Using wikis to develop student teachers' learning, teaching, and assessment capabilities

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ABSTRACT

This article describes an innovative and unique practice involving two classes of information technology (IT) major student teachers, who created digital learning resources and assessment rubrics by utilizing a Web 2.0 tool. The project spanned more than two weeks and data were collected from a number of sources, such as the content of the wiki sites, comments posted by the students, and their selected assessment rubrics and reflections. The findings indicated that this pioneering practice helps students develop various generic skills, such as IT skills, collaboration skills, and organizational skills. The study also established that assessment rubrics are a feasible means of assessing a wiki site. The conclusions reached by this study were that wiki-based activities are useful in developing a diverse range of student teacher capabilities and can play a significant role in their learning.

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1. Introduction

Assessment is a valuable task in education because it lets teachers know how much their students have learned, how effective their courses are, and whether some students need special help. Generally, assessment is conducted after learning to evaluate what students have learned and thus enables instructors to accurately rank students by ability. Morris (1995) further explains that assessment is one of the basic components of a curriculum and that there are six major reasons for carrying out an assessment. Similarly, Berry (2008) points out that the fundamental principle of assessment for learning is that it should be used to promote, induce, and reinforce learning. In essence, teaching requires more than the mere transmission of knowledge; besides content, teaching should include pedagogy and assessment. In particular, teachers should aim to develop learners' ability to think and solve all kinds of problems, thus helping them to eventually become independent learners (Pellegrino, 2002).

Morris (1995) further explains that teachers often require feedback from their students on an immediate basis, which helps them plan their lessons. Information and communication technology (ICT) undoubtedly has the potential to provide exactly this type of immediate feedback. Macdonald, Weller, and Mason (2002) suggest that, “Networking opens up possibilities for enhancing formative feedback to students through peer review, when scripts are posted electronically for comment and review” (p. 10). Indeed, multiple detailed studies have been conducted on the effectiveness of online assessments and have reached positive results (Buchanan, 2000; Kwok & Ma, 1999; Thelwall, 2000). Chang (2001) further confirms that most students agree that web-based portfolio systems help them learn. Although scholarly research into collaborative learning and peer assessment has generated many positive findings, there is little current published research on how student teachers use technology for collaborative learning and peer assessment (Sivan, 2000).

O’Reilly (2005) first coined the term “Web 2.0” which is now broadly defined as a second-generation or more personalized communication form of the World Wide Web that emphasizes active participation, connectivity, collaboration, and the sharing of knowledge and ideas among users. Many people collaborate, create, and share new information on the Web through various Web 2.0 tools, such as social bookmarking systems, blogs, wikis, and video-sharing platforms during their leisure time. Oliver (2007) has argued that technology integration courses need to be redesigned to leverage new Web 2.0 tools. Although many people are informally involved in various Web 2.0 communities and many researchers believe that these communities provide invaluable research opportunities, in reality only a handful of researchers have conducted rigorous research in this area (McLoughlin & Lee, 2007). Furthermore, there are very few empirical studies on how to assess students’ learning in Web 2.0 environments. Therefore, the researchers aimed to explore whether or not student teachers’ experiences of using a Web 2.0 tool — in particular, wikis — to develop digital resources and assessment rubrics could truly enhance their generic skills. In addition, this study also examines whether or not Web 2.0 provides a good environment for fostering student teachers’ learning and assessment skills.
2. Literature review

Biggs (1996) argues that assessment should be designed to support learning, rather than to select learners; assessment should also be embedded in the learning process with formative feedback, with explicit guidelines, and with learners acting as co-evaluators. Peer assessment not only sharpens content learning, but also provides opportunities for students to learn the metacognitive processes of self-monitoring. Similarly, it has been found that student teachers who utilize peer assessment outperform their counterparts who do not use peer assessment. Moreover, student teachers who use peer assessment also tend to come to new understandings of assessment, instruction, and the role of the educator (Sluijsmans, Brand-Gruwel, & Van Merriënboer, 2002).

