

Fostering Online Collaborative Learning Using Wikis: A Pilot Study

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Abstract: A classroom that operates as learning community should not be bounded to one weekly face to face meeting. Collaboration and social interaction are enabled to continue online using Web 2.0 technologies. We examined the affordances of wikis to support online collaborative learning within a learning community. The study was conducted with 24 students in an educational psychology graduate level course.

Purpose of the Study

Wikis are Web 2.0 technologies that allow every visitor to become an editor of a given topic at any time and from any location. The largest and perhaps most well-known *wiki* is Wikipedia. Wikis might have the power to transform classrooms into online learning communities unbounded by time and space constraints. Nevertheless, empirical evidence to support or refute this argument is currently lacking. In this study we examined the affordances of wikis to support online collaborative learning (CL). The wiki environment became our means for online collaboration and social interaction in addition to our face to face (F2F) meetings. Our purpose was twofold: (a) assess students' attitudes about their CL experiences using a wiki (RQ1), and (b) investigate the CL processes evident in the wiki environment, as well as characteristics of a wiki that may support online learning communities (RQ2).

Theoretical Framework

When a classroom is transformed to a community of learners, the teacher and students work collaboratively to help one another master complex topics. Online learning communities provide support for individual learners who can test assumptions, try out new ideas, and ask questions in the company of other learners with common interest. Fostering a learning community (online or offline) is consistent with a sociocultural perspective on learning, which views learning as active, reflective, and social (Brown & Campione 1994; Rogoff, 1994). A sociocultural perspective on learning also emphasizes that learning is mediated by psychological tools that help people regulate their thinking and interactions (Wertsch, 1994). Thus, from this perspective, different technological tools afford different opportunities for collaboration and learning within a community of learners (e.g., Hmelo-Silver, Chernobilsky & Nagarajan, in press; Suthers, Vatrappu, Medina, Joseph, & Dwyer, 2008).

Methodology

Participants were 24 graduate students enrolled in a F2F, educational psychology graduate level course taught (in Greek) during the fall of 2008 at a private university in Cyprus. The class met once a week for three hours. The sample consisted of mostly female (90%), in-service teachers with 1-3 years of teaching experience (90%), ages 22-47. Besides two students, the rest of them reported that they had never used a wiki before.

MediaWiki -- an open-source platform originally written for Wikipedia -- was used to build the wiki environment for this study. The wiki environment allows editing, formatting, and linking of shared wiki pages, asynchronous personal talk and public discussion via special wiki pages, email notifications for changes in the environment, and access to history documentation for each page.

During week 4 of class, students were introduced to the wiki environment for 15 minutes at the end of the class. Then, students were asked to use the wiki environment in distance (i.e., from home or school) to participate in a warm-up "introduce yourself" activity. This activity revealed minor technical difficulties (including login procedures and posting/editing) that were resolved via email communication between the investigator (first author) and students. For weeks 5 and 6 students were randomly assigned to four online groups of 6 students. Class did not meet F2F. Instead, students worked in their online groups within the wiki environment. Groups were asked to discuss a classroom case scenario and to work collaboratively to produce a consensus response to their groups' assigned question.

The twofold purpose of this study required a mixed-method research design that incorporated both qualitative and quantitative data collection and analysis. Data sources included online discourse and history

documentation archived in the wiki environment, groups' consensus responses, and quantitative and qualitative data collected from an anonymous survey administered immediately after the completion of the activity.

