Tool to monitor students’ contribution in a wiki-based group work assignment

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Abstract. Wiki is an online platform that support collaborative authoring tool. It comes with lots of feature to enable students and instructor working together to develop a written manuscript. However, when wiki used as a media for learning environment it needs additional tool to monitor and report students’ contribution. This paper reports on the development of a tool to monitor students’ contribution in a wiki-based group work assignment. This is a further work from previous project of developing assessment framework for an online group task. These works include designing database, designing interface and implementing algorithm to monitor and create report of students’ work. Data used in this study was taken from a basic computer and programming unit in the Bachelor Electrical Engineering Petra Christian University. Data has been collected from a Wiki log file. The results show that this monitoring tool helps students and instructor to maintain the progress of individuals’ efforts of the cohort. Furthermore, it gives better picture on how individuals performs in an online learning environment.

1. Introduction

The modern workplace operates as a collaborative environment that relies on effective communications and teamwork activities. To support effective communications, several online tools have been used and adopted in the workplace, such as: e-mail, twitter and discussion board. While wikis, Huddle and Wiggio has been widely implemented as a media for collaborative task [1].

Aligned with the increasing implementation of online collaborative tools in the workplace [2]; it is necessary for higher education to introduce collaborative group work in their learning activities as it helps graduates to be ready for globally connected workplace and operate it effectively.

There are already a growing number of higher education institutions that adopt online collaborative tools in their learning activities or implement it to support assessment task.

Perhaps wikis are the most widely implemented platform to support collaborative task due to the nature of its features [3]. The ability of wiki’s users to create, edit, delete and restructure contents among group members allowing students to mimic real workplace environment. Moreover, wiki’s log file provides academics with the archival information on students’ activities and contributions.

Unfortunately, from the teaching perspectives, the adoption of wikis in higher education does not always end up with a success story. As far as assessing the quality of students’ contributions and group interactions are concerned, wikis provide limited support. Students might not all be able to play an equal role in making contributions to a wiki [4]. Some students dominate and others fail to participate...
fully, which means that the final group product evaluation may not be representative of all students’ perspectives.

As far as the monitoring and assessment are concerned, several extensions and plugins are available to support group evaluation [5], most of them are either based on counting measurable activities or cosmetics related (e.g. monitoring and visualization). As a result, the wiki-based group task evaluation using those built-in extensions and plugins have not exposed the types of students’ contributions.

The objective of this study is to develop a more realistic monitoring tool that capable to reveal the types of students’ activity that emerged during a wiki-based group work assignment. The presentation of this paper is divided into five sections: introduction, previous works on wiki monitoring tools, methodology, purpose of the paper, results and discussion.

2. Previous Works

When it was released in 1995, Wiki was a website with pages that can be edited via browser. Each page has an editing history that record changes of the content. Wikis provide authoring capability without requiring prior knowledge to HTML.

When wikis adopt into educational purposes, the efficacy of that tools has become self-evident. The ability of creating, editing, deleting and moving content allow students to collaborate with other cohort. However, wikis were not originally designed as an assessment tool. The early version of wikis does not have any built-in assessment features. Therefore, academics and researchers start to develop and add assessment functionality (e.g.: in the forms of plugins, scripts and tools) that integrates into wikis system.

History flow was an early tool that offers automatic analytic functionality of wiki archival data and produce graphical representations of sentence’s different in wikis [6]. History flow highlights four different aspects of authorship in wikis: contributions from all group’s members, single contribution from a group member, new contributions from group members and content persistence. Unlike the normal behavior of checking paragraph difference in Wikipedia, this tool provides more details and realistic approach in visualizing history tracking by looking on the difference between sentences.

Wattle Trees also provide visualization of students’ contributions but with different approach [7]. Instead of producing graphical representation of contents’ differences, this tool mapping student’s contributions in timeline manner that consist of wiki, subversion and a Trac project management. The graphical image produces is replicate wattle trees trunk complete with branches and flowers. The project tasks are depicted as tree branches, contributions are represented by the orange flowers and the quantity of wikis contributions illustrated by the size of the flowers. In a healthy group work, that wattle tree visualization should have a lot of branches with bigger flowers. On the other hand, in the poor group situation, the tree would consist fewer branches and scattered small flowers.

Those two examples of adding assessment functionality into wikis illustrate the potential of wiki’s log file utilization to be evaluated in such quantitative manner. Several studies [8-10], explore further opportunity to assess wiki-based group task by counting and identifying measurable contributions.

While assessing students’ contributions based on their measurable activities provide information on the size of student’s contributions and level of their engagement with wikis, academics miss the opportunity to assess the types of students’ activity.

3. Methodology

Data used in this study was taken from Basic Computer and Programming unit that was conducted in the Bachelor of Electrical Engineering study program at Petra Christian University. It is a compulsory unit that aimed to provide programming foundation knowledge for first-year students.

The group assignment was a collaborative wiki writing project to create an article on the topic of influential people in the history of computer technology. There were 34 students participated in this group task. The cohort was divided into groups of three up to four students. They were assigned into nine groups. The wiki platform utilized in this study was TikiWiki [11]. TikiWiki is one of well-
developed and maintained wiki platform. It was introduced in 2002 and having more than 250 active developers who contribute to the Tiki Project.

The wiki platform being used for the students to collaboratively write the task can be accessed at https://wikiwiki.web.id

4. Purpose of the paper
This paper reporting on the utilization of a monitoring tool that have been developed on top of TikiWiki, an open source wiki platform. Several features that have been developed in this study were:
  • Login report
  • Activity report
  • Preassigned writing menu

Those features were developed and added into TikiWiki platform to gain better understanding on how individuals work in an online group task environment.

