Virtual collaborative learning using Wiki for ODL learners: the case of Wawasan Open University

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Virtual collaborative learning using Wiki for adult ODL learners:  
The case of Wawasan Open University

Ean-Teng Khor  
Wawasan Open University  
Penang, Malaysia

Abstract:

Virtual collaborative learning is gaining in popularity in Open & Distance Learning (ODL) environment over the last decade. Findings from preliminary study conducted showed that collaborative learning activities enhance student satisfaction and achieve course learning outcomes. Wiki is widely promoted as virtual collaborative tool and has been integrated into several learning management systems. However, there are limited studies on the effectiveness of moodle-wikis for virtual collaborative learning. Therefore, the aim of this study is to evaluate the effectiveness of moodle-wiki in terms of students’ perception and students’ performance. The collected data was further analyzed and evaluated. The statistical results demonstrated that students have positive perception towards moodle-wiki and the collaborative tool does enhance student’s learning performance. This study is useful for instructors and course designers as a guideline to investigate students’ perception and evaluate the effectiveness of collaborative tool.

Keywords: Online Learning Support, Instructional Technologies, Virtual Collaborative Learning, Student-Centered Learning, ODL Environment, Learning Process

1.0 Introduction

Wawasan Open University (WOU) is a private and non-profit institution of higher learning dedicated to learners who seek to pursue tertiary qualifications for professional development and self-enrichment. WOU is based on blended learning which combines both online distance learning and traditional face-to-face learning methods. The blended learning moves away from traditional classroom teaching and engages student to participate and become active in their own learning process.

The rapid development of ICT has changed the pedagogy of teaching and learning at all levels of education (Cain, 2000; Helford & Lei, 1999). There is a shift from teacher-centered to student-centered approach. The student-centered approach, instructor-learner interactions, and knowledge sharing among peers are crucial for the successful distance learning courses delivery process.

Collaborative learning is viewed as student-centered teaching practice while knowledge is socially produced through peer interaction. Dillenbourg and Schneider (1995) defined collaborative learning as “a situation in which two or more people learn or attempt to learn something together” (p.1). Collaborative learning solves the problem of pure ODL
which lacks of instructor-learner interactions and peer-to-peer knowledge sharing. Wiki was designed as a collaborative tool on the Internet (Leuf and Cunningham, 2001).

2.0 Literature Review

In constructivist learning environment, students learn by making meaning and building up their own knowledge through collaborative activities (Wilson, Teslow & Osman-Jouchoux, 1995). Based on constructivist theory, collaboration is considered inherently social and the role of peer relationship is considered as a key component of educational success (Golub, 1988).

According to Newby, Stepich, Lehman and Russell (2000), learning is not only an internal process but occur in the context of interacting with peers. In a learning process, learning is influenced by participation in a community (Vygotsky, 1978). Dillenbourg and Schneider (1995) pointed out that students learn because they interact with each other and the interaction triggers some mechanism that produces the effect of collaboration. Tobin (1990) has also highlighted that learners construct their knowledge through social interaction with peers, through applying ideas in practice, and through reflection and modification of ideas.

Wiki is an effective tool for collaborative learning and writing (Lund, 2008; Bold, 2006) and is being used to support learning and teaching within the higher education sector (Hughes, 2009). Numerous empirical studies have shown that wiki is ideal for knowledge creation and management (Bruns & Humphreys, 2007; Raman, Ryan & Olfman, 2005; Nicol, Littlejohn & Griersson, 2005). Moreover, wiki also has the advantage of ease of use, and option for updates and editing by contributors with different access rights (Engstrom & Jewett, 2005).

Minocha and Thomas (2007) used wiki for collaborative activities among distance learning students who took a software engineering development project. Their findings indicate that a wiki is a good medium for collaborative activities in non face-to-face mode. In addition, Mak and Coniam (2008) in their study found that student wrote better when writing collaboratively in wiki.

With the potential benefits of wiki, there is question raise whether student perceive the same levels of usage, usefulness and ease of use while utilizing wiki. According to Liaw, Huang and Chen (2007), the effectiveness of technology implementation in learning greatly depends on positive perception towards it. Liaw (2002) defined perception as feeling towards certain object and statement of beliefs that lead to the individual’s action.

Technology Acceptance Model (TAM) was selected in this study as it has been widely used to investigate learners’ perception of information technology and applied to studies
of technology acceptance (Bruner & Kumar, 2005). Besides, The TAM is also used because of its tested validity and reliability in measuring and predicting attitudes, technology acceptance and use.

