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Research Paper

Students' Perceptions of Knowledge Gained from Problem-Based Learning Online in a Malaysian Public University

Education

KEYWORDS : Problem-based learning; online learning; knowledge gained.

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ABSTRACT

This paper reports the results of a study concerning of Malaysian public university undergraduate science physics students' and pre-service science teachers' perceptions of learning through online. The main focus is to seek students' feedback after exposed with a student-centered learning (i.e., problem-based learning online) approach, particularly their feedback and perception on knowledge gained from online learning. Hundred and two (102) students were involved in this study which consists of 61 students from the School of Science and Technology (SST, science student) and 41 students from the School of Education and Social Development (SESD, pre-service science teachers). Both programmes were offered in a Malaysian public university which is University Malaysia Sabah. The students followed all online learning activities for sixteen weeks. The online learning environment (i.e., learning management system, LMS) was used as the main medium to delivered learning process throughout the second semester of 2008/2009 academic year. Analysis of the open-ended questionnaire and interview data indicated that majority of students felt they i. Gained a large amount of knowledge; ii Learning activities helped enhance understanding in Modern Physics; and iii. Improved computer skills.

Introduction

Online learning (i.e., hybrid online, blended online) is the results of growing demanding of knowledge opportunities around the world, where business and technology oriented program, undergraduates level in United States and graduate level in UK are frequently offered this learning formats (Kelley, 2011). The growthof online learning these recent years also increasingly popular in higher education due to the rapid growth of Internet technologies (Oya*et al*., 2012). Online learning in Malaysia was first implemented in Tun Abdul Razak University and followed by other institutes such as Multimedia University, University of Technology MARA, University of Putra Malaysia, Open University Malaysia, Wawasan Open University and the Asia e-University (Tamil *et al*., 2013).

Online learning is comparatively new in University Malaysia Sabah (UMS).Though in early 2000, UMS has been introduced with an electronic teaching aid such as Blackboard and several computer aided instruction as one of the teaching and learning tool, both from School of Engineering and Information Technology (SEIT) and School of Education and Social Study (SESD), until now the usage of these teaching aid seems not been utilised at all or at least part of it. In School of Science and Technology (SST), a very small number of lecturers prefer to use online learning as the teaching and learning medium. They were really comfortable with the existing medium (i.e., face-to-face lecture based) to deliver course syllabus and content objective throughout semester. Ironically Malaysian government through the nine challenges in Vision 2020 that must be achieved in order to be a well-developed, advanced and higher income country in 2020 had stated through the 6th challenge that Malaysian citizens must try to adapt with these cutting edge technology and must also contribute to the science and technologies civilizations. Additionally Malaysian Prime Minister also stated the Information Communication Technology (ICT) and education service are two main keys of the National Key Economic Area (NKEA), thus must be utilised very well in our daily life scenario to ensure the higher income economically and productivity country objectives can be achieved (Razak, 2010). Therefore, as a rapid developing country, Malaysia really need to explore the potentials of these NKEA especially in higher leaning institution in order to reply the Prime Minister's call.

Department of Information Technology & Communication (DITC) Media & Educational Technology Unit (formerly known as Multimedia and Educational Technology Unit, METU) was then established in UMS to ensure the nation's vision and mission in higher education particularly in UMS can be achieved. The main objective for DITC is to cater the service and facilities in Information Communication and Technology (ICT) such as computer and software component to the university including the teaching and learning aspects, besides it is also deliver digital information across all academic disciplines for research, administration and management of the university activities (Media & Educational Technology Unit, 2012).

It is critical for researchers to considerate many factors before implementing online learning fully. As stated by Kišićek, Lauc and Garić(2012) understanding students' preferences can guide to a better learning instruction through online. Additionally the use of ICT in modern teaching aid (e.g., internet technologies; web portals; and multimedia software) contribute positive output to parts of teaching and learning process such as, cooperation amongst students and the learning becomes more interactive (Mandic, Dzinovic, & Samardzic, 2012). It also might be one of the powerful tools to lesser lectures' teaching workload. Thus, it is really a need for the researcher to look into the online learning aspect.

And as for this paper, students' perception on what they have learned and how far they can grab knowledge from this approach was addressed. As stated Sarah *et al.* (2011) students get better view and description about their learning contents through problem-based learning approach, while Karl et al. (2006) says online learning might help them to get clearer view on their syllabus. This is quiet opposite with students' response report in Laura et al. (2002) study as students claimed the most challenging in online course was not the content of the course itself but the need for their discipline for managing the work equipment and etc.

The main objective was to get a clear view from students' perspective, the different between PBL online approach as compare to current practice (i.e., face-to-face pedagogy). Thus the researcher took steps inblending online learning and also problem-based learning constructivist approach in a physics course. Students' perceptions after experiencing the online learning were gathered from an open-ended questionnaire and focus group interview.

