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Winter 12-2-2011

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Sumonta Kasemvilas

Kittisak Sirisaengtaksin

Daniel Firpo

Thipnapa Huansuriya

Pimpaka Prasertsilp

See next page for additional authors

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Authors

Sumonta Kasemvilas, Kittisak Sirisaengtaksin, Daniel Firpo, Thipnapa Huansuriya, Pimpaka Prasertsilp, Sucheng Soeung, and Lorne Olfman

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Enhanced MediaWiki for Collaborative Writing in the Web 2.0 Era

Sumonta Kasemvilas, Khon Kaen University, sumkas@kku.ac.th
Kittisak Sirisaengtaksin, Claremont Graduate University, kittisak.sirisaengtaksin@cgu.edu
Daniel Firpo, Claremont Graduate University, daniel.firpo@cgu.edu
Thipnapa Huansuriya, Claremont Graduate University, thipnapa.huansuriya@cgu.edu
Pimpaka Prasertsilp, Claremont Graduate University, pimpaka.prasertsilp@cgu.edu
Sucheng Soeung, Claremont Graduate University, sucheng.soeung@cgu.edu
Lorne Olfman, Claremont Graduate University, lorne.olfman@cgu.edu

ABSTRACT

The primary goal of this case study research is to investigate users' perceptions of the efficiency of MediaWiki used in the collaborative writing process for students in graduate classes. MediaWiki version 1.15.1 was used in this study. Two case studies were used to explore situations that were occurring as students used the MediaWiki instance. The results show that MediaWiki needs some additional features, such as chat, advanced text editor, and discussion to facilitate the collaborative writing process.

Keywords: MediaWiki, collaborative writing, group writing in higher education, web 2.0, education technology.

INTRODUCTION

The collaborative writing process relates to social nature because group members need to communicate and participate. MediaWiki is considered a social technology tool for collaborative writing in the Web 2.0 era. MediaWiki was chosen as the platform for this study because it is one of the world's most popular Wikis. For example, Wikipedia runs on MediaWiki because it is easy to install, configure, and use. In this study, students use MediaWiki as a tool to construct their own knowledge and at the same time, they use MediaWiki as a medium to distribute their knowledge when working with each other. Design mechanisms in MediaWiki should be able to fulfill this dichotomy because they have to be practical for users who have the role of author, reader, reviewer, or editor. In order to design the mechanisms for MediaWiki that suit the needs of the classroom, this study addresses the following research question: what mechanisms can be designed to enhance collaborative writing in classroom settings?

CASE STUDY METHODOLOGY

The case study research method is used to address a contemporary phenomenon, such as an event or activity within its real-life situation [1] [7]. This method is used to examine a single case or a few related cases that involve development of detail [5]. Information gained from case study research is mostly descriptive, involving various sources (i.e. interview and observation) in order to understand the demonstration of complexity of the phenomenon being examined [2]. In this research, two case studies in classroom settings were conducted. The two case studies emphasized detailed information about two small groups of participants and were used to explore and describe the complexity of the processes taking place as a result of using the MediaWiki instance designed to enhance the collaborative writing process. Qualitative research reveals complexities and provides insights that quantitative research or fixed designs cannot achieve [4]. Individual interviews (either face-to-face or by telephone depending on participants' availability) were conducted to collect the users' perceptions.

Population and Sample

The population for this study included students in two graduate classes that use MediaWiki as a research-intensive learning tool for collaborative writing. A convenience sample was selected because this study relied on the professor using MediaWiki in the classroom and students who volunteered to participate. The sample consisted of two sets of students who were required to use MediaWiki to complete classroom assignments. More importantly, they were real world users in a collaborative writing process and a part of the learning community of users.

Procedures

The procedures used to conduct each case study are outlined in this section. Students in both classes were assigned projects that had to be written up and finished within a specific timeline. The first case study was conducted in a graduate research methods class where students were required to conduct reviews of academic papers in a group format. The second case study was conducted in a

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knowledge management (KM) class that required students to collaboratively write a group essay.

Case Study 1: Group Review

This case study investigated collaborative writing in the reviewing process. [3] proposed that Wikis might suitable for use in reviewing. In this case study, one of the main assignments for the course was to review academic papers with students having two assigned roles: author and reviewer. The instructor acted as the Associate Editor. Each student worked with other students in his or her group as a reviewer to comment on and discuss their reviews with other students.