Brown and Knight (1994) present a theory of formative assessment, suggesting that feedback must be rapid and provided at an appropriate point in the learning process to be effective. It helps if feedback is diagnostic and prescriptive, so that recipients can actually use it to guide their future learning. ICT’s potential for rapid interaction certainly fits the time requirement. Many new technologies are interactive; thus, it is now relatively easy to develop environments in which learners can learn by doing, receiving feedback, and continually refining their understanding to build on existing knowledge (Scardamalia & Bereiter, 1994).

Buchanan (2000) has found that learners using one such ICT tool—a Web-based formative-assessment software—perform better than those not using the software. Lin, Liu, and Yuan (2001) have found that students are more willing to critique others online because they can post their comments anonymously, which helps them avoid confrontation (Davies, 2003). The Joint Information Systems Committee (JISC) also argues that e-assessment can increase the range of what can be tested (2007). In addition, Dermo (2009) has ascertained that feedback from e-assessment adds value to learning and should form an integral element of all e-learning activities.

However, using technology for assessment also possesses certain unavoidable disadvantages. It has been noted that most computerized assessment methods do not build higher-order thinking skills, since they are closed-type assessment tests. For example, multiple-choice questions fail to assess competencies such as cooperation and the critical reflective skills promoted by collaborative learning (Buchanan, 2000).

Web 2.0 concepts have led to the development and evolution of many web-based communities and hosted services, including weblogs (blogs), wikis, podcasts, Really Simple Syndication (RSS), and social networking sites (O’Reilly, 2005). Web 2.0 users not only create their own content; they also mix, amend, and recombine content. Web 2.0 users are also relatively more “open to the world,” welcoming comments and revisions (McLoughlin & Lee, 2007). Boyd (2007) claims that the social aspects of Web 2.0 have great potential for enhancing education, while Klamma et al. (2007) suggest that Web 2.0 concepts and technologies could support lifelong learning communities. Barlow (2008) argues that Web 2.0 tools also offer an exciting opportunity to create a classroom without walls because they enable learning take place wherever and whenever possible.

Wikis are one of the many popular Web 2.0 tools that facilitate collaborative work. With wikis, users do not need to know how to write HTML codes to publish their products on the Internet with ease (Heafner & Friedman, 2008). The editing and history features of wikis are particularly helpful for users, allowing them to trace the content and timing of the revision. Richardson (2006) suggests that there are different educational possibilities of using wikis for learning, especially for language learning. Indeed, several studies have found that wikis can foster collaborative learning—in particular; writing English from primary to university levels (Mak & Coniam, 2008; Wang, 2010; Wilkoff, 2007). Wikis are also useful for fostering deep understanding of social studies (Heafner & Friedman, 2008) and helping pre-service teachers produce high-quality science learning materials (Nicholas & Ng, 2009).

3. Research methodology

3.1. The research questions

There are not many empirical studies on how to foster pre-service teachers’ learning and assessment capabilities in Web 2.0 environments. Therefore, the main objective of the study is to examine the potential of using wikis to develop teachers’ capabilities in teacher-education programs. The following research questions are posed:

1. What are student teachers capable of learning in wiki-based activities?
2. Is it possible to integrate self-assessment and peer assessment with wiki-based activities?
3. Are wiki-based activities an effective and successful means of developing teachers’ capabilities?

3.2. The research setting

Because using wikis in education is still a relatively new concept for teachers and its potential needs to be further explored, the authors started their study by using a case-study approach, beginning with a pilot case study in the academic year 2008–2009. Subsequently, they carried out a second case study in 2009–2010. This second case study built on the pilot study’s design and involved more student teachers. Because case studies can cope with complex phenomena (Johnson, 1994), they are particularly useful for exploratory purposes (Robson, 1993). Case studies help researchers investigate the learning process and patterns of interactions in wiki-based activities. Both studies were conducted at the Hong Kong Institute of Education (HKIED), the foremost teacher-training institute in Hong Kong. The participants were student teachers from two different programs who received training to teach pupils ICT or related subjects in secondary schools after their graduation.