5. Results and Discussion
This section provides results and discussion that come up from the study being conducted. In order to gain access into TikiWiki server, students and instructor were given authentication (username and password). Once they are logging into the wiki, they can start writing and editing text.

Figure 1 shows the main page of the TikiWiki server. On the left side of the page, under menu section, all of the cohort work is listed. This list is a hyperlink that leads to relevant page that has been written. On the far left of the page, login button is located. User who want to add or edit text should login first into the TikiWiki server.

Additionally, under the Get Started section, a collection of resources is provided to give users assistance when they need a help to use TikiWiki.
The example of students writing text is provided in Figure 2. This work was conducted by A1 group that consist of three students. The topic that they choose was Steve Jobs. The screenshot indicates that after logging into the wiki, users can contribute to the writing task through various types of activities. Such as, adding, editing, deleting, and moving text. Figure 2 also indicates that the work has been successfully saved and it is the eleventh version of the page. In order to see the change that made by the group member, a history link is provided.

A history page is an important feature that is provided by TikiWiki. As it is necessary for the group members to gain information on who work on which version of the page. Furthermore, it is also necessary when group members create text and write some type of writing activity which has been done.

On the other side, the history page gives benefit for the instructor in terms of group monitoring. By tracing the history page, instructor can see the regularity of students’ contribution. A good group should maintain steady working pace to make sure that the task can be completed right on time according to schedule.

The history page could also reveal whether a task has been abandoned through looking at the last timestamp of contribution. When the last work contributed to the group task is behind the schedule, it might be indicated a poor group behavior and intervention should be given to the group such as providing motivation or looking for possible solution to the encountered problems.
When working in wiki, it is also necessary to be able comparing between any version of works. As it was mentioned previously, complexity of the wiki page is growing linear to the size of the writing text. As such, the ability to compare between version of the page is critical to monitor changes being made in the text.

It is important to noted that students do not always contribute in any of these writing activities: add, edit, delete, and move. Nonetheless, the change made in the wiki page could also in the form of formatting, such as: changing text size, changing font type, and perhaps highlighting. TikiWiki recognize any changes being made and if no writing activities was recorded then the result of comparison will be a message: Versions are identical (see Figure 4).

This formatting activities can happen in any patterns. It can be done at the end of the writing stage; some groups might choose to do it along the writing stage or groups never conducted a formatting activity. Although formatting text might not directly show the quality of the writing text, it can be used as an indicator of coherency and increasing the appearance of the wiki page.

Another possibility when group member login into the TikiWiki is generating writing content through any possible writing activities. These might include adding text, editing, deleting or moving text between section within wiki page. TikiWiki recorded these changing into version. Figure 5 show the result from comparing two version of wiki page.
TikiWiki provides a built-in feature to show text-to-text comparison between wiki page versions. With this feature, group members can track the changes between versions. Furthermore, this version comparison feature in TikiWiki might open an opportunity to explore students’ contribution in the group task. For instance, users can see what changes has been made to the particular version of the text.

As it was stated previously, the challenge of monitoring process in a wiki writing construction is happened when the text is getting longer and involved a lot of version. Lecturers often find it difficult to reveal the actual students’ activity that is stored the log file. It is because the type of students’ writing activities is hidden behind the wiki page.

Therefore, a set of preassigned writing activities menu was proposed and developed on top of TikiWiki. By using these added features, student not only type the text but also need to think what is the change that they made to the text.

There are four preassigned writing activities being included in the TikiWiki, namely: Add, New Wiki, Format, and Delete. Through utilizing these menus, the process of monitoring activities can be done easier as the system should be able to count it easily and provide report to the users (see Figure 7).
Second feature being added into the TikiWiki is login report. The screenshot of the page is provided in Figure 7. This basic report is created through importing users’ login data that is recorded in the log file.

This login report page summarizes the login information from all of the users who have logging into the TikiWiki server. Although the total login number might not directly relate to the quality of their contribution, by using this report, the lecturer can sense the level of responsiveness between students and the group task. Users with high numbers of login might show greater enthusiasm to the group task compare with the students who rarely login to the wiki server. Furthermore, students with higher number of logins may demonstrate willingness to complete the group task on time.

Figure 8 provides an activity report page that show a more comprehensive view of the group members contribution and activities during the completion of the group task. This activity report page is the third feature being developed in this study.

In details, this activity report page contains several information as follows: page name, user, preassigned writing activities (PWA), action, and number of PWA, and number of contribution (words). For example, from Figure 8 it can be seen that user C11170013 created 1,502 words of text. This contribution was made as a result of five times Add activity.

This activity report can give better picture to the lecturer on how the wiki page created and how individuals completed their task. For instance, it gives information on a particular group member’s contribution to a specific wiki page. This leads to a more realistic assessment to a group task beyond counting up number and size of contributions.

6. Conclusion and future work

This study shows the development and utilization of an online tool to monitor students’ contribution in a wiki-based group work assignment.

The work conducted was including development of three monitoring features (login report, activity report, and preassigned writing menu).

This study is a part of a bigger research project that aims to propose a better assessment method wiki group work task. Moving beyond the quantitative measures, our monitoring tool provides potentially deeper and richer information that could be used to identify the types of students’ activity through the use of preassigned writing menu.

Further work will involve testing the monitoring tool consistency and functionality. This will be achieved by trialing in other units that use different wiki-based assessment task.
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