

# THE ROLE OF TECHNOLOGY: MOODLE AS A TEACHING TOOL IN A GRADUATE MATHEMATICS EDUCATION COURSE

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## ABSTRACT

*MOODLE is an open source e-learning system. MOODLE can be used as a tool for delivering content to students and more interestingly, it can be used to build rich collaborative learning communities. MOODLE allow users to be active learners, actively participating in the online learning process. This study aimed to investigate the views of students regarding the use of MOODLE. This study gives attention to the variables of perceived usefulness, perceived ease of use, attitude and computer self-efficacy. Participants of this study consist of 21 students, who take courses at the master's levels in mathematics education. There are 6 male and 15 female students. Students Perception Questionnaire (SPQ) instruments was used to gather the data. Data were analyzed descriptively. The finding revealed that students have positive perception towards the use of MOODLE. MOODLE if its use appropriately and systematically benefits lecturer and students accordingly.*

**Keywords:** MOODLE, collaborative learning, attitudes, usefulness, self-efficacy

## INTRODUCTION

Internet based technologies and World Wide Web is the foundation of online learning environment. Internet technology and computer has become increasingly important in the field of education and give more choice and flexibility teaching and learning. According to Boldt, Gustafon and Johnson (1995), internet is an excellent learning tool to enrich students' learning and experiences. E-learning, which is described as the use of ICT to enhance and supports the teaching and learning in education has become increasingly important in tertiary education (OECD, 2005). According to Sanchez and Hueros (2010), E-learning is now a fundamental tool for universities and educational institution to gain a competitive edge. E-learning allows students not to be in the classroom and therefore gives them more flexibility to learn and interact with other students and lecturers. However, the success of e-learning is dependent on students' acceptance and usage (Sanchez & Hueros, 2010). In recent years a shift has occurred in higher education, the role of university is no longer as a provider of knowledge, but instead to create an environment that the students can explore, discover and learn by themselves.

## MOODLE AS A PEDAGOGICAL TOOL

Using technology should be used as a tool and provide a platform for achieving objectives and standards (Reigluth, 1999). Web-based courses management system is the latest pedagogical tool based on technology (Wernet, Olliges & Delicath, 2000). Web-based Course Management Systems (CMS) are an increasingly important part of academic systems in higher education. There is several learning management system (LMS) commercially available on the market such as Blackboard, WebCT and Desire@Learn. There are also many open-source, free LMS, such as MOODLE, Coursework, Atutor and Interact. However, MOODLE is one of the popular LMS currently (Suleiman, Umar & Abdu, 2012, Chewe &

Chitumbo, 2012). In addition, MOODLE was further chosen due to its social-constructivist nature (MOODLE, 2010). MOODLE is a course management system which enables delivery of online education. MOODLE allows instructors to plan and designate activities for the students. MOODLE is a dream tool for teachers, integrating wide range of resources and assessment strategies and is powerful in content creation (Ahmed Yousif, 2012). As stated by Ayse (2008), it is unwise to ignore the pedagogical impact of MOODLE.

MOODLE stands for Modular Object Oriented Dynamic Learning Environment. It has been developed by Martin Dougiamas as part of his PhD in Education thesis (Moodle, 2005). The underlying philosophy of MOODLE is maximum instructor control and minimal administrator control (Moodle, 2010). MOODLE is based on the philosophy of socio-constructivist pedagogy which encourage discovery and provide collaborative activities. Different with commercial software, it is open source with no licensing costs and using the PHP code. According to Open Source Initiative (2005), the main reason to use open source software includes the independent to distribute and modify compatibility cross-platform, universal access and active cooperation for design improvement. It is seen as users friendly and easy to manage and technically easy. It adapts a flexible modular design and one can choose and apply among thousands of available extensions for their version of Moodle (Unal & Unal, 2011).

