The impacts of PBL on Student's Performances

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Abstract

The purpose of this paper is to evaluate the impacts of PBL on students' performances. 56 respondents were enrolled in the Human Computer Interaction course that are in the second year of study from Universiti Teknikal Malaysia Melaka. Three phases involved in this research methodology which is 1) Analysis, 2) Designing and Development and 3) Testing and Evaluation. There are three research instruments gathered to evaluate the project which are questionnaire, interview and prototype development. A t-test was conducted to analyze student's performances. Findings of this study revealed that the use of PBL approach could increase student's understanding towards the topic that has been taught.

Keywords: Assessment; human computer interaction; methodology; PBL; students' performances; t-test

1. INTRODUCTION

Even since ICT becomes popularly used in teaching and learning, there is enormous to integrate PBL within online environment (Watson G., 2002; Savin-Baden, 2007). Problem will drive the learning where students are not only required to seek a correct answer for the problem, but they have to interpret the problem, gather needed information, identify possible solutions, evaluate options, and present conclusions that are related to the problem (Zaidatun Tasir et al.,2005). Problem Based Learning (PBL) is a pedagogical strategy for posing significant, contextualized, real world situations, and providing resources, guidance, and instruction to learners as they develop content knowledge and problem-solving skills (Mayo et al, 2000). PBL also encourages collaborative and cooperative learning among students and their peers; students play the key role in encouraging learning in this collaborative setting (Neo, 2003). Below is the comparison between traditional learning and PBL.

Table 1: Comparison between Traditional Learning and Problem-Based Learning

Traditional Learning	**Problem-Based Learning**
Teacher centered	Student centered
Linear and rational	Coherent and relevant
Teacher as transmitter	Instructor as facilitator or collaborator
Students as passive receivers	Students as constructors. Active participants
Structured environment	Flexible environment
Individual and competitive learning	Co-operative learning
Assessment is the responsibility of the teacher	Assessment is the shared responsibility of the students, the group and the teacher

2. METHOD

2.1 Subject

There are 56 undergraduate respondents from Interactive Media course. The course will be held at second semester of study at Universiti Teknikal Malaysia Melaka (UTeM). The preliminary data were gathered to justify the difficult topic in HCI subject.

Table 2: Preliminary Analysis

Topic	Mean	N	Std. Deviation
Introduction	2.06	56	.818
Cognitive Psychology	2.72	56	.834
User Interface Design	3.82	56	1.119
Interaction Design	2.94	56	.767
Usability and Usability Engineering	3.08	56	.829
Evaluation	3.00	56	.782
User Centered Design	3.10	56	.789
Task Analysis	2.90	56	.763
Prototyping	3.18	56	.941
Design User Support	3.08	56	.829
Accessibility Issues	3.10	56	.839
Design Issues	3.12	56	.872

Table 2 shows the preliminary data for choosing the HCI difficult topic. Based on findings, the highest mean is 3.82 and standard deviation is 1.119. It is found that the most difficult topic in HCI subject is User Interface Design compared to other listed topics. The HCI subject is chosen because it is a compulsory subject for computer science students in Media Interactive course. Specifically HCI is concerned developing new interfaces and interaction techniques.

2.2 Context

The research is carried out at UTeM that organizes its curriculum according to principles of PBL. The HCI subject will cover Chapter 3 on User Interface Design. Students will be presented with a problem. The problem is initially discussed. The information gathered is shared and elaborated upon. Tutor acts as a facilitator to facilitate and scaffold student learning process.

2.3 Instrument

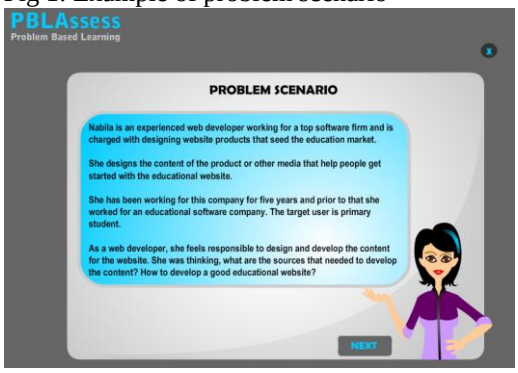
There are three instruments that have been developed for this research:

a) Questionnaire – Questions are distributed to students to grade the difficulties of each topic. Students were asked to respond to these items on a five-point Likert scale .

b) Interview- HCI lecturers are interviewed and selected students regarding HCI topics.

c) Prototype – The prototype is developed namely PBLAssess. Figure 1 shows an example of problem scenarios crafted for teaching User Interface Design subject offered at Faculty of ICT in the Universiti Teknikal Malaysia Melaka (Che Ku Nuraini & Faaizah, 2009).