Davis (1989) modified Theory of Reasoned Action (TRA) to predict computer adoption by replacing the belief determinants of TRA with two key beliefs (i.e., perceived ease of use and perceived usefulness. Davis (1989) defined perceived ease of use as “the degree to which a person believes that use of a particular system would be free of effort”; in contrast, perceived usefulness is “the degree to which a person believes that use of a particular system would enhance his or her job performance”.

Figure 1 shows the TAM model. In TAM, technology acceptance and use is determined by intention to use (IU). IU in turn, is affected by Attitude towards Using (AT), as well as the direct and indirect effects of Perceived Ease of Use (PE) and Perceived Usefulness (PU).

![Figure 1: The Technology Acceptance Model (Davis, 1989)](image)

### 3.0 Moodle-Wiki

Moodle-wiki, a wiki in LMS allows students to contribute their ideas by adding, modifying and commenting a wiki in collaboration with others. This engages student-instructor and student-student interactions. The interactions are important for effective learning process.
Figure 2, the View and Edit tab allows user to view and edit the wiki page respectively. The Comment tab allows user to add comments about the wiki. For Figure 3, the History tab allows user to see what has been altered in the wiki. The tab also allows user to compare and restore edits. The Map tab allows user to view areas of the wiki, such as contributions, list of pages, page index, links, orphaned pages and updates pages.
4.0 Research Methodology

The method used to gather information of students’ perception towards moodle-wiki was through questionnaires. The questionnaires composed of measures taken directly or adapted from Davis (1989)’s TAM model. Pre-test and post-test instrument was used to assess students’ performance and examine the mean score increment from pre-test to post-test.

The participants were recruited from 60 ODL undergraduate students who enroll in TCC234/05 Computer Networks in Jan 2014 semester. It is a middle-level course offered by WOU to all computing students. There are two different groups of samples in this study, namely control group and experimental group. Experimental group was formed from students who used moodle-wiki while control group was formed from student who did not use. The students were randomly assigned to either control group or experimental group.
Pre-test was carried out during third weeks of semester. Both pre-test and post-test consists of similar questions but with a different sequence to prevent students from memorising answers from the pre-test. The pre-test score of each student was recorded accordingly. Post-test were then conducted 15 weeks after the pre-test. The post-test score of each student was recorded accordingly.

The students were introduced to the wiki tool and they are informed about the collaborative tasks at the beginning of semester. Students were also given an extensive training for practical hands-on to understand on how wiki works. The course-coordinator had ensured her students to familiarize themselves with each area of wiki before the actual experiment. The collaborative activity via wiki lasted for 3 months and students contributed their knowledge and ideas to the wiki tasks. They may seek further advice from course-coordinator if they have any doubts from time to time.

The questionnaire was then conducted via online survey. A modified survey instrument based on the principle of Davis’s (1989) TAM was distributed to all ODL undergraduate students enrolled in Computer Networks course at WOU. The purpose of the study was explained and appropriate guidelines were given to the respondents before they took part in the survey. Participation in this study was on voluntary basis. The questionnaire designed to include three items of perceived ease of use (PE1-3), three items of perceived usefulness (PU1-3), two items of Attitude Towards Using (AT1-2) and two items of Intention to Use (IU1-2). All items are measured four-point Likert scales anchored between “1=strongly disagree” and “4=strongly agree”.

5.0 Results and Discussion

Statistical tests were conducted using SPSS program for further analysis and evaluation. Students’ perceptions were assessed from questionnaire data. On the other hand, the independent sample t-test was conducted to compare students’ performance (post-test mean score) between control group and experimental group. All the t-tests analyses were conducted at the .05 level of significance.