### **Perception of Online Learning**

Student perception is an influential factor in the successful adoption of MOODLE in the mathematics education course. To get any educational value out of MOODLE, the students must pursue educationally sound behaviors such as collaboration, participation and interaction. According to Fishbein and Ajzen, 1975, behaviour intention is determined by attitudes and subjective norms. An attitude refers to an individual's perception (either favourable or unfavourable) toward specific behavior (Werner, 2004) and human behaviors are shaped by perception. Several study of online learning has been carried out. Schultz (2001) found that students liked the convenience of online education but dislike the lack of personal interaction. In a study by Palmer and Holt (2009), they found that students were to give higher importance and satisfaction ratings to elements of online learning than staff and students also agree that online learning enhanced their learning. Angulo and Bruce (1999) reported that supplemental web based instruction give benefit to their learning. Gay et al. (2005) found that students generally like using ICT. Koohang & Durante (2003) states the more the user experience in the use technology, the more the person tends to accept it. Naqvi (2006) concluded that students who were exposed to online learning environment had positive attitude toward online learning. There were also studies that focus on MOODLE. Ayse (2008) revealed that 66.7% of teachers enjoyed the MOODLE environment and 53.3% said that having control of their own learning was useful. Another study by Gower and Barr (2005) reported that their respondents were very positive in relation to the usefulness and user friendliness of MOODLE. A study by Santamaria, Ramos and Antolin (2012) among student teachers on the uses of MOODLE found that the overall assessment is very positive about MOODLE. However, one of the problems identified by the teachers regarding the use of MOODLE is the lack of training in using MOODLE. Although there was an increase in the use of online learning, however there have been limited discussions about how students views and their reaction to the element of e-learning (Smart & Cappel, 2006), especially in higher education institution in Malaysia. Thus, the current study sought to examine students' perception towards the use of MOODLE in graduate mathematics education course.

## METHODOLOGY

### Context and Participants

Participants of this study consist of 21 students, who take courses at the master's levels in mathematics education. There are 6 male and 15 female students. The active involvement and interaction with content web-based courses is one of the components of this course. Course synopsis, content material, assignments, forums, web resources and tutorials can be found online. Students can download content material, send assignments, and interact through forum with instructors or friends. The context of this study was a graduate level course in mathematics education at the Faculty of Education, Universiti Kebangsaan Malaysia. The course consisted of 9 modules. For each module, students were asked to make presentations on related topic. For the purpose of ensuring that learning activities extend beyond the classroom, students were told to participate in asynchronous online discussion forum. Students are obliged to take part in the discussion forums, where every posting will be monitored. Students were asked to reply to the questions in the forum and interact actively with other students. At the end of each module, students were asked to write their reflections regarding their learning experience on the particular topic. At the end of the semester, participants were asked to state their perceptions toward the use of MOODLE through questionnaires.

### Instrument

The Students Perception Questionnaire (SPQ) instruments comprised of 20 items, using a 4-point Likert scale. Response to every item is based on scale from 1 to 4, wherein 1 = Strongly Disagree, 2 = Slightly Agree, 3 = Agree, 4 = Strongly Agree. High score shows positive perception towards the MOODLE. SPQ instrument was adapted from Sanchez and Hueros (2010). The maximum score is 80 and the minimum score is 20. This instrument was to get information about the perception of students on the use of MOODLE in Master of Education Mathematics course. The subscale of the instrument consists of a) perceived usefulness b) computer self-efficacy, c) perceived ease of use and d) attitude. Perceived usefulness refers as to how much the user believes that he or she can get help and benefits his or her performance from the use of MOODLE. Self-efficacy refers to confidence shown by users in their own ability to utilize MOODLE. Perceived ease of use denotes to how easier the user will perceive in using MOODLE. Attitude is the degree to which the user is interested in MOODLE. The validity of the instrument was determined and confirmed by a panel consisting of faculty members. The overall internal consistency of the instrument was 0.90, as measured by Cronbach Alpha. According to Fraenkel & Wallen (2005), alpha value of 0.7, is suitable for making inference to a group. After collecting the data, it was analyzed using statistical package for social science (SPSS).

**Table 1. Index reliability of each subscale**

Item No.	Item Subscale	Alpha value
1-6	Perceived Usefulness	0.82
7-12	Computer Self-Efficacy	0.50
13-16	Perceived ease of use	0.72
17-20	Attitude	0.80

## Assumption and Limitations

It was assumed that each participant would be honest in recording a response. Further assumptions were that the participants were representative of learners at the institution where the research was conducted. One limitation was that the participants were determined by using purposeful sampling, with a focus on graduate students in mathematics education. Generalizability should not be expected or assumed. The students that participated in this study are mostly obliged to use Moodle in their studies.

## Procedure

At the early of semester the researchers gave briefing regarding the components of MOODLE and its functions. This briefing takes about two hour. The researchers demonstrate on the use of MOODLE to the students so that they clearly understand about how to use MOODLE. Hands on training were also provided. Researchers also notify students that the use of MOODLE is part of the course evaluation. Other than participating in presentation and forum students also need to get material (like syllabus, notes, and lecture), send assignments, and interact with instructors or with other partners. Researchers also make announcement through MOODLE.

