Virtual Collaborative Learning Using Wiki for Adult ODL Learners: The Case of Wawasan Open University

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Abstract

Virtual collaborative learning has been gaining in popularity in open and distance learning (ODL) over the last decade. In collaborative learning environments, the instructors facilitate and initiate discussion on particular issues of concern. Students are given the chance to share their knowledge in a way they have not been used to and the possibility of participating in a coordinated effort to solve problems together. A preliminary study showed that collaborative learning activities enhanced student satisfaction, achieved the course learning outcomes and encouraged group participation. Peer-to-peer interaction has been shown to be successful and can be engaged in during collaborative learning activities. Wiki is widely promoted as a virtual collaborative tool and has been integrated into several learning management systems. However, there are only limited studies on the effectiveness of moodle-wiki for virtual collaborative learning. Therefore, the aim of this study is to evaluate the effectiveness of moodle-wiki in terms of students' perceptions and performance. The data collected were analysed and evaluated, and the statistical results demonstrate that the students had positive perceptions of moodle-wiki and the collaborative tool enhanced their learning performance. This study will be useful for instructors and course designers as a guide to investigating students' perceptions and evaluating the effectiveness of a collaborative tool. The findings of this research are also useful for stakeholders to maximize students' academic learning achievement.

Keywords: online learning support, instructional technologies, virtual collaborative learning, student-centred learning, ODL environment, learning process

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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's course provision is based on blended learning which combines online distance learning and traditional face-to-face learning methods. Blended learning moves away from traditional classroom teaching and engages students in participating actively 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), with a shift from a teacher-centred to a student-centred approach. In the latter, instructor-learner interactions, and knowledge-sharing among peers, are crucial.

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 instructor-learner interaction and peer-to-peer knowledge-sharing. Wiki was designed as a collaborative tool on the Internet (Leuf & Cunningham, 2001).

Literature Review

In a 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 relationships is viewed 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 occurs in the context of interacting with peers. In the 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) also argued that learners construct their knowledge through social interaction with peers, through applying ideas in practice, and through reflection and modification of ideas.

Kear, Woodthorpe, Robertson and Hutchison (2010) consider wiki to be one of the Web 2.0 tools that enable collaboration by working on a HTML-based document through a Web browser. It has been used widely as a collaborative tool in the education sector as a wiki page can be edited by its users (Judd, Kennedy & Cropper, 2010). By discussing, editing and sharing information on a topic, wiki allows its users to create a collective document (Chao & Lo, 2011; Peled, Bar-Shalom & Sharon, 2014; Wichmann & Rummel, 2013).
Minocha and Thomas (2007) used wiki for collaborative activities among distance learning students who were doing a software engineering development project. Their findings indicated that wiki is a good medium for collaborative activities in a non-face-to-face mode. Also, in their study, Lai and Ng (2011) found that wiki can improve learners' knowledge and help them to develop various generic skills in conjunction with their peers in wiki environments. In addition, a research study by Ertmer, Newby, Liu, Tomory, Yu & Lee (2011) showed that wiki can be used to enhance students' confidence and convince them to adopt it for their learning.

According to Liaw, Huang and Chen (2007), the effectiveness of technology implementation in learning depends greatly on positive perceptions of it. Liaw (2002) defined 'perception' as feelings towards certain objects and statements of belief that lead to an individual's action. Given the potential benefits of wiki, do students perceive the same levels of usefulness and ease of use while utilizing it?

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

Davis (1989) modified the Theory of Reasoned Action (TRA) to predict computer adoption by replacing the belief determinants of

TRA with two key beliefs, viz. perceived ease of use and perceived usefulness; and he defined 'perceived ease of use' as 'the degree to which a person believes that use of a particular system would be free of effort', and 'perceived usefulness' as 'the degree to which a person believes that use of a particular system would enhance his or her job performance'.