In the pilot case study, two groups of participants were involved. The first group consisted of students from the one-year full-time Postgraduate Diploma in Education (Secondary) program (hereafter termed the FT PGDE), and the second group consisted of students from the two-year part-time PGDE (Secondary) program (hereafter termed the PT PGDE). Under normal circumstances, most FT PGDE students are recent college graduates, although some of these students have one or two years of work experience. On the other hand, PT PGDE students are either ICT teachers or ICT technicians in secondary schools. As the study was at the exploratory stage before the pilot run, the participants were instructed to work in groups and create a wiki site for teaching an ICT topic called “Elementary web authoring,” according to the requirements of the New Senior Secondary (NSS) ICT curriculum. Researchers monitored the process for approximately two weeks. The information gathered from the pilot case was used to formulate and develop the design of the second study. The results obtained from the pilot study indicated the following:

1. It was difficult to examine technical hurdles with the use of wikis because all participants involved in this study possessed a well-established ICT background. Furthermore, participants seemed to have no problems with the subject content, since the content focused on ICT skills and all participants had the advantage of an ICT-related degree.
2. The small sample size of the participants also tended to diminish the extent of the interactions among participants.

Since ICT is not a core subject in the secondary school curriculum, there are not many student teachers with a major in ICT. In order to increase the sample size, the researchers tried to bring together student teachers studying similar modules from
different programs. Keeping this in mind, in the academic year 2009–2010, an additional group of participants from the four-year full-time Bachelor of Science in Mathematics and Information Technology Education program (hereafter termed MAIE) was added to the study. These students were expected to complete the same ICT curriculum and teaching method modules at HKIEd. The majority of MAIE students in the study had just graduated from secondary school. So in sum, the second study included five groups of student teachers from three programs: one group of FT PGDE students, one group of PT PGDE students, and three groups of MAIE students. Table 1 summarizes the participants' backgrounds. Because the sample size was not very large, the researchers favored the case-study approach.

There were several advantages of combining these student teachers: (1) the size of the learning community was significantly increased; (2) the problem of the group possessing a homogenous background was solved; (3) students had the advantage of receiving feedback from peers with different backgrounds; and (4) peer assessment could be made more meaningful because more participants were involved in the wiki-based activity.

Since all the students had taken the same curriculum and teaching method module titled “Curriculum and Teaching Methods of Information Technology” offered in the three programs, they were expected to have sufficient knowledge to give constructive comments to their fellow participants. During this study, the MAIE students took a module called “Supporting Information Technology in Schools,” while the PGDE students took a module called “Learning and Teaching of Selected Topics in Information Technology.” The wiki task in the study helped the participants to achieve the objectives of both modules, as the task essentially helped “develop participants’ ability to coordinate and manage issues related to ICT management in school” (MAIE module) and also to “enhance participants’ ability to select appropriate strategies to create learning environments for their students that foster learning and teaching of ICT subjects” (PGDE module). Thus, the study brought the students together to enhance their ICT skills in a virtual learning environment.

3.3. The wiki project

Though these three groups of students attended two different modules, they were required to complete a wiki task in order to fulfill the module requirements. The aim of this wiki-based activity was to familiarize students with free wiki tools on the Internet and thereby enable them to gain hands-on experience of setting up a wiki for teaching and learning ICT. Using wikis for formative assessment was also a key focus in the study, and their levels of participation and involvement in this task were factored into their final grades for the module. The wiki task comprised the following stages:

Stage 1: Construct a wiki site for teaching a selected topic in the NSS ICT curriculum through collaboration

In this project, the module tutors used a free wiki service provided by Google Sites (Project link: http://sites.google.com/site/teachandlearnict/). The initial wiki page had been set up for the participants (see Fig. 1), and the project guidelines had been uploaded beforehand to this wiki. Prior researchers have argued that online activities should be authentic and useful (Basque, Dao, & Contamines, 2005; Paige, Lloyd, & Chartres, 2008) and contain enough elements for every team member to work on (Nicholas & Ng, 2009). Each group was required to select a topic in the area of “Social Implications,” namely, Internet addiction, Internet privacy, browsers and security, privacy threats on the Internet, and ordinances against computer crime and unauthorized access. These social implications make up one of the five major content areas in the NSS ICT curriculum.