Analysis and Results

To assess students' attitudes about their CL experiences using the wiki (RQ1), we examined students responses to the survey ($N = 20$). The survey included a total of 27 items. First, 25 Likert-type items were designed to measure five constructs of interest: 1. Communication and Interaction; 2. Reflection; 3. Technology Satisfaction; 4. Overall Satisfaction; 5. Frustration. Subscales were adapted from previous studies that reported good psychometric properties in terms of factor structure and internal consistency (see Yeo, Taylor, & Kulski, 2006; Ioannou & Artino, 2008). High internal consistency (Cronbach's alphas $> .80$) was confirmed using data from our 20 participants. Using a response scale from 1 (completely disagree) to 7 (completely agree), means were quite high ($6.29 < M < 6.66$) for the positively worded subscales 1-4, suggesting our use of wiki technology for an online group activity was positively endorsed by our students. On the other hand, the mean score for the frustration subscale was very low ($M = 1.51$) indicating that students' level of frustration during the activity was generally low.

Second, the survey included two open-ended questions. We asked students if there was anything about (1) the technology and (2) the structure of the activity that hindered their collaboration. The vast majority of the students had nothing negative to respond. A couple of students reported that (1) they lost some work while editing a wiki page concurrently. In fact, MediaWiki has a process for resolving editing conflicts, but students were not aware of that. Another student reported that (2) fewer group members would make collaboration easier.

To understand the CL processes evident in the wiki environment (i.e., how students interact and arrived to a consensus), and how characteristics of a wiki that may support online learning communities (RQ2), we employed a combination of qualitative, quantitative, and illustrative techniques. Specifically, we used the coding-and-counting approach to computer-mediated-discourse analysis (CMDA) described in Herring (2004), followed by the Chronologically-oriented Representations of Discourse and Tool-related Activity (CORDTRA) technique described in Hmelo-Silver & Chernobilsky (2004) and Hmelo-Silver et al. (in press). The online discourse of each group was coded for student collaboration, statement complexity, monitoring, and other content (broken into more detailed subcategories; see Figure 1). Our coding scheme was adapted from Hmelo-Silver and Chernobilsky (2004) who studied student CL processes during problem-based activities in the STEP online environment. The unit of analysis (segment) was decided to be a consistent 'unit of meaning'. In most cases 'a contribution' on the wiki was a unit of analysis that was classified into a coding category. One coder coded the whole discourse, and a second coder independently coded 23% of the discourse (group#3's discourse), after being trained by the first coder. The inter-rater agreement was satisfactory – 89% for segmentation into units and 87% for coding of the units. We, then, counted the frequency each coding category was used by each group. Our subsequent analysis focused on two selected groups: Group#3 demonstrated high levels of participation and productive discussion: more than 90 contributions were recorded in the wiki environment (not counting instructor's feedback), and 70% of discourse was coded in the collaboration and statement complexity categories. Group#1 was less successful with regards to the above criteria.

To construct group#3's CORDTRA, we used the group's coded discourse and information recorded in wiki history documentation (see Figure 1). Time of contribution is running at the top of the diagram in chronological order. The discourse categories, wiki features, group members, and action taken (expanding, deleting, or editing information) are listed on the right of the diagram. Each time point represents a discourse category, a corresponding wiki feature that the specific student is using, and the type of action taken. We explore CL by going back and forth between the CORDTRA and the coded discourse.

Group#3 began with some task and tool -related talk, explanatory questions, and monitoring/planning statements. Soon after that, students started brainstorming. A lot of new ideas, elaborations and transforming statements were posted. Only three of the group members were active in the discussion. Students generally agreed with each other's ideas. There were no disagreements; only a couple of modifications of ideas. A number of explanatory questions and prompts were present as students sought to reach common understanding of the problem in the case. Contributions were generally sophisticated and well-grounded in theory (transforming statements) moving the task forward. There were fewer simplistic contributions of facts and theories (telling). Active discussion of ideas lasted for approximately four days. Then, some tool-related and monitoring/planning discussion took place as students proceeded with constructing their solution. The group used one wiki page for their public discussion and the associate front page for the construction of their solution. Features such as personal talk, history documentation, and email notification (self-report) were not utilized. As students moved to the front wiki page to construct their solution, the discussion was almost completely abandoned. For three days students refined their solution. They copied and pasted information from the discussion page into their solution, re-arranged paragraphs, expanded and

revised content, added and deleted sentences or paragraphs, and played with headings until they had a coherent essay. In general, ideas included in the solution reflected what was previously discussed among group members.