Fig 1: Example of problem scenario



3. FINDINGS AND ANALYSIS

3.1 Pre and Post Test Result

Table 3 shows the result of t-test and p-value for self and peer assessment using PBLAssess. The test employs paired sample t-test. Based on the performance of the students in t-test using self assessment and peer assessment assessment preferences in PBLAssess, the t-value is 9.427 and the significance of two tailed value, p is 0.000. In the next series, peer assessment preferences in PBLAssess, the t-value is -11.955 and the significance of two tailed values, p is 0.000. The result shows, p< 0.05, thus there is a significant difference between using of self assessment and peer assessment in PBL. Hence, the null hypothesis $H_0 1$ is rejected.

Table 3: Pre and Post Test Result

	Testing			
	Pre Test	**Post Test** (Self Assessment)	**Pre Test**	**Post Test** (Peer Assessment)
Mean	32.29	57.86	38.75	63.39
SD	10.732	11.680	10.395	14.499
t-test	9.427		-11.955	
p-value	0.000		0.000	

Based on the result, peer assessment performs highest mean compare to self assessment in PBL. Hence, the result indicates that peer assessment perform better that self assessment among students at UTeM. The Human Computer Interaction (HCI) subject focuses on the User Interface Design topic as a case study in this research. Peer assessment also can be used to enhance the quality of students' personal improvement and their contribution on group work (Roberts T.S., 2006).

3.2 Relationship between PBL assessment between student's performance and preference

Table 4: Mean and Standard Deviation

Student's Preferences (Questionnaire)	**Assessment Preferences**	**Student's Performances**	
		Mean	**SD**
Peer Assessment n = 35	Self Assessment	59.09	14.110
	Peer Assessment	67.14	15.538
Self Assessment n = 21	Self Assessment	56.50	8.835
	Peer Assessment	57.50	10.875

SD: Standard Deviation

According to the result in Table 4, researcher found that for the group which prefers peer assessment in PBL, the average of prefered peer assessment in PBLAssess is 67.14 (SD = 15.538) which is higher than the average of using self assessment in PBLAssess, 59.09 (SD = 14.110). The t-value for group that prefers peer assessment is 2.580 and p-value is 0.023. Since the p-value is smaller than 0.05 ($p<0.05$), there is a significant difference between the result of using peer assessment and self assessment. Thus, there is a positive relationship between peer assessment student preferences and their performances.

Besides that, students with self assessment, who have been using peer assessment in PBLAssess perform the highest average with 57.50 (SD = 10.875) compared to group using self assessment which the average is 56.50 (SD = 8.835). The results also reveal that students who have been practically using self assessment approach found that they are more inclined towards peer assessment form. This finding is strongly supported by the statistical result which shows the highest average score of 57.50 as compared to group using self assessment with average score of 56.50. The t-value for the group that prefers self assessment is -0.632 and p-value is 0.000. The p-value is smaller than 0.05 ($p>0.05$), there is a significant difference between the result of using self and peer assessment. Thus, there is a negative relationship between linear student's preferences and their performances.

4. IMPLICATION

Hence, assessment in PBL should focus not only on the process itself, but also on the outcomes. This is in line with Uden & Beaumont (2006), in PBL the important one to be assessed is process skill that includes the learning outcomes. In other opinions Neo (2003), states that PBL assessment content, technical expertise and skills such as problem solving skills, self

directed learning skills and teamwork skills should be assessed.

In the testing that conducted among students, it proves that using the peer assessment give the students the experience of having to clearly explain their thoughts and to refine those that were not clear to their fellow students. Self and peer assessment promote the values of the learning process. The self assessment allows the learners to compare the standards achieved by the other learners against their own work (Race P. et al., 2005). It usually allows them to assess aspects of their work such as the range of vocabulary, originality and structure. It is also recognized that peer assisted learning which can have a motivating effect on the teams and mentoring between teams should be encouraged and rewarded (Frank, M., & Barzilai, A., 2004).

5. CONCLUSION

At the end of the PBL session, it was observed that majority of students enjoy using the PBL approach in the course. With the development of prototype, it enhances learning especially assessment part because it gives new opportunities for sharing information, resources and expertise. It is important to build trust among students and between facilitators and the learners so they are able to create a relaxed atmosphere especially in PBL environment. The process of PBL lends itself well to the definition of learning as understanding because assessment is regarded as an integral element in the facilitation of learning (O'Grady G., 2004). There are also many areas in PBL and assessment that are still open issues. Other educators should also consider using PBL in the classes and the assessment techniques used can easily be applied to study its impact on enhancing student learning in their course.

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