To facilitate an easy start, the guidelines also included a reference to a school textbook adopted by nearly all secondary schools in Hong Kong. Each group was required to select one topic proposed by the authors. Alternatively, they were also allowed to propose a new topic within the same area to their tutors. The participants of the wiki-based activity were also expected to take up at least one of the following available roles: (1) Owners: open to module tutors and one student from each group; (2) Collaborators: open to all participating students; and (3) Viewers: open to module tutors and all participating students. Furthermore, every collaborator had the added responsibility of providing appropriate and updated content to the wiki project.

Stage 2: Provide constructive comments to their peers

All participants were required to give encouragement to their peers and write constructive comments on their peers’ work at all times. Dialogue exchanges among peers were encouraged to promote greater teamwork. Although the project guidelines had been posted to the initial wiki page, supplementary guidelines and feedback were also given by the module tutors during the project period in order to direct the wiki task toward the module objectives.

Stage 3: Design an assessment rubric that can be used to assess the wiki project

Each group was required to design an assessment rubric that could be effectively used to assess the wiki site constructed in the study.

Stage 4: Use the assessment rubric for self-assessment and peer assessment

Each group was required to use their assessment rubric for self-assessment and peer assessment:

- Self-assessment: All groups were required to use their own assessment rubric to assess their own wiki site (i.e., use Group A’s rubric to assess Group A’s wiki).
Peer assessment: Each group was expected to use their own rubric to assess the other four groups (i.e., Use Group A’s rubric to assess Groups B, C, and D’s wiki pages), as well as to assess the wiki sites of other groups by using those groups’ rubrics.

Stage 5: Write their reflections on using wikis for teaching and learning ICT
Each group was required to write their reflections on the following aspects:

• The process of creating the wiki pages (such as technical knowledge, locating resources, organizing the subject content, work allocation, and difficulties encountered).
• Use of assessment rubrics for wiki projects.
• Use of self-assessment and peer assessment for wiki projects.

4. Findings from wiki sites

Since the project spanned a period of two weeks, the tutors had sufficient opportunities to examine the learning process of the students in detail. The footprints left by the student teachers on the wikis reflected distinct and compelling evidence of their learning process and demonstrated what the participants were able to learn from this wiki-based activity. The findings from the wikis also permitted the researchers to examine the feasibility of using self-assessment and peer assessment for this kind of activity and the effectiveness of using wikis in developing teachers’ capabilities. Furthermore, these findings could be triangulated by the information obtained from the students’ reflections on the whole process. The linkage between the data sources and the research questions in the study is depicted in Fig. 2.

4.1. Content of the wiki sites

The wiki task was an ill-defined problem; thus, the student teachers were required to: (1) determine the curriculum content to be included in the wiki site; (2) develop the structure and features of the wiki pages; (3) present the curriculum contents and feature elements logically; and (4) design appropriate learning tasks for secondary students on the selected topics.

All groups established their own wiki sites and often refined the sites according to the guidelines given by their tutors during the project period. Fig. 3 illustrates that the wiki platform provides a log of activities including page editing and comment posting. The log shows that the activities were intense and that some of the participants labored for a considerable period of time on the wiki task during the project. The pages were edited 410 times and there were 77 comments during the two weeks. The statistics of page editing also indicated that the comments from tutors had a positive impact on the students’ participation. Indeed, the frequency of page editing became higher after the tutors had posted more task requirements on the wiki platform. Moreover, the groups also tried to compare other groups’ work frequently with their own work, which meant that students were using unique features of Web 2.0 to encourage further comments and revisions (McLoughlin & Lee, 2007). At the end of the project period, all the groups were proficient enough to be able to include rich media in their wiki pages, such as formatted text, graphics, and videos (see Figs. 4 and 5).