## FINDINGS

### Demographics Information

All of the 21 participants stated that they had experience with computers. More specifically, when the participants were asked for what purposes they use a computer, they replied that they most often used the computer for emails (90.50%), followed by word-processing activities (85.71%), for browsing the internet (80.95%), online translating (33.33%) and less frequently for gaming (9.52%). With regard to presentation software, 95.24% stated that they used presentation software such as Power Point.

### Perception of Students toward MOODLE

What is the perception of students towards the use of MOODLE?

**Table 2. Shows the descriptive analysis of the item**

No	Item	Mean	Standard Deviation
1	Moodle helps me to learn more efficiently	3.57	0.59
2	Moodle improves my academic performance	3.38	0.58
3	Moodle makes my learning more effective	3.57	0.51
4	Moodle makes it easier to learn at university	3.62	0.59
5	Moodle gives me control over my learning	3.48	0.60
6	Overall, Moodle is advantageous for my learning	3.76	0.44
7	I can access the contents of Moodle	3.57	0.51
8	I can freely navigate the contents of Moodle	3.43	0.59
9	I can use Moodle without needing to be told how it functions	3.00	0.55
10	I can solve problems that arise on Moodle	2.86	0.57
11	I can use Moodle if there are user manuals available	3.24	0.70

( Continued.....)

**Table 2. Shows the descriptive analysis of the item** (.....countinued)

No	Item	Mean	Standard Deviation
12	Overall, I am able to use Moodle	3.48	0.51
13	Learning to use Moodle is easy for me	3.38	0.49
14	It is easy to get materials from Moodle	3.57	0.51
15	The process of using Moodle is clear and understandable	3.38	0.59
16	Overall, I believe that Moodle is easy to use	3.38	0.50
17	Learning using Moodle is fun	3.57	0.51
18	Using Moodle is a good idea	3.57	0.60
19	Using Moodle is an attractive way to learn	3.57	0.51
20	Overall, I like using Moodle	3.71	0.46

As shown in Table 2, the highest mean was item 6 "Overall, web-based system benefit my learning", while the lowest item was item 10 "I can solve any problems that arise in web-based system". The second-highest mean was item 20, "On the whole, I likes using web-based system". The finding revealed that students have positive perception towards the use of MOODLE in the classroom. In addition to that, it is observed from the table that 19 items scored above or equal to 3.0 which mean that the students' perceptions are positive. For the component of perceived usefulness, the data indicated that MOODLE makes their learning more effective and efficient. They also believe that MOODLE makes them easier to learn at the university. For the component of computer self-efficacy, the data indicated that they can access and navigate freely the contents of MOODLE. For the component of perceived ease of use, the data indicated that MOODLE is easy to use and to get material. In addition, under the component of attitude the students also indicated that using MOODLE is a good idea and an attractive way to learn.

## DISCUSSION AND IMPLICATION OF THE STUDY

On the whole, students have a positive view towards MOODLE. This is in line with the study by Hanafi et al. (2004) and Paris (2004) which states that students have a positive attitude towards online learning. Further, in a study by Zoran & Rozman (2010), their respondents commented that Moodle was helpful, useful, time-saving, and above all that it had a positive influence on their learning. Drennean, Kennedy and Pisarski (2005) reported that a high positive perceptions, is related to high satisfaction towards online learning. Melton (2006) highlighted the usability of MOODLE which may contribute to the positive perceptions. Students who have a positive attitude towards e-learning will easily accepted e-learning (Research Institute of Bangkok University, 2002).

MOODLE if its use appropriately and systematically benefits lecturer and students accordingly. Students' experiences in using MOODLE will initiate them to fully utilize its potential in their teaching career. It has shown that teaching using web-based system can be used as one method of delivery for Master of Education course. Integrated features within MOODLE facilitate students in the classroom to upload their assignment other than participating in forum actively. Apart from that, MOODLE enable teacher to interact with students with more effective. However, effort to make implementation a success require instructors be trained, have good network facility and access to technology, technical and administrative support. Faculty members should frequently attend 'hands-on' workshop on implementing e-learning in their classroom.

## CONCLUSION

This study gives preliminary data about students' perception towards MOODLE. On the whole, perception of graduate students towards MOODLE is positive. As a result of this study we can conclude that MOODLE can be used as a tool for the teaching of graduate courses in mathematics education.

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