

The Implementation of Problem Based Learning (PBL) by using FILA Form in Measuring Student's Life Long Learning

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Abstract

Recent education system has posed a big challenge to all educators in fostering intellectual development which primarily focuses on the resources available to students and lecturers using a more student centered learning approach. In an attempt to improve teaching and learning of a program, Faculty of Civil Engineering, Universiti Teknologi MARA has moved to a new paradigm with utmost enthusiasm and commitment. The implementation of Outcome-Based Education (OBE) system was proposed by the Malaysian Quality Assurance Department, Ministry of Higher Education to all Malaysian Universities since 2005. The Board of Engineers Malaysia, has shifted teaching and learning methodologies in the faculty to a more motivated and reformed education system in empirically assessing student's outcome. Since the end of 2007, the implementation OBE towards learning system in the faculty has created new dimensions in monitoring the students' development through the Program Outcome achievement. One of the difficulties found in its implementation is the measurement of the Program Outcome related to student's lifelong learning (affective domain). One of the courses of Diploma in Civil Engineering program, Structural Steelwork & Timber Design (ECS 328) for part 06 student has taken up this challenge to measure student's lifelong learning. Therefore, through a Mini project assessment students are given a PBL task with the implementation of FILA form to capture their lifelong learning skills.

Keywords: Problem Based Learning, lifelong learning, FILA form, Outcome Based Education.

1. Introduction

Today, engineering profession often deals with uncertainty and conflicting demands from clients, governments, environmental groups and the public. Technical competencies are very much needed by the newly graduated engineers, as well as skills in human relations so that they will be well accepted among the professionals. In addition, they must encounter the ambiguity of the real world that continuously changing, commercialization interest and legal issues which might be raised as consequences of every action taken.

With expansion of internet age, the engineering students require lifelong learning to be able to surmount their problems and direct their learning in accordance with the new problems faced in their daily life. They must also comprehend the nature of the workplace problem solving to be better prepared. Hence, a problem-based learning (PBL) approach is the capstone to capture all the needs of graduates for the workplace. PBL encircle around learning at philosophical model and practical level. The systematic philosophy makes PBL a suitable choice for a life- long learning process, because it provides a platform for learning through problem solving [8].

Problem-based learning emphasizes learning by doing, which provides a motivating context for learning. Students are given a real-world problem similar to those they would face as professionals. They grant ownership of the problem, and undertake the problem solving process. Meanwhile, instructors will take the role as their cognitive coach. A pedagogical goal of PBL is to help students develop their own problem-solving skills, rather than telling them how to solve the problem [1].

This approach creates a fundamental shift from a focus on teaching to a focus on learning and from convergent to divergent way of thinking. Students are given opportunity to enjoy the process of learning genuinely. The challenging part is to make changes that intrigue the students in making them motivated to learn with a need to understand and solve real managerial problems. At the same time, they will be independently, rationally and continuously learning to solve the problems.

2. Literature Review

Over 30 years, PBL approach has been used in multidiscipline. [6] defined PBL as an instructional and curricular learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem. He also suggested that current and future generations of students are vitally important to experience a problem-based learning approach and engage in constructive solution-seeking activities.

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PBL mainly highlights its concepts to the students by means of challenges in the form of problems relevant to their future practice [3]. Instead of using a rigid lesson plan that directs a learner down a specific path of learning outcomes or objectives, project-based learning allows in-depth investigation of a topic worth learning more about. In addition, learners typically have more autonomy over what they learn, able to maintain interest and are motivated to take more responsibility for their learning [9].

In engineering programs, PBL approach has been reported by several authors, although the practice is still far from widespread. Georgia Institute of Technology has introduced ‘Sustainable Urban Development’ course, in which the students developed projects to make their campus and community more sustainable. In the process, students learn how to analyze sustainability, work with decision makers, and put classroom knowledge into practice. Further, through this course’s emphasis was on problem-based learning within the curricula of civil and environmental engineering. This relates to a more general educational concern that the classroom often focuses on what information should students be told, rather than on how students can effectively learn and apply information [1].

While at McMaster University, the chemical engineers took the initiative to implement PBL in their program in the early 1980’s. The program incorporates several student-centered teaching strategies and curriculum developments were integrated across its program, of which problem based learning is one of its components [2]. The same goes to Monash University, where the implementation of PBL into civil engineering program has allowed the groups of students to be able to identify their learning needs and find their learning resources [11].

3. Methodology

In this study, a course from Diploma in Civil Engineering program at the Faculty of Civil Engineering, Structural Steelwork and Timber Design (ECS328) was selected. Out of 7 Program Outcomes from this program, only 2 Program Outcomes measured through this course which are PO3: Ability to identify, formulate and solve engineering problems (Cognitive-C4) and PO7: Having the lifelong learning skills to search for information independently (Affective-A3). Through Mini Project assessment that is embedded in this course, Problem Based Education (PBL) assessment was designed and assigned to student with the implementation of FILA form. FILA form is form where **F** for **F**act, **I** for **I**dea, **L** for **L**earning Issues and **A** for **A**ction. This Mini Project is a one semester continuous task where students will complete it during their tutorial session every week and will be supervised closely by the lecturers. A complete design report with completed FILA form from every task is expected to be compiled at the end of the semester. Marks that students get from their filled FILA form will contribute directly to PO7 marks which will reflect their lifelong learning achievement.