According to [3], Wiki-based review, if conducted the right way, can enhance the speed and quality of the review process. Rather than having each reviewer work on his or her own review separately and then submit it to the editor, he or she has opportunities to look at other reviewers' opinions and would be able to work with them directly to discuss issues in that paper. If any reviewer agreed or disagreed with any points of the paper, he or she could comment and reply back and forth with other reviewers.

The instructor provided two articles for review. The first article was reviewed between weeks 2 and 4 of the class by using standard MediaWiki. The second article was reviewed between weeks 5 and week 7. After that students were asked to participate in interview sessions about how they felt about MediaWiki, and about what kind of features they would like to have to support their collaborative writing process.

Case Study 2: Group Writing

In this case study, one of the main assignments of the course was writing essays. Students were assigned three roles: Author, Reviewer, and Associate Editor. The instructor acted as the Editor-in-Chief. Each student's main responsibility was to work with assigned groups to write essays in a topic area. The essay was expected to be between 1,500 and 2,000 words, and followed a predefined structure. The essay was to be completed during a six-week period using a MediaWiki instance. All students contributed to the writing, editing, and reviewing process; and one student was assigned the role of associate editor to coordinate the process.

DATA COLLECTION

Semi-structured, open-ended questions were used to interview students. Audio recordings were made with permission. The following key questions were used for the evaluation process: what are the advantages and the disadvantages? What features would they like to see implemented to aid them in the collaborative writing process? Why would they like to see these features implemented, and in what way do they believe these features would help them? The interviews took between 20 minutes

and an hour, with an average of 30 minutes. The difference in interview time depended on the amount of opinion(s) the participant wanted to contribute.

DATA ANALYSIS

The interview data was transcribed and the coding schemes were manually created. The researchers carried out the following activities: transcribing the recordings of the interviews and reading each student's transcription, and developing and defining a set of coding categories, and assigning category codes. Relevant information from interviews was classified by selecting the relevant phrases and sentences. To classify the relevant information into the defined categories, tables were created where the column heading represented the participants' code and the row heading represented the defined categories, and coding symbols were placed into the appropriate cells where any relevant information from each participant referred to the defined categories. Descriptive statistics were used to analyze interview data. Revising the coding categories was done as redundant or unclear coding categories were found.

To increase accuracy and completeness and prevent selective memory bias, when the transcribing was completed, the researchers immediately began coding. Inter-reliability was achieved by having someone else transcribe sections of the transcript that were then compared with the researcher's transcriptions to ensure they were the same. To increase intra-reliability and consistency, after completing the coding, random sections of the transcripts were chosen. These were then coded again and compared to the first round of coding to ensure that the coding was the same in both instances.

RESULTS

In Case Study 1(see Table 1), the participants were eight graduate students between the ages of 20 and 50. Four participants (50 % of the class) were between 20 and 30 years of age, two participants were between 31 and 40, and the other two were between 41 and 50. Four of them were male and the other four were female. Two of them were Master's students, and the other six were Ph.D. students. Three participants had used Wikis before and knew how to configure MediaWiki. In Case Study 2 (see Table 1), the participants were twelve graduate students with five between 20 and 30 years of age, three between 31 and 40, three between 41 and 50, and one participant older than 50. Eight of them were male and four were female. Eight were Master's students and the other four were PhD students. Five participants had used Wikis before and two participants knew how to configure MediaWiki. Eleven of twelve students allowed the researcher to conduct interviews. Two of them were interviewed by telephone and nine were interviewed face-to-face.

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Table 1. Overview of Both Case Studies

	Case Study 1	*Case Study 2*
Course	Seminar in Research Methods	Knowledge Management
Class size	N = 8	N = 12
Age	20-30=4(50%) 31-40=2(25%) 41-50=2(25%)	20-30=5(41.7%) 31-40=3(25%) 41-50=3(25%) 50+=1(8.3%)
Gender	M=4(50%) F=4(50%)	M = 8(66.7%) F = 4(33.3%)
Degree	Master=2(25%) PhD=6(75%)	Master = 8(66.7%) PhD = 4(33.3%)
Have used Wikis in classrooms	Yes=3(37.5%) No=5(62.5%)	Yes=3(25%) No=9(75%)
Know how to configure MediaWiki	Yes=3(37.5%) No=5(62.5%)	Yes = 2(16.7%) No = 9(75%) Missing =1(8.3%)
Group size	4 (2 groups)	4 (3 groups)
# of group writing assignments	2 review papers	1 essay
Time	3 weeks /1 paper	6 weeks /1 essay
Roles	Author and reviewer	Author, reviewer, and editor

The perceptions of the students in the two classes towards standard MediaWiki are quite similar (see Table 2). In Case Study 1, seven of eight students in the class were interviewed. Two had positive perceptions of MediaWiki, while another two had negative feedback. The other three had both positive and negative impressions of MediaWiki. In Case Study 2, eleven of twelve students were interviewed. Four had positive perceptions of MediaWiki, while three had negative perceptions. The other four had somewhat positive perceptions of standard MediaWiki.