Methodology

The study was conducted throughout Semester II during the 2008/2009 academic year at University Malaysia Sabah (UMS), Malaysia. One hundred and two (102) students were involves,

which consist of sixty-one science physics students from Physics With Electronic Programme at the School of Science and Technology (SST), and another forty-one pre-service science teacher from Science Education Programme at the School of Education and Social Development (SESD). The samples undergone all learning activities in an online learning environment (i.e., learning management system, LMS) which acts as the main medium to support full learning process throughout the semester.

The teaching and learning via online was conducted within 16 weeks. During the intervention, all assessment was delivered using the LMS organised byDepartment of Information Technology & Communication (DITC) Media & Educational Technology Unit (formerly known as Multimedia and Educational Technology Unit, METU) at the university. Researcher prepared the LMS where including relevance content of a physics course (i.e., Modern Physics)to fulfilled learning and teaching activities via online.All learning activities were done online, and each studentneed to check-in every week for the whole sixteen weeks of period as to replace face-to-face lecture classes. During the online learning process, besides discussing with facilitator regarding to their subject matter, they were able to do any learning activities such as searching extra information, knowledge and source independently by using their own personal computer. Moreover, UMS library also provides computers for students.Other sources that they might find useful in adding their knowledge are from the Internet, interviewing lectures or tutors, text books, observation or any other methods in sequence to find adequate information.

One compulsoryteaching and learningactivity that students need to do is a weekly meeting in chat room with facilitator. During this chat room discussion they argued, shared thoughts and constructed their own thinking regarding to the particular problem or subject matter that become the main topic for the week. They also were welcometo post questions and inquiries at "forum post" asynchronously that can be found in the LMS. Additionally few linkages, sources and lecture's note also uploaded by the facilitator to ensure students did not lose their ways in sequence to find the suitable solution. This also will aid the studentsin searching their relevant resource. They had been given two weeks for each problem to solve before passing up, and there were five problems/subject matters need to be solved throughout the semester (16 weeks). The LMS system was using Moodle2007 course management systems.

The intention of this paper was to survey what is the Malaysian undergraduate Science Physics Students' (SST) and Pre-Service Science Teachers' (SESD) perceptions of knowledge they gain from problem-based online learning. Data was gathered using an established open-ended questionnaire and from focus-group interview.

Findings

This paper presents finding from students' perception regarding to what they had learned from online learning. The main question that askedwas straight forward:what they gain from problem-based online learning, particularly in term of knowledge? Analysis of the open-ended questionnaire and interview data indicated that majority of students felt they i. *Gained a large amount of knowledge*; ii *Learning activities helped enhance understanding in Modern Physics*; and iii. *Improved computer skills*, for both SST and SESD group.

i. *Gained a large amount of knowledge*

A participant responded that her knowledge acquisition was better than the typical class, and that she managed to apply the learning contents to everyday life situations that happen: From learning via online learning, I had gained more knowledge compared to tutorial class. For example, I know more clearly on how to apply physics concept in the real situation rather than just read from the text book. (R4, SESD, F, PBL, questionnaire)

A participant commented that she can expand her medium resources rather than books and hardcopy material:

Increase my knowledge in learning new things in multiple sources, not only limiting myself to refer in books but also websites, journals, articles and so on. (R7, SESD, F, PBL, questionnaire)

One female participant also managed to relate information and resources:

Nearly to its fullest. I combined facts and resources that I get from the net and form a good understanding. (R15, SST, F, PBL, questionnaire)

ii. *Learning activities helped enhance understanding in Modern Physics*

The students said online learning helped them to understand their learning content more deeply. With help from the Internet, it made searching for information easier, they discovered plenty of information outside of lecture times, and they exchanged ideas and valuable sources through group members, as remarked by a participant:

I have gained lots of new experience through this online learning programme. Besides that, I can know the concept and theory of modern physics more deeply and clearly. This is because the PBL question which given to us is related to our daily life situation. Via Internet searching, I find that many extra information which do not given during lecture time. Moreover, it also give us a chance to survey and find out the most ideal solution for the task given since our aim is to solve the task given. Through the internet discussion, I can exchange my idea with my group members. All of us would like to share all the information which we found, and make us know more deeply about the concept. (R13, SST, F, PBL, questionnaire)

Thus, to gain knowledge, a female participant remarked that from online learning, they (within group members) shared everything through the discussion room, and found latest information easily:

I can gain knowledge by sharing the information with group members by online, find the information from the Internet; discuss the problem with group members, and by chat through the Internet. (R6, SESD, F, PBL, questionnaire)