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

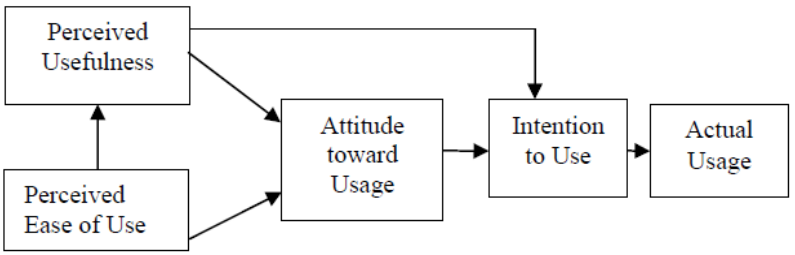

Figure 1 The technology acceptance model (Davis, 1989)

Moodle-wiki

Moodle-wiki, a wiki in a LMS, allows students to contribute their ideas by adding, modifying and commenting in collaboration with others. This induces both student-instructor and student-student interactions, which are important for an effective learning process.

Basically, there are five main tabs, viz. *View*, *Edit*, *Comment*, *History* and *Map*. Figure 2 shows the *View* and *Edit* tabs that allow users to view and edit the wiki page. The *Comment* tab lets users add comments about the wiki. Figure 3 shows the *History* tab which allows users to see what has been altered in the wiki, and to compare and restore the edited part. Finally, the *Map* tab allows users to view areas of the wiki, such as contributions, lists of pages, page index, links, orphaned pages and updated pages.