4.2. Comments posted by the students

Fig. 6 illustrates the comments posted by peers on the wiki pages. A noteworthy observation was that peers offered both positive
feedback on the content of the presentations and critiques of their peers' wiki sites. Some examples of the above are cited herewith:

1. The hyperlinks of the reference websites do not work.
2. There is no focus, you just try to copy and paste.
3. The wiki page only teaches student how to perform the “copy and paste” function and does not serve any other educational purpose. [Original comment in Chinese]
4. It would be better if the assessment rubric can be displayed on the page directly instead of being packed in a pdf file. Furthermore, this page should have links to other wiki pages. [Original comment in Chinese]
5. The learning objective is clear. It is good and informative to gather all kinds of material including news articles, video clips and websites. But the organization of the topic is a bit odd. It would be better if the content would be well arranged. The layout of the site is attractive and user-friendly. I like it.

Some participants were also keen to give various succinct suggestions for improvements, such as:

The font size of the text in the first paragraph is too small. I suggest that you use the same format for the whole page. [Original comment in Chinese]

A noteworthy point from Fig. 3 is that students were much more likely to comment on and edit pages after they had viewed and noted the comments or instructions posted by the module tutors. This finding echoes the suggestions that feedback should be rapid and given at an appropriate time in order to make the learning process effective (Brown, 1994). This finding also corroborates the idea that the facilitator role of module tutors should not be neglected.

4.3. Assessment of the wiki sites

In addition to building a wiki site, each group was also required to design an assessment rubric for self-assessment and peer assessment. Fig. 7 shows an assessment rubric designed by one of the MAIE groups. Judging from their reflections (discussed in the following section), it is clear that the concept of the assessment rubric was new to them. The students realized that the rubrics available on the Internet differed in format and criteria, so they found it difficult to agree on criteria to assess the quality of a wiki site. However, some students still felt that assessment rubrics could provide fair assessment guidelines for grading. By the end of the project, all groups had completed the self-assessment and peer-assessment process. One of the students argued that it was not easy to understand the rubrics posted by others, and that the process to read and understand the rubrics took up a considerable amount of time. Nevertheless, the development of assessment skills was fairly easy to observe. Even though the assessment rubric was a new concept at the beginning, it proved to be a valuable and constructive tool by the end of the study.
Fig. 3. Log of recent activities provided by the wiki platform.

Fig. 4. The front page of one group's wiki site, displaying formatted text and a graphic.
Fig. 5. Wiki page displaying an embedded YouTube video.

Fig. 6. Students’ comments posted on the wiki.
4.4. Summary of findings from the wiki platform

The wiki sites recorded the development process of the student teachers’ capabilities. Table 2 summarizes the learning outcomes of six dimensions that can be observed from the data sources discussed above. The evidence demonstrated that students were willing to devote additional time to diverse student-centered learning activities, which is consistent with prior findings (Ng, 2008).

5. Findings from student teachers’ reflections

The integration of reflective practice into the curriculum for initial and continuing education has been prevalent over the past 10 years, especially for professionals such as teachers, nurses, and social workers (Boud & Walker, 1998). Boud and Walker (1998) further suggest that it is important to frame reflective activities within the learning context in which they are taking place. In this study, the reflections from the student teachers presented the authors with a whole new picture of using wiki-based activities in teaching and learning. These findings helped elucidate the effectiveness of using wiki tasks as a learning and assessment tool. Furthermore, the data provided comprehensive information to triangulate the findings obtained from the wiki sites constructed by the students. This in-depth analysis of student reflections positively established that their opinions could be classified into the categories given below.

5.1. Technical skills involved

Nearly all the student participants opined that the wiki platform was easy to use as found by Heafner and Friedman (2008). Some positive student comments included the following:

1. This wiki platform is well designed and we almost have no difficulties in creating the wiki pages. We made hyperlinks, we imported images, and we imported video into these wiki pages. It is user-friendly enough to use, since we get no problems.
2. We create wiki pages at the first time but it seems that it is not difficult to do it. The wiki platform is user-friendly, so the wiki page is easy to create. Concerning the technical knowledge, we simply imported images, hyperlinks and video clips to the platform. I have learned how to import a video clip to it.