As observed from Table 1, all of the measures employed in this study demonstrated good internal consistency, ranging from 0.836 to 0.969, thereby exceeding the recommended reliability estimates (alpha = 0.70). The results show that all the mean values fall above the midpoint 3.00. The standard deviations are ranging from 0.681 to 1.008. This indicates that most of the respondents are between ‘agree’ to ‘strongly agree’ on the items tested. Among the four variables, IU achieve the best rating with mean value of 4.03 (SD=.706).
Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th>Construct</th>
<th>$M$</th>
<th>$SD$</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Ease of Use (PE)</strong></td>
<td>3.69</td>
<td>.792</td>
<td>.874</td>
</tr>
<tr>
<td>PE1: I would find moodle-wiki easy to use.</td>
<td>3.50</td>
<td>.938</td>
<td></td>
</tr>
<tr>
<td>PE2: Learning to use moodle-wiki would be easy for me.</td>
<td>3.43</td>
<td>1.006</td>
<td></td>
</tr>
<tr>
<td>PE3: It would be easy for me to become skillful at using moodle-wiki.</td>
<td>4.13</td>
<td>.681</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Usefulness (PU)</strong></td>
<td>3.49</td>
<td>.966</td>
<td>.969</td>
</tr>
<tr>
<td>PU1: Using moodle-wiki would enhance my effectiveness in learning.</td>
<td>3.43</td>
<td>.971</td>
<td></td>
</tr>
<tr>
<td>PU2: Using moodle-wiki would improve my learning performance.</td>
<td>3.47</td>
<td>1.008</td>
<td></td>
</tr>
<tr>
<td>PU3: Using moodle-wiki would increase my productivity in my course work.</td>
<td>3.57</td>
<td>1.006</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude Towards Using (AT)</strong></td>
<td>3.45</td>
<td>.865</td>
<td>.883</td>
</tr>
<tr>
<td>AT1: I have a generally favorable attitude towards using moodle-wiki.</td>
<td>3.37</td>
<td>.850</td>
<td></td>
</tr>
<tr>
<td>AT2: I believe it is (would be) a good idea to use moodle-wiki for my course work.</td>
<td>3.53</td>
<td>.973</td>
<td></td>
</tr>
<tr>
<td><strong>Intention to Use (IU)</strong></td>
<td>4.03</td>
<td>.706</td>
<td>.836</td>
</tr>
<tr>
<td>IU1: I intend to use moodle-wiki whenever possible.</td>
<td>4.10</td>
<td>.759</td>
<td></td>
</tr>
<tr>
<td>IU2: I would adopt moodle-wiki in the future.</td>
<td>3.97</td>
<td>.765</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 illustrates acceptable discriminant validity between each pair of construct, with all AVE square roots greater than the correlation between the constructs. The correlations among the variables are relatively strong, with correlation pearson’s $r$ ranging from .691 to .932.

Table 2: AVE Square Roots and Inter-Correlation

<table>
<thead>
<tr>
<th>Construct</th>
<th>Perceived Ease of Use</th>
<th>Perceived Usefulness</th>
<th>Attitude Towards Using</th>
<th>Intention to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Ease of Use</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>.811**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude Towards Using</td>
<td>.874**</td>
<td>.932**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Intention to Use</td>
<td>.913**</td>
<td>.691**</td>
<td>.751**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Correlation is significant at the .01 level (2-tailed)

As observed from Table 3, the independent-samples $t$-test failed to reveal a statistically reliable difference between the pre-test mean score of experimental group ($M = 41.27$,
$SD = 11.248$) and control group ($M = 42.56$, $SD = 14.792$) with $p > .05$ and $\alpha = .05$. In other words, pre-test mean score of control group and experimental group is homogeneous.

<table>
<thead>
<tr>
<th></th>
<th>$M$</th>
<th>$SD$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group (EG)</td>
<td>41.27</td>
<td>11.248</td>
<td>-.465</td>
</tr>
<tr>
<td>Control Group (CG)</td>
<td>42.56</td>
<td>14.792</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: T-Test Analysis of Pre-Test Mean Score between EG and CG

Table 4 shows the post-test mean score of experimental group is $74.80$ ($SD = 10.738$) and post-test mean score of control group is $62.98$ ($SD = 16.660$). The result of $t$-test analysis indicated a significant difference between control group and experimental group with $p < .05$ and $\alpha = .05$.

<table>
<thead>
<tr>
<th></th>
<th>$M$</th>
<th>$SD$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group (EG)</td>
<td>74.80</td>
<td>10.738</td>
<td>4.001***</td>
</tr>
<tr>
<td>Control Group (CG)</td>
<td>62.98</td>
<td>16.660</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***$p < .001$

The comparison of pre-test and post-test for both experimental group and control group is illustrated in Figure 4. There is a dramatic rise of 33.53% from 41.27% to 71.8% for post-test mean score of experimental group with the use of wiki collaborative tool if compare to control group (a rise of 20.42% only). The findings are well in line with other research studies that it is an effective tool for collaborative learning (Lund 2008, de Pedro et al., 2006; Bold, 2006) and it does enhance students’ learning and improve the understanding of topics.

![Figure 4: Line Graph of Pre-Test and Post-Test for Experimental Group and Control Group](image-url)
6.0 Conclusions

The aim of this research study is to evaluate the effectiveness of moodle-wiki in terms of students’ perception and performance. The findings reveal that students perceived moodle-wiki well and had used moodle-wiki extensively for their learning. The findings also show that moodle-wiki is an effective supporting tool to enhance students’ academic performance. The results gained from this research study provide solid understanding on the implementation of wiki in moodle learning management system. In addition, this study provides guidelines to relevant stakeholders to study students’ perception towards the implementation of any new teaching and learning methods. Further study on other fields of study, such as engineering, management and psychology is recommended.

References