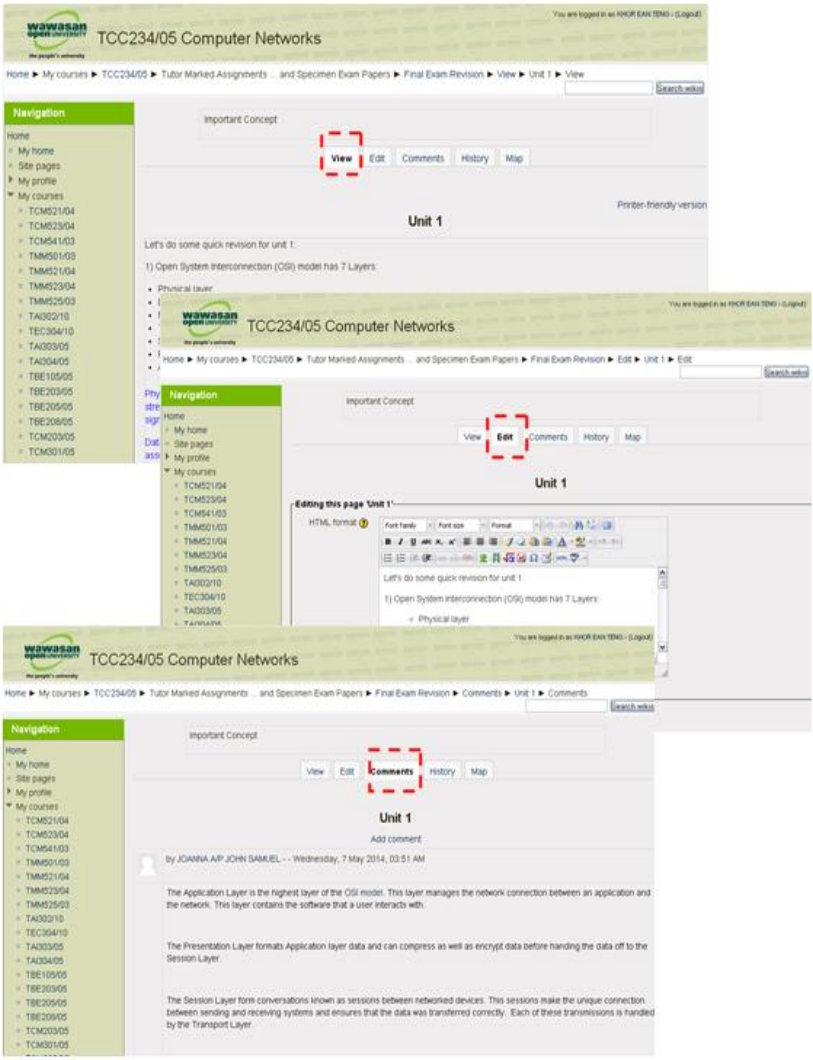

Figure 2 Moodle-wiki screen 1

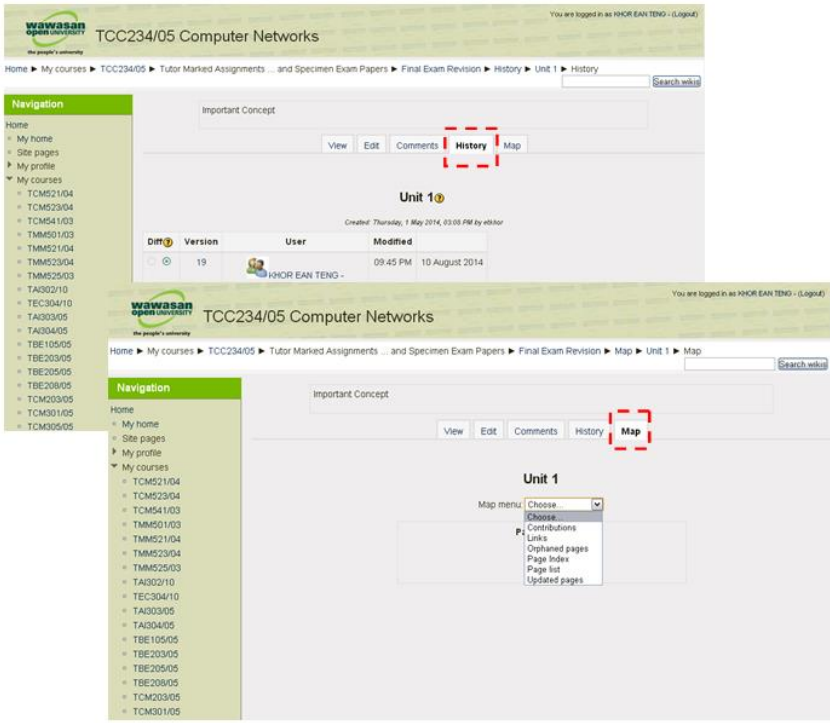

Figure 3 Moodle-wiki screen 2

Research Methodology

A questionnaire was used to gather information on students' perception of moodle-wiki. The questionnaire was composed of measures taken directly or adapted from Davis's (1989) TAM model. A pre-test and post-test design was adopted to assess students' performance, with the mean score increments from the pre-test to the post-test being examined.

The participants were recruited from 60 ODL undergraduate students who were enrolled in WOU's TCC234/05 *Computer Networks*, which is a middle-level course offered to all students in computing programmes. There were two independent groups — the control group and the experimental group — with the students divided equally. The experimental group was formed from the students who had used moodle-wiki since the beginning of the semester, while the control

group had used a forum.

The pre-test was carried out during the third week of the semester and the score for each student was recorded. The pre-test and post-test consisted of similar questions but with a different sequence to prevent students from memorizing answers from the pre-test. The post-test was then conducted 15 weeks after the pre-test and again each student's score was recorded.

The students in the experimental group were introduced to the wiki tool and were informed about the collaborative tasks at the beginning of the semester. They were also given an extensive training on practical 'hands-on' work for understanding how wiki works. The course coordinator ensured that her students were familiar with each area of wiki before the actual experiment. The collaborative activity via wiki lasted for three months and students contributed their knowledge and ideas for the wiki tasks. From time to time, they could seek further advice from the course coordinator if they had any doubts.

The questionnaire was then conducted through an online survey. A modified survey instrument based on the principle of Davis's (1989) TAM was distributed to all ODL undergraduate students enrolled in the *Computer Networks* course. 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 a voluntary basis. The questionnaire was designed to include three items on the perceived ease of use (PE1-3), three items on the perceived usefulness (PU1-3), two items on attitude towards usage (AT1-2) and two items on intention to use (IU1-2). All the items were measured on a five-point Likert scale, with 1= 'strongly disagree' and 5 = 'strongly agree'.

Results and Discussion

Statistical tests were conducted using SPSS for further analysis and evaluation, with students' perceptions being assessed from the questionnaire data. Also, an independent sample t-test was carried out to compare students' performance (post-test mean score) between the control group and the 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 showed that all the mean values fell above the midpoint 3.00. The standard deviations ranged from 0.681 to 1.008, which indicated that most of the respondents were between 'agree' and 'strongly agree' on the items tested. Among the four variables, IU achieved the best rating with a mean value of 4.03 (*SD*=.706).