5.2. Content organization

The majority of students were aware that it was not easy to filter and organize the content on their wiki sites. They therefore reported on this fact with these remarks in the original comments:

1. As work can be viewed by peers, they can learn from each other.
2. ... the resources are easily found through Internet, as we may use Google, Yahoo!, and some other search engines if necessary. However, we may take a bit longer time in filtering the resources that we have found ....

5.3. Collaboration

In the study, the students were satisfied with the help they received from their peers as found by Nicholas and Ng (2009). However, they did encounter some difficulties in sharing duties. Some of their opinions on this subject are given below:

1. As work can be viewed by peers, they can learn from each other.
Table 2
Observable learning outcomes in six dimensions.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Learning outcomes</th>
<th>Evidences</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT skills</td>
<td>• The students of weaker IT background get significant improvement.</td>
<td>• They were able to create wiki pages without difficulty.</td>
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<tr>
<td></td>
<td>• They were able to create table of contents in a web page.</td>
<td>• They were able to embed different types of media such as YouTube video on the wiki pages.</td>
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<tr>
<td>Collaboration</td>
<td>• Most students are aware that wikis can facilitate collaborative learning.</td>
<td>• Most wiki sites were built from joint efforts.</td>
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<tr>
<td>skills</td>
<td>• Most students are able to work with and learn from their peers.</td>
<td>• The group leader of the PT PGDE group nearly did all editing work.</td>
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<tr>
<td></td>
<td>• Some students are still reluctant to join the wiki task.</td>
<td>• Two PT PGDE students did not post any comments and edit any wiki pages.</td>
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<tr>
<td>Organization skills</td>
<td>• Improvement in organization skills can be observed.</td>
<td>• They attempted to learn how to use functions provided by the Wiki platform such as table of contents to improve the readability.</td>
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<td></td>
<td>• The students are able to present the contents in a logical manner.</td>
<td>• They were able to use heading and sub-headings to categorize the contents.</td>
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<td></td>
<td>• They were able to use different text formats to highlight certain types of information.</td>
<td>• They were able to use different text formats to highlight certain types of information.</td>
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<tr>
<td>Knowledge in subject contents</td>
<td>• The students are able to filter appropriate and relevant subject contents for the target audiences.</td>
<td>• The contents of the wiki pages have been enriched and refined for many times.</td>
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<td></td>
<td>• Students were encouraged to participate actively in the wiki task.</td>
<td>• All wiki sites got good comments in peer assessment.</td>
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<td>Knowledge about using wikis as a teaching and learning tool</td>
<td>• The students are able to design the wiki site for learning purpose.</td>
<td>• Each group was able to write clear learning objectives.</td>
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<td></td>
<td>• Students are able to apply their knowledge in pedagogy in the wiki task.</td>
<td>• Each group was able to design learning tasks for their students.</td>
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<tr>
<td>Assessment skills</td>
<td>• The students are able to design assessment rubrics for wiki-based activity.</td>
<td>• Each group was able to design an assessment rubric.</td>
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<td></td>
<td>• The students gain experience in self-assessment and peer assessment.</td>
<td>• Each group was able to use their rubrics for self-assessment and peer assessment.</td>
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<td></td>
<td>• Some students pointed out the problems and difficulties in using rubrics in self-assessment and peer assessment.</td>
<td>• Some students pointed out the problems and difficulties in using rubrics in self-assessment and peer assessment.</td>
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</table>

2. Working as a group, we do have some difficulties like the work allocations, technical problems and screening of resources.

5.4. Knowledge about using wikis as a teaching and learning tool

Through hands-on practice with wikis, the participants were able to point out the advantages and disadvantages of using wikis for teaching and learning. Some of their appreciative statements on using wikis as a teaching and learning tool included:

1. I believe that both teachers and learners can benefit in this teaching and learning platform. Teachers can give suggestions anytime and follow student’s work. Learners can act as creators and also commentators.

