Pedagogical Criteria for Successful Use of Wikis as Collaborative Writing Tools in Teacher Education

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Abstract. Wiki is a Web 2.0 technology that potentially promotes collaborative writing, group discussion and interaction. However, little research has been done as to which criteria are suitable to address pedagogical issues that are pertinent to collaborative writing with wikis. This paper proposes a set of pedagogical criteria to explore wiki-based collaborative writing. The criteria are then used to evaluate students' perceptions of collaborative writing using MediaWiki. The paper also reports on pedagogical implications for successful use of wikis as collaborative learning tools in teacher education.

Keywords: Collaborative writing, MediaWiki, pedagogical criteria, Web 2.0, wiki

1. Introduction

Wiki is a Web 2.0 technology that potentially facilitates collaborative writing and group discussion. Collaborative writing is an activity that transforms a text by multiple students into a collective document [1,2,3,4]. Collaborative writing also involves providing feedback, suggestions, and comments from fellow students. Of particular interest for the quality assessment of wikis is peer review. While wikis are considered as user-friendly, technical problems may arise for different reasons, such as unstable server, lack of features and extensions, insufficient multimedia support, placing of images, and concurrent editing. Beyond wiki technicalities, pedagogical issues are still the main factors that impact collaborative writing. This work addresses pedagogical issues to investigate students' perceptions of collaborative writing using MediaWiki.

2. Research Questions

The work focuses on the following three research questions:

- What are the pedagogical criteria that are pertinent to collaborative writing with wikis?
- How do students perceive pedagogical issues of collaborative writing?
- Which pedagogical implications are relevant for successful use of wikis as collaborative writing tools in teacher education?

3. Pedagogical Issues of Wikis

Since wikis are considered as a digital technology, it is possible to draw on a set of criteria from the literature research to address pedagogical issues of collaborative writing with wikis [5,6,7]. These are:

- *Motivation.* The literature research distinguishes between internal and external motivation [8]. Internal motivation is a function of the value a student places on the wiki. The motivation increases when the wiki is inherently enjoyable and contains intrinsically study material that has a highly value for the student. External motivation refers to motivation that comes from outside a student, e.g. when she/he performs wiki activities in order to benefit from them, e.g. passing an exam with a high grade.

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- *Collaboration*. The very nature of wikis lies in their potentialities to support collaboration among participants. True collaboration requires one student to modify the content posted by another student and re-working the writing of others. In contrast, collaboration may occur at a lower level, when a student simply adds content to an existing wiki page [9].
- *Discussion*. This criterion describes the way and the extent to which the wiki is used for discussion. Basically, the wiki discussion page is used as a space for communication among participants. It can be used to discuss wiki tasks and reflect on critical issues of project work, including technical and pedagogical issues.
- *Assessment.* This criterion is important to evaluate the students' contribution to the wiki. Of particular interest for the assessment of individual participation and group processes is the data log of MediaWiki that tracks students' activities and stores previous versions of the wiki by observing who is active, and when, the type of activities performed on the wiki, the level of contribution, timing and work intervals.
- *Peer review and feedback.* In addition to collaborative activities within their own group, students need to benefit from comments and feedback from other groups. Peer review needs to be well-organized and structured in terms of assessment issues in order to be beneficial to the students. Peer review is also important from the point of view of academic writing.

4. Methodology

This work is situated within teacher education. It uses a case study to examine pedagogical issues of collaborative writing with wikis. The units of study were three wiki projects that groups of students performed collaboratively using MediaWiki.

4.1. Participants

Participants were 9 students enrolled in a course in Web 2.0 technologies offered by the University. None of the students were involved in wiki projects or had pre-requisite knowledge in collaborative writing before taking the course.

4.2. Wiki Projects

The wiki projects were carried out as collaborative writing projects. These involved a group of students working on the same document to edit, modify, review, and improve it. The collective production of the document involves all aspects of writing: content, structure, and language [1,2,3,4]. The students need to co-ordinate their efforts to produce the document collectively; otherwise collaborative writing projects cannot be carried out successful. Genuine collaborative writing is primarily a matter of modifying and improving the students' contributions to the collective document. Beyond the modification of others' contributions, collaborative writing also involves providing feedback, suggestions and comments [1]. Of particular interest for the quality of the wiki projects is peer review [3].