Table 1 Descriptive statistics

	M	*SD*	Cronbach's Alpha
***Perceived ease of use** (PE)*	*3.69*	*.792*	*.874*
PE1: I would find moodle-wiki easy to use.	3.50	.938	
PE2: Learning to use moodle-wiki would be easy for me.	3.43	1.006	
PE3: It would be easy for me to become skillful at using moodle-wiki.	4.13	.681	
Perceived usefulness (PU)	*3.49*	*.966*	*.969*
PU1: Using moodle-wiki would enhance my effectiveness in learning.	3.43	.971	
PU2:Using moodle-wiki would improve my learning performance.	3.47	1.008	
PU3: Using moodle-wiki would increase my productivity in my coursework.	3.57	1.006	
Attitude towards usage (AT)	*3.45*	*.865*	*.883*
AT1: I have a generally favourable attitude towards using moodle-wiki.	3.37	.850	
AT2: I believe it is (would be) a good idea to use moodle-wiki for my coursework.	3.53	.973	
***Intention to use** (IU)*	*4.03*	*.706*	*.836*
IU1: I intend to use moodle-wiki whenever possible.	4.10	.759	
IU2: I would adopt moodle-wiki in the future.	3.97	.765	

Table 2 illustrates the acceptable discriminant validity between each pair of constructs, with all AVE square roots greater than the

correlation between the constructs. The correlations among the variables were strong, with Pearson's *r* ranging from .691 to .932.

Table 2 AVE square roots and inter-correlation

Construct	Perceived ease of use	Perceived usefulness	Attitude towards usage	Intention to use
Perceived ease of use	1.000			
Perceived usefulness	.811**	1.000		
Attitude towards usage	.874**	.932**	1.000	
Intention to use	.913**	.691**	.751**	1.000

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

The independent-samples *t*-test failed to reveal a statistically reliable difference between the pre-test mean score of the experimental group (M = 41.27, SD = 11.248) and the control group (M = 42.56, SD = 14.792) with $p > .05$, $\alpha = .05$ and t (58) = -.465. In other words, the pre-test mean score of the control group and the experimental group was homogeneous.

On the other hand, the post-test mean score of the experimental group was 74.80 (SD = 10.738) and post-test mean score of the control group was 62.98 (SD = 16.660). The result of the *t*-test analysis indicated a significant difference between the control group and the experimental group with $p < .05$, $\alpha = .05$ and t (58) = 4.001.

The comparison of pre-test and post-test scores for both groups is illustrated in Figure 4. There is a dramatic rise of 33.53% from 41.27% to 74.8% for the post-test mean score of the experimental group with the use of the wiki collaborative tool when compared to the control group (a rise of 20.42% only). These findings are in line with other research studies that show it is an effective tool for collaborative learning (Bold, 2006; Lund 2008) and enhances students' learning and improves their understanding of topics.

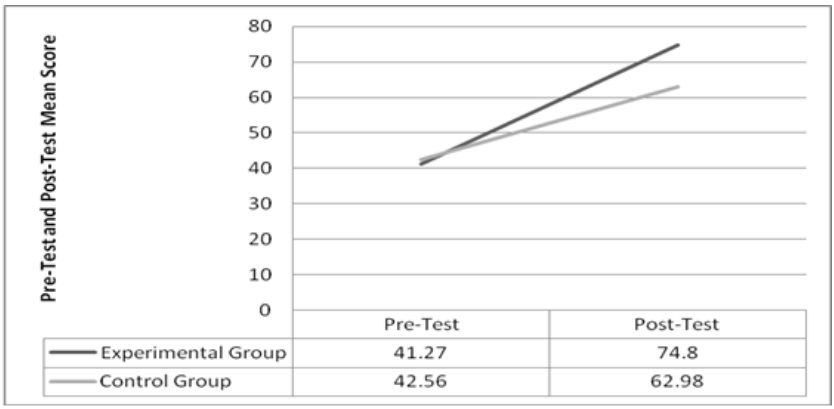

Figure 4 Line graph of pre-test and post-test for the experimental and control groups

Conclusions

The aim of this research study was to evaluate the effectiveness of moodle-wiki in terms of students' perceptions and performance. The results showed that students perceived moodle-wiki positively and had used it extensively for their learning. The findings also showed that moodle-wiki is an effective supporting tool for enhancing students' academic performance. The results gained from this research study provide a solid understanding of the implementation of wiki in a moodle learning management system. In addition, this study provides guidelines for relevant stakeholders for studying students' perceptions of the implementation of any new teaching and learning method. Further work on other fields of study, such as engineering, management and psychology, is recommended.

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