2. This Google wiki is a good tool for both teaching and learning. This platform is easy to use and not much technical things are involved.

Students learn how to select and organize information from the Internet. By using this platform, teachers can keep track of the student’s process in doing the project. Also, they can give comments directly.

However, on the subject of using wikis as a teaching and learning tool, some of the participants argued that:

Whether free wiki can be used as a teaching tool still remains a question. After the establishment of the wiki, I doubt the possibility of assessment and extended learning. Fairness will be the main concern of assessment.

5.5. Assessment issues

Most of the students agreed that the assessment rubric was useful for assessing a web page project. However, some of them expressed the view that this concept was quite new to them:

1. … as all wiki projects are of different topics and they may be different in format … it is difficult for us to assess the quality of the wiki. With the use of assessment rubrics, we have a fair assessment guideline to base on when marking.

2. It is not easy to understand the rubrics posted by others, and it takes time to read and understand.

The results from the students’ reflective reports are summarized in Table 3. The table shows that the technical skills involved in the use of wikis were low and most teachers should have no difficulty in using the wiki platform. Since the chosen platform was very user-friendly and allowed them to complete most editing tasks with only a few steps, they found it easy to create wiki pages. In addition, their comments on content organization showed that the wiki task helped them develop their organizational skills. Besides their self-reports, the construction process and their final products are concrete evidence of their improvement in organizational skills.

In general, the student teachers agreed that wikis facilitate collaborative learning. This positive attitude toward online collaborative assessment is consistent with the findings from other studies (Buchanan, 2000; Kwok & Ma, 1999; Nicholas & Ng, 2009; Thelwall, 2000). However, the authors also observed that collaboration did not happen automatically: student teachers participating in wiki-based activities need constant encouragement and support.

The student teachers agreed that the hands-on task helped them understand the advantages and disadvantages of using wikis for teaching and learning. However, there were shortcomings to the student teachers’ experience. For one, the student teachers experience with the wikis was still limited to a two-week period. They may change their opinions after having more long-term experience. Secondly, some student teachers spent a lot of time surfing the Internet, instead of working on the wiki project. Wiki projects may suffer from the distractions that computers bring. Thus, some still questioned the usefulness of using wikis as a teaching tool.

After their experience using assessment rubrics, most student teachers agreed that assessment rubrics provided them with useful guidelines for grading, even though this tool was new to them. They also felt that the wiki task could improve their assessment skills. Finally, they felt that they now understood more about what makes for an effective web site design, after developing their own rubrics and consulting sample web page design rubrics.

6. Tutors’ reflections

Throughout the study, the two authors involved collaborated closely to embark on an exploratory study of a new practice, which
The authors understand and appreciate the fact that, even with the most detailed planning, they cannot design a perfect activity that completely matches the objectives of the class. With traditional modules, the authors also observed the following important points in this case study.

6.1. Wiki tasks provide chances for tutors to align the learning activities to the module objectives

The authors understand and appreciate the fact that, even with the most detailed planning, they cannot design a perfect activity that completely matches the objectives of the class. With traditional assignments, it is nearly impossible to monitor the daily progress of students, which means they cannot provide immediate guidance for assignments. However, for wiki-based activities, the tutors can collect a great deal of information about their students by observing the students' performance constructing the wikis, the comments made by the students, and the between-student exchanges. This transparent process presents tutors with opportunities to provide their students further guidance and direction to clarify the purpose of the task. This also lets the teachers adjust the task midstream to the learning objectives.

6.2. The effectiveness of wiki-based activities is substantially improved by introducing new elements that pique the participants' interest

The authors observed that it was unrealistic to expect every group of students to devote an equal amount of time and effort to the experiment. However, the authors did observe that finding new features in their fellow students' wiki sites often motivated the students. For example, some students attempted to learn how to create a table of contents and how to embed YouTube videos after seeing these features on the wiki sites posted by other groups.