4.3. Data Collection and Analysis Methods

To investigate the students' perceptions of pedagogical issues of wikis, particular attention was devoted to the following methods and their combination to a multi-strategy of data collection and analysis: a) Students' self-evaluation using a survey questionnaire with open-ended questions; b) Peer review based on a survey questionnaires with open-ended questions; c) Students' discussion log of the respective wikis; and d) Students' contributions to the wiki in the history function of the wikis, which tracks all actions performed by each student and stores all previous versions of the wiki.

5. Results: Students' Perceptions of Collaborative Writing with MediaWiki

5.1. Motivation

Basically, the majority of the students felt that the wiki projects were motivating enough to work with, but they also gave both technical and pedagogical explanations for low motivation. First, the motivation was sometimes rather low due to the technical problems MediaWiki has brought up. Because of these problems, some students felt that the wikis could have been written as a report in Microsoft Word. Second, some

students pointed out that the wiki tasks were too focused on content and not enough on how to use a wiki to its full potential. Finally, the wikis were mostly motivating when collaboration in the groups runs smoothly

5.2. Collaboration

Most students indicated that they liked to comment and edit each others' contributions. In stark contrast, they believed that collaboration did not increase substantially, and that collaboration was rather of average quality. The majority of the students also indicated that MediaWiki does not automatically foster collaboration among participants. Students reported a number of pedagogical reasons to explain why MediaWiki did not substantially support collaboration, or even hindered collaboration, such limited student contribution to collaborative writing and resistance against using wiki technology. Also the lack of familiarity with the MediaWiki was an obstacle for increased collaboration. Furthermore, the limited capacity of MediaWiki does not facilitate multiple-editing, because the tool was unable to cope with simultaneous writing, in contrast to other Web 2.0 technologies such as Google Docs. Another reason was that collaboration did not happen in real time, and because of connection problems with the server. Some students also mentioned the superiority of Google Docs for concurrent writing. As a result, the degree of collaboration among the students cannot be characterized as high. In line with the students' perceptions, the evaluation of the data log confirms that collaboration did not really increase, since most of the activities on the wiki were done by only one or two students in the respective groups.

5.3. Discussion

Students pointed out that oral and face-to-face communication were equally important as online discussions. In addition, they indicated that they used both traditional and new communication channels, e.g. Google Docs, email. They also reported that the discussion page does neither identify the contributor and the time, nor separate discussions about points so that a great deal of searching is required before a thread of a discussion can be followed. Clearly, the students were disappointed that the discussion page cannot keep a sense of order to multiple discussions.

5.4. Assessment

The assessment of the data log revealed that the students' contributions were not evenly distributed in two groups. The result was that only one or two students performed most of the wiki tasks. It also happened that some students copied items from other sources, e.g. Wikipedia, and pasted them directly into the wiki. The students learned to write their own commentaries after the teacher made them aware of this problem. Furthermore, it appears that all groups worked much as the last deadline approached, and did not follow the schedule assigned throughout the project period, as the increased number of activities during the last phase of the projects clearly shows. Clearly, this reduced the possibility of collaboration further.

5.5. Peer Review and Feedback

Peer review was carried out three weeks before the end of the wiki projects. At this point of time, the wikis lacked a number of features that need to be addressed by peer review. Basically, students addressed three major issues. First, they mentioned efficiency problems, the lack of important technical wiki functions, and server problems. Second, the students pointed out that the degree of collaboration cannot be characterized as high, and that MediaWiki does not automatically foster collaboration. Finally, the students reported that the discussion page of MediaWiki is not good enough to promote group discussion.

