Wiki as a collaborative writing tool in teacher education: Evaluation and suggestions for effective use

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ABSTRACT

Wiki technology provides new opportunities to foster collaborative writing in teacher education. To empirically evaluate the level of collaborative writing in a wiki-based environment, this article used three methods and their combination. The first method was the history function that records all students' actions, enabling to trace all changes made in the wikis. The actions were analyzed in terms of number and percentage of contribution using a taxonomy categorized by 10 editorial types. The second method examined comments posted on the wiki discussion page to evaluate the level of collaboration. The third method provided feedback on the level of collaboration by means of peer assessment. The results show important differences in the types of contributions across the categories investigated. The results also reveal that the level of collaborative writing was lower than expected. Possible factors that may influence wiki-based collaborative writing are discussed. Finally, suggestions for effective use of wikis as collaborative writing tools in teacher education conclude the article.

1. Introduction

Wikis are seen as potentially powerful tools to foster collaborative writing. They provide opportunities for students to collaborate on joint assignments and group writing tasks. According to Parker and Chao (2007), wikis may serve various educational purposes, such as presenting class materials, keeping a log for knowledge, storing documentation for a research project, or supporting collaborative writing projects. The research literature provides many other examples of wikis in education (Caple & Bogle, 2013; Grant, 2009; Li & Zhu, 2013; Mak & Coniam, 2008; Tetard, Patokorpi, & Packalen, 2009; Thomas, King, & Minocha, 2009; Wichmann & Rummel, 2013). Whilst wiki use is becoming more and more common, its use in education is still under explored (Davidson, 2012). In addition, there is relatively little research on successful implementations of wikis supporting collaborative writing (Pifarré & Fisher, 2011). Research studies on wiki are mostly perception-based, such that it is not straightforward to determine who contributed to the wiki, how students collaborated, the extent to which they collaborated, and what types of activities were performed (Judd, Kennedy, & Cropper, 2010). Recently, a small but growing number of studies have drawn on the data log generated by the history function of wikis. This function enables retrieval of number and percentage of contribution from each student. The data log is considered as inherently more reliable than percep-

tion-based studies to explore collaborative writing activities. However, statistical data alone do not necessarily give a complete picture of students' contributions to the wiki. Supplementary methods are needed to explore the level of collaborative writing. This work aims at investigating students' collaborative writing activities in a wiki-based environment in teacher education. The activities were analyzed using three methods. First, the data log of the history function categorized by 10 editorial types of actions. Second, students' comments posted on the wiki discussion page, and categorized by increased level of collaboration. Third, peer assessment to provide feedback to each other's wiki, and highlight the level of collaboration. A cross-checking of the findings is then performed to find whether the methods produced similar results regarding the level of collaborative writing. This is followed by a discussion of possible factors that may influence wiki-based collaborative writing. Finally, suggestions for effective implementation of wikis as collaborative writing tools in teacher education conclude the article.

2. Theoretical background

2.1. Wiki technology

Wikis are considered as a type of Web 2.0 technology that enables users to work together on the Web. In terms of collaborative writing, wikis allow participants to create a collective document by editing, discussing, and sharing information about a topic of common interest (Chao & Lo, 2011; Peled, Bar-Shalom, &

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Sharon, 2012; Wichmann & Rummel, 2013). Wikis have three major functions to facilitate collaborative writing:

(a) Editing function that supports multiple users to create and modify articles, texts, or documents. This function provides navigation for non-linear organization of the wiki.
(b) History function that records all edits, by means of color coding, allowing users to trace all revisions being made. The history log enables edits to be traced to the users, and helps the teacher to monitor and assess students' progress.
(c) Discussion page that enables asynchronous written communication between users by providing explanations and posting comments on various issues related to the wiki.

The advantages provided by wikis enable teachers to evaluate the level of contribution of each student and groups of students by looking at the history log and creating statistics on the basis of a set of given criteria. Similarly, comments posted on the discussion page may be analyzed quantitatively and qualitatively to evaluate the extent to which students discussed issues related to collaborative writing. Among a plethora of wiki tools, MediaWiki was chosen as a platform for collaborative writing tasks. MediaWiki incorporates all functionalities described above. In addition, it is restricted to university members, making it appropriate for education (Kasemvilas & Olfman, 2009). MediaWiki uses a simplified HTML language and provides an extensive functionality for user authentication (Su & Beaumont, 2010). MediaWiki has a history log that keeps track of students' edits by name, date, and color coding (Lund & Smørdal, 2006). Using this function, it is possible to rollback to earlier versions of the wiki. MediaWiki also provides a discussion page that serves as a place for reflections for the wiki (Ibid).