Group #1 demonstrated quite different patterns of collaboration. Due to space limitations, we only present Group#3 in this companion paper. The poster presentation will include: screenshots of the wiki environment, case scenario and questions, coding scheme, coding-and-counting CMDA results for each group, CORDTRA diagrams for both groups #1 & #3, discussion about the inferences we can make from the diagrams, and methodological limitations.

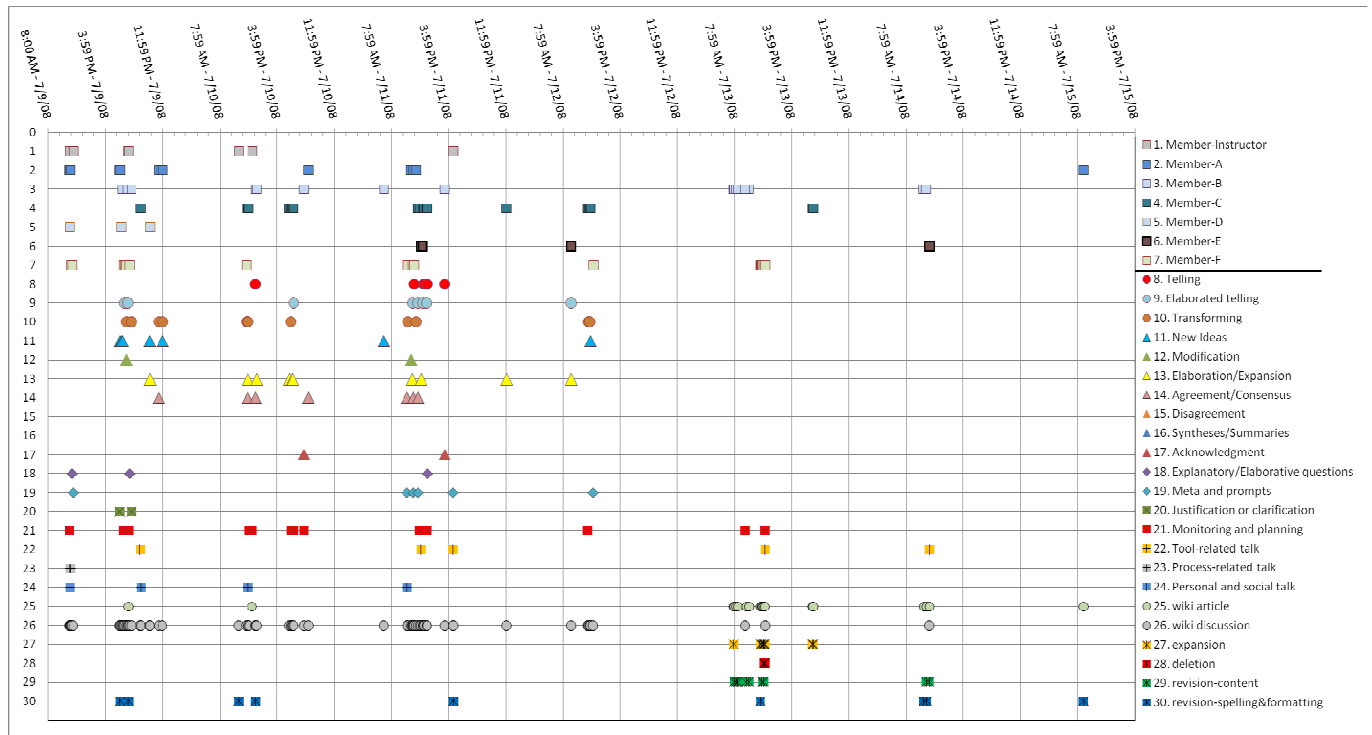


Figure 1. CORDTRA for Group #3.

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