6. Implications for Successful Use of Wikis as Collaborative Learning Tools

Several lessons and pedagogical implications for successful use of wikis in teacher education can be drawn from the results. First, both the students' subjective perceptions and the analysis of the data log revealed that the students were more inclined to cooperate, by slitting the wiki tasks in subtasks that were developed individually, than to collaborate to accomplish the task collectively. One reason for the poor collaboration was likely the lack of collaborative skills and familiarity with MediaWiki, since none of the students were involved in wiki projects before. Another reason is that true collaboration may be a real challenge for most students as it is cognitively demanding, unless they possess higher-order academic skills and critical awareness to judge the information posted on the wiki [10]. Moreover, students were inclined to

postpone their work as the project deadline approached. This reduced the possibility of collaboration as the research literature reveals [11]. Clearly, to successfully use wikis as collaborative writing tools, it might be necessary for teachers to adopt a socio-constructivist approach to learning, and emphasize the role of collaboration and group work. As Cole [12] pointed out, it is not enough to simply use wikis in courses without radical change of the underlying pedagogy and learning paradigm, and expect students to automatically collaborate. Rather, course content and pedagogy need to be redesigned to realize the potential capabilities of wikis in teacher education.

Second, since students were more inclined to cooperate rather than to collaborate, it may be necessary to develop an awareness of the difference between cooperation and collaboration, and the way collaborative writing might be carried out. As the results show, putting students together does not automatically result in collaborative work, because the acquisition of collaborative skills need to be addressed before using wikis. Such skills, indeed, become necessary to foster collaborative learning. Clearly, collaborative learning and writing should not be restricted to wikis alone but should be possible using other means, e.g. allow students come together to discuss a topic, especially when the participants have different backgrounds, and reflection through co-student summaries of what they have learned [13].

Third, students referred many times to the inappropriateness of MediaWiki for discussion. They indicated that online discussions alone are not the ideal arena through which to conduct communication, because the need to engage in some form of synchronous communication is still highly valued by the students. It appears that the blended model of communication is the most appropriate form of discussion, because the combination of different forms of communication is more stimulating for the learning process than one tool alone [14]. The blended model involves both synchronous and asynchronous; e.g. face-to-face meetings supplemented with traditional and new forms of communication, such as email, Facebook, and Google Docs.

Fourth, students need be aware of the role of motivation, since it is an essential component of collaborative writing with wikis. Although the students were motivated by the wiki topics, the results indicated that many students were not deeply engaged in the wiki projects since they did not sufficiently contribute to the collective text as the data log clearly shows. A number of factors may explain low motivation: lack of collaborative skills, technical problems with MediaWiki, lack of clear assessment procedures, etc. It is clear that technical problems should be addressed before any use of wikis for collaborative writing, otherwise students will not be motivated to work with. Beyond wiki technicalities, motivation can be achieved in many ways. First of all, motivation must be seen in relation to the wiki topic itself, whether it is highly relevant and meaningful to the students. Motivation can also be achieved through performance goals [7], and multimedia possibilities afforded by the wikis.

Fifth, there is no clear evidence that the way the students were assessed, as a group and not individually, influenced the quality of collaborative writing. Nevertheless, assessment plays an important role in evaluating the students' contributions, and can enhance student achievement. MediaWiki has a history function that keeps a record of students' individual contributions to the wiki. This function enables a quantitative evaluation of the contributors' individual input. From the teacher's point of view, a quantitative assessment of students' individual contribution must in some cases be made, even though evaluation of individual performance is a sensitive issue when students work in groups. Teachers also need other assessment forms, since statistical data alone give little information about the quality of the output. Other ways might be used, such as self-assessment or/and peer assessment, on an individual basis or in groups, in line the philosophy of collaborative learning [3].

Finally, the benefit of peer review and feedback from fellow students cannot be underestimated [15]. During peer review, students evaluate other students' wikis to find out if they followed the requirements of the wiki projects. This process gives students a possibility to look at the requirements once again, because they are assessing whether other students followed them. As a result, they may be especially careful to reflect on and reassess their own understanding of the requirements. In turn, a careful understanding of the requirements may help the students revise their writings and improve their wiki after the peer review process.

7. Conclusions and Future Research

The main research goal of this work was to use MediaWiki to develop a set of pedagogical criteria to evaluate collaborative writing with wikis. The work was conducted with a small convenience sample. Therefore, it is not representative for a larger population of students, and cannot be generalized, even though some results are consistent with current research work. However, the experiences that have been reported in this paper demonstrate that the use of wikis for collaborative writing can never be easy or straightforward [16]. Future work will focus on the refinement of the pedagogical criteria. In addition, the work will be undertaken with larger student groups to ensure more reliability and validity of the results.

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