A survey has been conducted to get students’ feedback on the implementation of PBL in this course especially the significant use of FILA form and the lifelong learning skills measured through it.

4. Results and Discussion

There were 63 out of 84 students who took part in this survey and they were given only 4 questions that they have to rate either 1 (Not Agree), 2 (Partially Agree) and 3 (Agree). The survey also has given the students an opportunity to comment on the implementation of PBL in the course. From all comments received, it can be concluded that some students are unable to see the benefits of PBL and these students also perceived the implementation of FILA form as troublesome. The faculty has taken all these comments in and considers them for the continuous quality improvement of the course especially in designing more effective PBL task for students. Results obtained from the survey are as in the Figure 1, 2, 3 and 4 below.

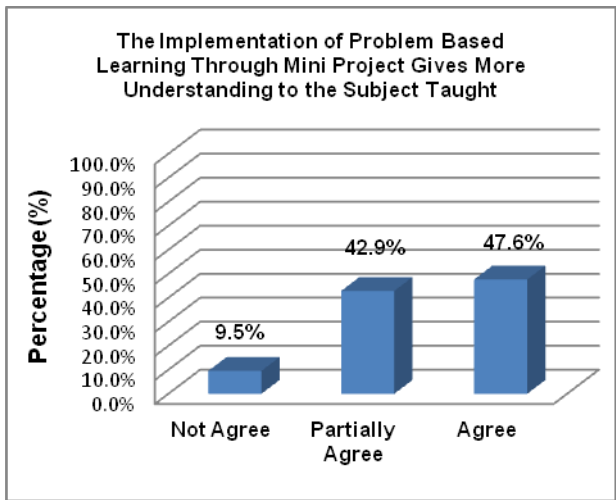


Figure 1. The implementation of problem based learning through mini project gives more understanding to the subject taught.

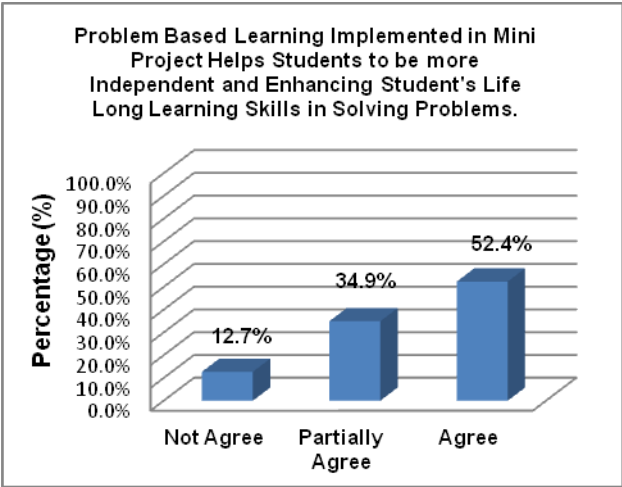


Figure 2. Problem based learning implemented in mini project helps students to be more independent and enhancing student's life long learning skills in solving problems.

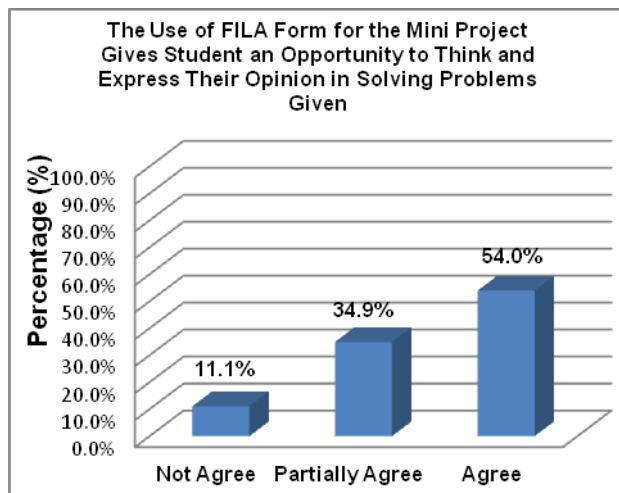


Figure 3. The use of FILA form for the mini project gives student an opportunity to think and express their opinion in solving problems given.

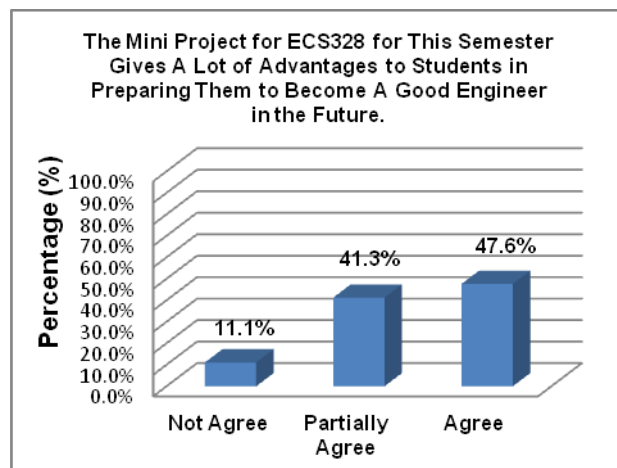


Figure 4. The mini project for ECS328 for this semester gives a lot of advantages to students in preparing them to become a good engineer in the future.