Table 1. Comparison of Students' Perceptions towards Standard MediaWiki

Perceptions towards standard MediaWiki	*Case Study 1 (n=7; missing=1)*	*Case Study 2 (n=11; missing=1)*	*Both Cases (n=18; missing = 2)*
Positive	2 (28.57%)	4 (36.36%)	6 (33.33%)
Negative	2 (28.57%)	3 (27.27%)	5 (27.78%)
Somewhat positive	3 (42.86%)	4 (36.36%)	7 (38.89%)

Advantages and Disadvantages

Nine of eighteen students from both classes agreed that the most important advantage of MediaWiki is that the user interface is easy to use and navigate (see Table 3). Student B10 noted that although he and his friends are computer science savvy, they were overwhelmed with the new Web applications, Web 2.0, and social technologies. He felt that he wanted something that was easy for him and his friends to catch up with and MediaWiki seemed to be an easy-to-use application for them.

Table 3. Comparison of Advantages of Standard MediaWiki's User Interface and Features

Advantages of Standard MediaWiki's Interface and Features	*Case Study 1 (n = 7)*	*Case Study 2 (n=11)*	*Total (n=18)*
User interface and navigation are easy to use	4(57.14%)	5(45.45%)	9(50%)
MediaWiki Markup is not complex	1(14.28%)	1(9.09%)	2(11.11%)
History tab	1(14.28%)	1(9.09%)	2(11.11%)
It is easy to find information in MediaWiki	2(28.57%)	0(0%)	2(11.11%)
Free and Open Source	0(0%)	2(18.18%)	2(11.11%)
Layout of MediaWiki is simple	1(14.28%)	0(0%)	1(5.55%)
Ensuring assignment submission	1(14.28%)	0(0%)	1(5.55%)
Saving drafts	1(14.28%)	0(0%)	1(5.55%)
Scalable	0(0%)	1(9.09%)	1(5.55%)
Flexibility and robustness	0(0%)	1(9.09%)	1(5.55%)
Watchlist	0(0%)	1(9.09%)	1(5.55%)

Yet, five students from both classes said that MediaWiki did not have a user-friendly interface(see Table 4). This contrast is quite compelling. The plain interface of MediaWiki might be a double-edged sword. While some students consider MediaWiki easy to use, it does not provide a user-friendly interface. It might be too primitive to provide what the users currently need. Other Wiki instances such as Wikispaces and PBworks (or PBWiki) provide user-friendly Wikis. Users are able to change font colors and styles, insert files, images and media, and so on, without any knowledge of Wiki markup. Their interfaces are more stylish than MediaWiki, provide

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simple toolbars, and allow users to use most features without installing any additional extensions as in MediaWiki. However, the extensions and features cannot be freely customized like MediaWiki. If MediaWiki's interface can be made more user-friendly, it would be both easy to use and user friendly.

Table 4. Comparison of Disadvantages of Standard MediaWiki's User Interface and Features

Disadvantages of Standard MediaWiki's Interface and Features	Case Study 1 (n = 7)	Case Study 2 (n=11)	Total (n=18)
Not a user-friendly interface	2(28.57%)	3(27.27%)	5(27.78%)
Text Editor	1(14.28%)	2(18.18%)	3(16.66%)
MediaWiki markup	1(14.28%)	1(9.09%)	2(11.11%)
Discussion tab	2(28.57%)	0(0%)	2(11.11%)
Spacing	0(0%)	2(18.18%)	2(11.11%)
Date and time	1(14.28%)	0(0%)	1(5.55%)
Numbering	0(0%)	1(9.09%)	1(5.55%)
Help section in MediaWiki	0(0%)	1(9.09%)	1(5.55%)
Unorganized and content too large	0(0%)	1(9.09%)	1(5.55%)

Most-Used Features

The feature that a majority of students from both classes used the most was the history tab (see Table 5). For example, five students in Case Study 1 and five students in Case Study 2 used the history tab. They used the history tab because they were able to identify changes other students in the class made as well as when they made them. Another feature that students used the most was the discussion tab (see Table 5). One reason they used the discussion tab was that it was required by the instructor to complete assignments.

