Designing Wikis for Collaborative Learning and Knowledge-building in Higher Education

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Abstract: A wiki design that facilitates collaborative learning, knowledge-building, and student reflection was implemented in three graduate courses. Empirical data collected from interactions in the Resources area where students added new resources and commented on peer contributions is analyzed and reported in this poster. The goal is to test the effectiveness of the proposed design for collaborative learning and for the development of a knowledge-building community driven by wiki participants.

Introduction
The ubiquity of the Internet and easy access to information on the World Wide Web today provide educators with unforeseen opportunities to use online technologies for collaboration and knowledge-building. While a number of Web 2.0 tools – wikis, blogs, and social bookmarking tools like del.icio.us have inherent capabilities that enable collaborative learning, it remains important to identify instructional design that will facilitate and ensure knowledge-building among participants. This project explores the usefulness of a wiki design for knowledge-building among participants in three graduate courses where wiki interactions were analyzed using both quantitative and qualitative methods.

Wiki design
A wiki has been defined as “a freely expandable collection of interlinked Web pages, a hypertext system for storing and modifying information – a database, where each page is easily edited by any user with a forms-capable Web browser client” (Leuf & Cunningham, 2001, p14). Notwithstanding the inherent capabilities of wiki technologies for promoting student collaboration, the student interaction required for a wiki to benefit learners involves the definition of parameters in educational activities (Phillipson & Hamilton, 2004). If educators hope to achieve higher levels of student participation and knowledge construction, wikis have to be designed to that effect. The wiki design proposed in this project is based on theories about collaborative learning and knowledge-building communities (Jonassen & Kwon, 2001; Moskaliuk & Kinnerle, 2007; Palloff & Pratt, 2005) and supports the characteristics of knowledge construction detailed by Piaget(1970), Mezirow(1990), Vygotsky (1962) and Scardamalia and Bereiter (1994). While most wikis contain areas for discussion and collaboration, this decentralized, non-teacher controlled wiki provides areas for students to -Share and adapt to new knowledge in the form of resources (e.g. research articles, online videos, facts and statistical reports) -Pose questions about course topics, discuss peer questions and negotiate understanding or meaning based on prior knowledge and experiences as well as individual environments -Reflect on their individual learning process with respect to different topics in the course and on their learning through wiki interactions The above design corresponds to Salomon’s (1993) proposal that successful CSCL should engage individual learners but encourage interdependence among learners by information-sharing and continuous joint thinking.

Methodology
The wiki design proposed above was first implemented in a graduate course with 14 students (six male and eight female) who were in-service teachers, educational technologists, administrators, and faculty developers in K-12 and higher education settings. The students met once a week for three hours over a 14 week semester where they learned about new technologies in education and experimented with their use. A small number of students was considered appropriate in order to study collaborative learning and meaning-making as posited by Stahl (2006). The instructor was the sole administrator but students could edit all parts of the wiki in the graduate course (Readings, Resources, Calendar, Assignments, Discussions, and Individual Reflection Pages). While the instructor provided Readings and Assignments areas, all other areas were maintained by the students. This poster focuses on the Resources area, where students created hyperlinks, added attachments or embedded resources on course topics.

A mixed approach was adopted to analyze the discourse in the three areas of the wiki (Resources, Discussion, and Reflection) where students interacted. While the participation of students on the wiki was not equated to learning in this study, it was considered important to count the number of visits as well as contributions by students in each area. Further, in the Discussion area, the number of times that students initiated a comment or responded to a comment was counted, and in the Resources area, the number of times a student contributed new information, stated that they have viewed new information provided by others, and commented on the content of that new information provided by others was counted.
Quantitative data was considered insufficient to understand the process of knowledge-building in a group, therefore the interactions in the Resources area were open-coded in two stages. In the first stage the actions/interactions of students were mapped and described. In the second, themes related to knowledge construction were attributed to different comments by students and to their actions. The same data was open-coded in the same two stages by two research students and inter-rater reliability calculated as a percentage of agreement. Eventually, interactions in all three areas (Resources, Discussion, and Reflection) will be analyzed to determine a process of interaction in each area. This procedure will be repeated for all three courses where the wiki design is used to compare the process of interaction in each area in the three courses.

Results and Conclusion

Students were not required to contribute to the Resources area of the wiki, the instructor told them that they were “welcome to” add any resources they thought appropriate. Student contributions to the wiki were thus not in response to an instructor-initiated question or prompt. In the first four weeks of the course, 71% of the students added new content at least twice and 86% read/heard/viewed and commented on the new resources added by their peers at least once. On average during the course, 36% of students added new content at least once a week and 57% commented once a week. Students’ use of the wiki varied as the course progressed. The least wiki activity was observed in weeks eleven and twelve of the 14-week course.

The unit of qualitative analysis in the Resources section was each new resource that was added. An interaction analysis map was first created for each resource, identifying the direction of student responses with respect to the resource added. Student contributions fell in the following areas: -Introduced new resource (NR) with relation to course content, relation to peer-contributed resources. -Supported comment. Resource NR ‘solidifies’ existing knowledge/experience. -Made apparent content of resource NR as different from existing knowledge; Questioned new information -Offered clarification/explanation/context/examples -Reported new learning or exposure to knowledge and way of thinking unknown before -Reported change in understanding or behavior or approach -Reported application in practice or use of resource NR

The above is only a preliminary analysis of the data. The actions reflect stages of knowledge-building (exposure to new knowledge, accommodation and assimilation of that knowledge, negotiation of understanding and identification of application) that will be refined to present a model of interaction in the Resources section. The above wiki design is being implemented using the same wiki software in two more graduate courses of the same size taught by different instructors. The interactions will be analyzed in a similar manner and compared to determine if the wiki design is effective in other contexts and with other groups of learners.

References