From the feedbacks obtained in Figure 1, there were about 47.6% students who agree that the implementation of problem based learning through mini project gives more understanding on the subject taught. Even though the number of students who partially agree was about 42.9%, the students are actually convinced that the method should be continued with some improvement. After all only a small percentage of 9.5% disagree on the implementation of PBL in the course.

Figure 2 shows a convincing feedback whereby 52.4% students agree that problem based learning implemented in mini project helps students to be more independent and enhancing student's lifelong learning skills in solving problems. This good feedback provides some evidences that student lifelong skills can be enhanced through PBL approach. Significantly, the feedback from students as referred to in Figure 3 where about 54% of the students agree on the given opportunity to think and express their opinion in solving problems through the use of FILA form for their mini project. This agreement has also convinced the faculty to continue its implement in the course.

5. Conclusion

1. PBL method with FILA form approach is proven to be a direct measurement which is practical to be conducted to measure student's lifelong learning.
2. The PO7 (lifelong learning) results can be used to continuously improve the assessment approach in assessing student's lifelong learning.
3. One of the weaknesses that can be discovered from this study is the lifelong learning assessment is measured collectively as group performance. To make the assessment's values more empirically genuine, individual measurement of student's lifelong learning should be conducted.
4. Students' feedback from the survey can be concluded as the following:
 - a. Some students' partial preference on the use of the proposed method reflects their unwillingness to work on problem solving independently.
 - b. Students find it a hassle to complete the FILA form because they are not used to the approach.
 - c. The clarity in lecturer's instruction and the rubric of PBL's assessment need to be improved.

References

- A. Steinemann, "Implementing sustainable development through problem-based learning: pedagogy and practice," *Journal of Professional Issues in Engineering Education Practice*, 2003, 129, pp. 216-224.
- D. R. Woods, A. N. Hrymak, R. R. Marshall, P. E. Wood, C. M. Crowe, T. W. Hoffman, J. D. Wright, P. A. Taylor, K. A. Woodhouse and C. G. K. Bouchard, "Developing problem solving skills: The McMaster problem solving program," *Journal of Engineering Education*, 1997, 86, 2, pp. 75-91.
- D. R. Woods, R. M. Felder, A. Rugarcia and J. E. Stice, "The future of engineering education III. Developing critical skills," *Chemical Engineering Education*, 2000, 34, 2, pp. 108-117.
- J. E. Mills and D. F. Treagust, "Engineering education – is problem based or project based learning the answer?" *Australasian Journal of Engineering Education*, online publication, 2003, 2003-04, http://www.aeee.com.au/journal/2003/mills_treagust03.pdf.
- J. M. Brault, P. M. n M. Milan, M. Pico n-Nunez, M. El-Halwagi, J. Heitmann, J. Thibault, and P. Stuart, "Web based teaching of open-ended multidisciplinary engineering design problems," *Education for Chemical Engineer*, 2007, pp. 1-13.
- J. R. Savery, "Overview of problem based learning: definitions and distinctions," *Interdisciplinary Journal of Problem-based Learning*, 2006, 1: Iss. 1, Article 3.
- L. R. de C. Ribeiro and M. da G. N. Mizukami, "Student assessment of a problem-based learning experiment in civil engineering education," *Journal of Professional Issues in Engineering Education And Practice*, 2005, 131, pp. 13-18.
- M. H. Bidokht and A. Assareh, A. "Life-long learners through problem-based and self directed learning," *Procedia Computer Science*, 2010, pp. 1446-1453.
- M. M. Grant, "Getting a grip on project-based learning: Theory, cases and recommendations," *Meridian: A Middle School Computer Technologies Journal*, 2002, Issue 1.
- O. Ates and A. Eryilmaz, "Factors affecting performance of tutors during problem-based learning implementations," *Procedia Social and Behavioral Sciences*, 2010, pp. 2325-2329.
- R. Hadgraft, "Student reactions to a problem-based fourth year computing elective in civil engineering," *European Journal of Engineering Education*, 22, 1997, pp. 115-123.
- S. A. Yost and D. R. Lane, "Implementing a Problem-Based Multi-Disciplinary Civil Engineering Design Capstone: Evolution, Assessment and Lessons Learned with Industry Partners," *ASEE Southeast Section Conference*, 2007.
- Y. Wang, Y. Yu, H. Wiedmann, N. Xie, C. Xie, W. Jiang and Xiao Feng, "Project based learning in mechatronics education in close collaboration with industrial: methodologies, examples and experiences," *Mechatronics*, 2012, 22, pp. 862-869.