Table 5. Comparison of Most-Used Features

Most-Used Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
History tab	5(71.43%)	5(45.45%)	10(55.56%)
Discussion tab or talk page	4(57.14%)	5(45.45%)	9(50%)
Recent Changes	4(57.14%)	1(9.09%)	5(27.78%)
Watchlist	2(28.57%)	1(9.09%)	3(16.66%)

Most-Liked Features

A feature of MediaWiki students from both classes liked the most, which is consistent with the advantage that students

addressed, is the ability to see other students' postings and the ability to share their knowledge and experience (see Table 6).

Table 6. Comparison of Most-Liked Features

Most-Liked Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
See other students' posting and able to share knowledge	2(28.57%)	3(27.27%)	5(27.78%)
Everyone can edit and post anything	1(14.29%)	1(9.09%)	2(11.11%)
History tab	1(14.29%)	1(14.29%)	2(11.11%)
Recent Changes feature	1(14.29%)	0(0%)	1(5.55%)
Signature and timestamp	1(14.29%)	0(0%)	1(5.55%)
Discussion page	0(0%)	1(9.09%)	1(5.55%)
Table of contents	0(0%)	1(9.09%)	1(5.55%)
Ease of communication	0(0%)	1(9.09%)	1(5.55%)
Easy to use	0(0%)	1(9.09%)	1(5.55%)

Least-Liked Features

A feature of MediaWiki students disliked the most is the characteristic of MediaWiki that allows anyone to change anything without any approval (see Table 7). This issue created frustration for them. Students from Case Study 2 felt that their writing belonged to them; therefore, they should be informed before other students can change their work.

Table 7. Comparison of Least-Liked Features

Least-Liked Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
The ability to edit without notification or approval	0(0%)	3(27.27%)	3(16.67%)
Spacing	0(0%)	2(18.18%)	2(11.11%)
Editing interface	1(14.29%)	1(9.09%)	2(11.11%)
Disorganization of Wiki	1(14.29%)	1(9.09%)	2(11.11%)
Does not have sum of Recent Changes	1(14.29%)	0(0%)	1(5.55%)
Inconvenience in using the discussion tab	1(14.29%)	0(0%)	1(5.55%)
Does not have live interaction	1(14.29%)	0(0%)	1(5.55%)

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Least-Liked Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
Difficulty in finding content	0(0%)	1(9.09%)	1(5.55%)
Does not have track changes	0(0%)	1(9.09%)	1(5.55%)

Interestingly, this negative impression only came from Case Study 2 but not from Case Study 1. This finding reveals several concerns. First, students in the KM class felt that their writing belonged to them and did not want other students to change it without any notification. The instructor might need to take this issue into account and consider that MediaWiki in classrooms does not work like Wikipedia because some students did not prefer to have others edit their postings. Second, the reason why the ability of anyone in MediaWiki to change anything caused trouble in Case Study 2 but not in Case Study 1 might be linked to students' perceptions that were described earlier. They felt that they did not work as a group; instead, they felt that they worked individually. This could be the reason that no students from Case Study 1 had this concern.

Additional Features

The feature that students from both classes most wanted was email notification (See Table 8). Figure 1 compares the number of students who proposed this requirement in each case study. For instance, four students from Case Study 1 and three students from Case Study 2 requested email notification when content was updated.

Table 8. Comparison of Additional Features

Additional Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
Email notification	4(57.14%)	3(27.27%)	7(38.89%)
Approval (supervisor) and acknowledgement	4(57.14%)	2(18.18%)	6(33.33%)
Chat	3(42.86%)	2(18.18%)	5(27.78%)
Advanced text editor	1(14.29%)	3(27.27%)	4(22.22%)
Enhanced discussion	3(42.86%)	1(9.09%)	4(22.22%)
Google Docs-like feature	2(28.57%)	2(18.18%)	4(22.22%)
A more user-friendly interface (Customizable)	0(0%)	4(36.36%)	4(22.22%)
Online interaction	0(0%)	3(27.27%)	3(16.67%)
SMS notification	0(0%)	3(27.27%)	3(16.67%)