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<th>Table 3</th>
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<td>Summary of findings from students’ reflection on the wiki task.</td>
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<td><strong>Dimension</strong></td>
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<td><strong>Technical skills</strong></td>
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<td><strong>Content Organization</strong></td>
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7. Conclusions and directions for future studies

The main objective of the study was to examine the potential of using wikis in teacher-education programs to develop teachers’ abilities. The findings led to answers to the study’s three main research questions:

7.1. What are student teachers capable of learning in wiki-based activities?

When examining the footprints on the wikis, the authors observed clearly the power of peer learning — of how the students developed their new skills in conjunction with their peers. During the course of their study, the students mastered various skills through their collaborative activities and peer learning, such as ICT skills, collaboration skills, and organizational skills. The students were able to refresh their subject knowledge while building their wiki sites. The study also gave the students an opportunity to integrate their knowledge of pedagogy with the various skills they learned, while creating learning materials intended for future students.

7.2. Is it possible to integrate self-assessment and peer assessment with wiki-based activities?

Many wiki-based activities in prior research covered the process of learning and teaching (Mak & Coniam, 2008; Nicholas & Ng, 2009; Wang, 2010), but there is virtually no literature on the forms of assessments suitable to evaluate tasks. The authors established that assessment rubrics were a feasible way to grade wiki sites, although most students and teachers were not very familiar with the concept. Because it was a new concept, the students experienced difficulties in designing and applying the assessment rubrics. Fortunately, the study also showed that it was easy for the student teachers to get used to this type of assessment tool after sufficient practice. This supports the idea that it is not only possible to integrate self-assessment and peer assessment in wiki-based activities, but also that the assessment helped the students better understand what goes into well-designed wiki sites.

7.3. Are wiki-based activities an effective way to develop teachers’ abilities?

The data on the wiki sites confirmed that wiki-based activities were useful for developing student teachers’ abilities. The reflections of the students also pointed to the same conclusion. The students expressed appreciation for the wiki platform, and most of them were eager to spend extra effort on the wiki task, as long as they found the task meaningful and they had tutors willing to provide constant guidance. It was evident that this guidance was rather different from types of learning activities that are not transparent to students. This, in turn, meant that the effectiveness of wiki tasks comes from its design and the role played by the tutors.

The study indicated that Web 2.0 environments can do more than promote learning (Boyd, 2007; Richardson, 2006). The versatile features of Web 2.0 enable student teachers to apply with ease their subject knowledge and education background to their designs of digital learning, teaching, and assessment materials. Indeed, the interactions within groups, between groups, and with the tutors motivated the students to dedicate extra effort to their wiki project. This suggests that the effectiveness of learning and teaching is greatly influenced by a Web 2.0 environment and active participation.

A significant limitation of this study was the small sample size, even though the authors attempted to maximize the sample size by combining students from several different programs together. Furthermore, the project was relatively short term, so the findings could be different after students have more experience with the wiki tasks. These limitations serve as a reminder that it is dangerous to generalize the findings from a single case study and that the findings should be tested in different settings and in different countries. Inevitably, longitudinal research is necessary to examine the potential of using wikis for various activities in teacher-education programs.

The authors plan to conduct similar case studies in other undergraduate programs that have higher enrollment numbers so that the findings can be generalized.

The study provided the authors with concrete experience with wikis in a teacher-education program, from which the authors conclude that wiki-based activities give teachers a new way of teaching that can be a superior alternative or a supplement to traditional classroom-based learning. This study also suggests that there is an urgent need for a change in the way teachers use assessments. Assessment has always been used for grading, but not for learning. With the emergence of Web 2.0, there are now many more ways to conduct assessments, such as through wikis, blogging, and social networking. It would be worthwhile to explore how best to assess students in these new kinds of learning activities. As Internet tools become more mature and popular in higher education, it is imperative to develop further new strategies for using wikis as learning and assessment tools. Finally, educators should seriously consider methods of applying different approaches to make use of wikis in order to facilitate more interaction among student teachers.

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References


