhanced collaboration as a result of the activity refinement, suggesting an insight of a crucial teacher role in responding to emerging complex problems with dynamic support critical to collaborative learning. The processing of data is at an early stage, currently exploring the student experiences during the course. The impact of this design on student learning *outcomes* has yet to be analysed. This will be explored through student perceptions of their learning and in particular focuses on the ways in which they understood key concepts of intercultural communication.

In this research DBR provides a critical and applied model for developing collaboration in a wiki learning environment. Importantly, the experience of DBR has supported the teacher as researcher to develop contextual principles that support their engagement with learners, and their application in course design.

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