Additional Features	Case Study 1 (n = 7)	Case Study 2 (n = 11)	Total (n = 18)
Use other collaboration tools	1(14.29%)	2(18.18%)	3(16.67%)
Track changes	0(0%)	2(18.18%)	2(11.11%)
Protect and control mechanism	1(14.29%)	0(0%)	1(5.55%)
Who-is-logged-on feature	1(14.29%)	0(0%)	1(5.55%)
Page statistics	1(14.29%)	0(0%)	1(5.55%)
Real-time whiteboard	1(14.29%)	0(0%)	1(5.55%)
Sum in Recent Changes	1(14.29%)	0(0%)	1(5.55%)
Rating feature	1(14.29%)	0(0%)	1(5.55%)
Private space	0(0%)	1(9.09%)	1(5.55%)
Set a deadline	0(0%)	1(9.09%)	1(5.55%)
Font color	0(0%)	1(9.09%)	1(5.55%)
Rule settings	0(0%)	1(9.09%)	1(5.55%)
Learning measurement	0(0%)	1(9.09%)	1(5.55%)

The next most wanted "feature" was a supervisor who oversees the writing project (see Figure 1). It sheds some light on the necessity of a person who has the authority and responsibility to supervise the writing project. As mentioned earlier, students did not want other students to change their postings before receiving acknowledgement, and they would like to have a supervisor or administrator who decides which edits should be accepted. Therefore, the instructor should consider this need when deciding if/when he or she would like to apply MediaWiki for collaborative writing in a classroom.
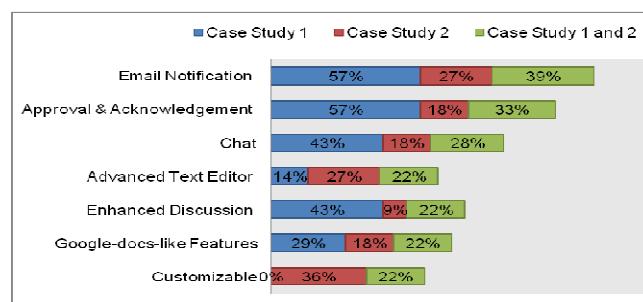

Figure 1. Comparison of Additional Features

The next most wanted feature was chat functionality (see Figures 1). An advanced text editor, enhanced discussion, a Google Docs-like feature, and the capability to customize the layout and user interface were additional features that students suggested. The insights gained from the interview

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data highlighted the necessity to provide other functionality to support students' needs in collaborative writing.

Answers for Research Question

The answers for Research Question – "What mechanisms can be designed to enhance mandatory collaborative writing?" – come from interview findings. As described earlier, features that students used the most were the history and discussion tabs. Features that students liked the most were the ability to see postings from other students and to share knowledge and experience amongst classmates. However, the feature that the students liked the least was that MediaWiki allowed anyone to change anything without any notification or approval. These findings related to design mechanisms are summarized in Figure 2.

Students were asked to address any ideas or suggestions that were not included in the interview questions. The students from both classes most commonly suggested that MediaWiki should not be used for the class. Student pointed out that they did not have enough time to learn how to use MediaWiki before the class started. Some students might not be accustomed to the specific characteristics of MediaWiki. Some of them found it difficult to understand MediaWiki's technical terms and markup. One student said that they should have been given time during the first couple of weeks before the first assignment was given to learn and become familiar with MediaWiki. This problem illustrates the need for an appropriate time period for students to learn how to use MediaWiki. This might also be mitigated if the instructor designs an initial assignment or some tutorials to help students in learning how to use MediaWiki before they really start to use it for their collaborative writing assignments.

In addition, the same student also compared MediaWiki with other social media, such as Facebook. Students pointed out that they would like to use some applications that they are familiar with and use almost every day. If the instructor would like to apply MediaWiki in the classroom, he or she might need to consider how to customize the user interface to be more user-friendly or ensure that students understand how to use the tools and functions they need.