Another female participant also noted that there is a wide variety of information that can be found through the Internet. Thus it is much easier for them to pick and to choose suitable information in order to solve their problems:

I also can find the knowledge by exchanging facts with other members. Furthermore when we trying to find the solution in the Internet, I open the browser, and gained much new information to me. (R9, SESD, F, PBL, questionnaire).

iii. *Improved computer skills*

This approach also was capable of improving students' computer competency. For example, a female participant said she learned how to send her assessment electronically. This made hunting for facts and knowledge online easier, as stated:

Now I know how to submit or send any assignment by e-mail. Know more how to find an information using Internet, by learning via online learning. I realize that there is Wikipedia to find any information easier. I also realize there are many things that

relate to physics that I didn't know before. (Thanks to PBL). For the first problem, we feel it so hard to solve, we were afraid if the solution that we give are wrong, but when the facilitator said that our solution is not about wrong or right, it is all about our opinion and also our thinking skill to solve it, we feel very excited to wait the next problem…Thanks to our facilitator. (R2, SST, F, PBL, questionnaire)

Again, this approach trained students to be more proficient using computers particularly when learning through, it as noted by a participant:

I can find the address bar in a browser, enter an address, and go to a site; Download text, graphics, and -ins from an Internet site; Bookmark Internet sites for later reference; Navigate through Internet sites; Use the refresh button; Download and save text, graphics, audio, and video files; Display downloaded files in appropriate applications. All of this can improve my Internet skills. (R32, SESD, F, Traditional, questionnaire)

From another point of view, SST students generally i. Gained little knowledge/ did not gain anything from this approach and SESD students said that it is i. Hard to explain some knowledge via online.

SST

i. *Gained little knowledge/ did not gained anything*

A traditional female participant was not satisfied with her knowledge acquisition, and she had to work hard for it:

I have gained a little knowledge in online learning and I have to work on my own way to understand this course. (R31, SST, F, Traditional, questionnaire)

Another participant prefers to study in the traditional way since she felt that learning via traditional approach gives her better knowledge:

The knowledge gained from online learning is not as good as the knowledge you learn when you attend lectures. (R40, SST, F, Traditional, questionnaire)

SESD

i. *Hard to explain some knowledge via online*

There were sometimes participants from SESD who faced difficulty explaining and elaborating physics terms and concepts in the chat room, as noted by one member:

Although students can post their questions on net and the lecturer will answer it, but some of the explanation just can't be done by using text, maybe need diagram to explain it, and this is hard to do via online learning. (R19, SESD, F, Traditional, questionnaire)

Discussion and Conclusion

Universiti Malaysia Sabah celebrating its 20th years of formation in 2014. Align with that there were also an urge and need to improve in every aspects of teaching and learning due to the rapid development of Information, Communication & Technology (ICT). UMS definitely will not compromise of any delay on this. Thus, educators and researchers need to really tackle this crucial issue wisely in order to strengthen teaching and learning process that aligns with the rapid development of ICT. However, the enthusiast of changing traditional way of teaching and learning to modern way should not be taken for granted. Researcher must consider and look into several issues before proposing any teaching and learning activities, specifically for science students.

From the findings student felt they gained a large amount of knowledge while solving the problem as in their own learning process. It is believed that the source they gained from Internet and online were so huge and many, thus they can have a range of sources that can be chose as their main information. This is in line with Khitam*et al.* (2010) as they found that e-learning helps learners understand the content better and also provide wide range of text, image with video and sound. Similar findings reported by Khaki *et al.* (2007) as students declared that they gain more knowledge compared to traditional learning approach.

ii Learning activities helped enhance understanding in Modern Physics. This response was in line with study done by Nor *et al.* (2012) as most students response they are realize the learning activities such as interaction with industrial visit regarding their task help them to enhanced their understanding on what they gain in class and prepared them for work world.

iii. Improved computer skills, for both SST and SESD group. This is similar with those concluded in Abdallah *et al.* (2010) study as students found to felts that e-learning helped them learn more effectively and contributed to the increasing of their technical skills.

SESD

i. Hard to explain some knowledge via online which quiet similar as describe by Lim *et al.* (2012) as students with weaker English skill find it challenging for them to firstly understand and explain resources to their classmates.

As a conclusion, online learning has become a common expression in higher institution of university education these days, Malaysia also is not exempted. If apply appropriately especially when it meet the requirements of students' needs, it might contributes to positive efficiency of the educational process, decreasing the amount of face-to-face instruction and strengthening the dimension of self-study and project activities. Thus it leads to the process of developing students' key competences. Therefore this paper gives someindicator and key points on how student sees the online learning, and what factors that should be considered if one would like to proceed with online learning particularly in physics course. However further research need to be done particularly in a concrete online structure thus can really contribute to students' satisfaction and may create a better environment of learning.

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