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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.

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) suggests 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.

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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 Merrienboer, 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