Another student who had experience with other Wikis addressed the same problem about limited learning time and requested training or a better help feature. With a limited time to finish assignments, students merely tried to finish their assignment without having time to learn how to use the tool.
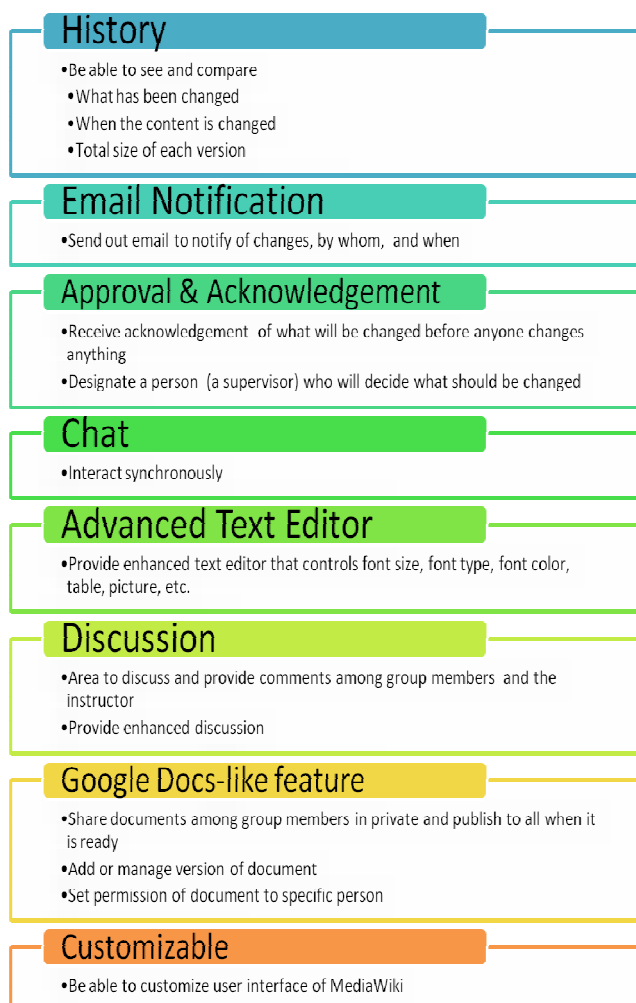

History
- Be able to see and compare
- What has been changed
- When the content is changed
- Total size of each version

Email Notification
- Send out email to notify of changes, by whom, and when

Approval & Acknowledgement
- Receive acknowledgement of what will be changed before anyone changes anything
- Designate a person (a supervisor) who will decide what should be changed

Chat
- Interact synchronously

Advanced Text Editor
- Provide enhanced text editor that controls font size, font type, font color, table, picture, etc.

Discussion
- Area to discuss and provide comments among group members and the instructor
- Provide enhanced discussion

Google Docs-like feature
- Share documents among group members in private and publish to all when it is ready
- Add or manage version of document
- Set permission of document to specific person

Customizable
- Be able to customize user interface of MediaWiki

Figure 2. Summary of Mechanisms to Be Designed to Enhance Collaborative Writing in Classroom settings

The instructor did not anticipate that students would find it difficult to self-learn MediaWiki. Students from both case studies were in the Information Systems and Technology field and accustomed to the digital era, but some of them still struggled with MediaWiki.

CONCLUSIONS

Studying a single user who uses MediaWiki, or setting up an experiment for a group of users in a lab setting, may not be able to reveal the design problems [6]. This research applied case study research to explore what features an instructor needs to take into account when he or she wants to apply MediaWiki for collaborative writing in graduate classes. A Wiki is considered a social technology tool for collaborative writing, but when MediaWiki is used in classroom settings, some new mechanisms and further refinements are needed.

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The findings from this study led to a set of pragmatic features to enhance group collaboration in the graduate classroom environment.

Implications

The findings from this research can be useful for developers and educators. A significant facet was discovered: Determine benefits and limitations of the wiki to be used to support learning activities. For developers, the results of the interviews indicated that talking to students can guide developers who want to enhance standard MediaWiki in order to enable it to support activities such as collaborative writing. Developers can make use of what students considered disadvantages in the user interface and in writing mechanisms as well as using a list of additional features students thought were important. However, this also means that students would have to use standard MediaWiki for these activities, which is contrary to the finding that instructors should give students significant time to learn the system.

Limitations

Threats to validity in this research might also include Reactivity. The researcher may be considered a threat to students when showing up in the classroom and informing them that data will be gathered from them. The researcher was in the classes the whole semester, which might affect the behavior of students in the class. This limitation was reduced by informing students that their answers did not affect their grades, their involvement was voluntary, and the findings from this research could help improve MediaWiki.

Future Research

In future research, researchers can explore more by adding or customizing additional features that enable more students to collaborate effectively; an example would be by reaching consensus. Another interesting avenue for future research is developing a mechanism to promote group awareness and make students feel engaged in collaborative learning activities.

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