2.2. Wiki-based collaborative writing

To examine the level of wiki-based collaborative writing in teacher education, it is important to distinguish between cooperation and collaboration. According to Witney and Smallbone (2011, p.102-103), cooperation is defined as an activity, "where participants divide the task among themselves and work independently", whereas collaboration is an activity that enables participants to "co-ordinate their efforts to solve a problem or accomplish a task collectively". Collaborative learning is then described as "the process of learning generated by small, interdependent groups of students (…), who work together as a team with shared problem solving" (Ibid, p. 103). In educational settings, collaborative learning involves collaborative writing, where "students produce a piece of text each by taking turns in contributing to the process of writing a join text" (Bradley, Lindström, Rystedt, & Vigmo, 2010, p. 71). Collaborative writing consists of one or more participants clarifying, modifying, by editing, and/or revising the text of one or more participants (Witney & Smallbone, 2011).

Collaborative writing is underpinned by Vygotsky's sociocultural learning theory (Kuteeva, 2011; Li, Chu, Ki, & Woo, 2012), which assumes that collaboration among participants can achieve more in terms of learning benefits than individuals. Particularly important for collaborative writing are language and social interactions, and the notion of Zone of Proximal Development (ZPD), defined as the "distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). Although ZPD originally refers to expert-novice or teacher–student interactions, it has been found that "students can reach high levels of performance than they might achieve by working on their own" (Li & Zhu, 2013, p. 2). Nevertheless, Mindel and Verma (2006) argued

that the wiki model provides instructors with the ability to monitor students' collaborations and group work. Hence, interactions between students and teacher are mutually supportive to reach the potential of ZPD.

While collaborative writing is not new in educational settings, wikis offer new opportunities to work in groups, and as such, they facilitate collaborative writing and group discussion (Lundin, 2008). Alterations and changes are made directly in the text being written. Argumentations and critical reflections accompanying the revisions may be made in the discussion page. Wiki-based collaborative writing is a coordinated activity that enables participants to edit and revise each other's contributions to the wiki (Chao & Lo, 2011; Meishar-Tal & Gorsky, 2010; Trentin, 2008; Witney & Smallbone, 2011). Hence, wiki-based collaborative writing is opposed to work that simply consists of splitting up the task, work independently of each other, and then assemble individual contributions to a final wiki. Most of the work is performed individually, by creating wiki pages, or portions of wiki pages, and editing only these pages, without any interference with peers' pages.

2.3. Taxonomy for categorizing students' actions carried out on wikis

Students can make various contributions to a wiki: add new information, remove content, restructure existing content, or revise the meaning of sentences, etc. Until recently, there have not been methods that would help in categorizing these various wiki editing types. Recent studies, however, have provided guidance to classify activities performed on wikis. Pfeil, Zaphiris, and Ang (2006) used a taxonomy to categorize editorial types in Wikipedia, which was later adapted to wikis by Meishar-Tal and Gorsky (2010). The taxonomy used in this paper draws on this research, which originally included 13 categories, of which the following 10 were identified as important to assess collaborative writing (Table 1). Three categories were not considered in this work. The first category was "Vandalism", because MediaWiki, unlike Wikipedia, is restricted to university users, and, therefore, there is almost no risk to demolish pages. The second category was "Mark-up Language" that may change the appearance of pages. This was not included, because the HTML code being used is simplified and does not impact the content. The last category was "Reversion", that is reversion of a page to a former version in order to reverse vandalism or certain users' activities. The reasons for not considering "Reversion" is that the risk for vandalism is minimal, and, in addition, reversing users' activities was not recommended to avoid drastic changes of the wiki content.

These categories have not the same level of importance when it comes to assess collaborative writing as defined in Section 2.2. To examine the level of collaboration, these categories need to be divided into three main groups of actions:

(1) Actions associated with technical issues, such as presentation, appearance and structure of the wiki (format, style/ typography)
(2) Actions on content, which do not change the meaning of sentences or links (add and delete information, add and delete link)
(3) Actions on content, which in contrast to the second group, alter the meaning of sentences or links (clarify information, fix link, grammar, and spelling)

These groups of actions can be further described by increased level of collaboration. The first group is characterized by a low level of collaboration, since the actions carried out on wikis focus mostly on technical issues, without reference to content. The second group emphasizes actions on content, such as add or delete information or links, without changing the meaning of sentences. These types