

## IMPLEMENTATION OF PROJECT-BASED LEARNING (PjBL) AT A MALAYSIAN POLYTECHNIC - A PRELIMINARY STUDY

**Mohd Noramdzan Mohd Yusof <sup>1\*</sup>, Aede Hatib Musta'amal<sup>2</sup>, Audu, R.<sup>3</sup>  
and Nor Salwa Ismail<sup>4</sup>**

<sup>1</sup>Mr., Universiti Teknologi Malaysia, MALAYSIA, [mnoramdzan2@live.utm.my](mailto:mnoramdzan2@live.utm.my)

<sup>2</sup>Dr., Universiti Teknologi Malaysia, MALAYSIA, [aede@utm.my](mailto:aede@utm.my)

<sup>3</sup>Dr., Federal University of Technology Minna, Nigeria, [rufai.audu@futminna.edu.ng](mailto:rufai.audu@futminna.edu.ng)

<sup>4</sup>Mrs., Universiti Teknologi Malaysia, MALAYSIA, [salwa\\_ramdzan04@yahoo.com](mailto:salwa_ramdzan04@yahoo.com)

\*Corresponding author

### ABSTRACT

The preliminary study was conducted to identify the extent to which the six principles of PjBL implemented in the Final Year Mechanical Diploma Programmed in the polytechnics. The six principles of the PjBL were (1) Authenticity; (2) Academic Rigor; (3) Applied Learning; (4) Active Exploration; (5) Adult Relationship; (6) Assessment. Qualitative methods were used as an assessment instrument (interview). The respondents are two Polytechnic lecturers who teach final year mechanical engineering project subject from two different Polytechnic. Data from the interviews was analyzed using the Atlas-Ti version 7.0 software and the study found that only five from the six principles of PjBL fully implemented in the final semester project in the polytechnics. The principle of PjBL partially implemented was "Applied Learning".

**Keywords:** Project-Based Learning, Malaysian Polytechnic, Atlas-Ti, Qualitative

### 1. INTRODUCTION

In these modern days, it becomes clear from the study that major changes are needed in the overall educational culture towards more creative learning and innovative teaching (Ferrari et al. 2010). Departments of Polytechnic in Malaysia have developed an initiative to make the polytechnic as an alternative route for the success of the New Economic Model in line with the National Higher Education Strategic Plan (The Strategic Plan for Polytechnic University, 2007). One of these strategies is the improvement in teaching and learning, namely through the migration project from traditional education to 'Outcome Based Education (OBE).

Project-based learning (PjBL) is a complete pedagogical approach which engages students in an organized and cooperative manner to investigate and resolve certain problem. (Musa, Mufti, Clarkson, and Amin, 2011). According to Martens & Umborg (2012), PjBL is a student-centered learning method in which new knowledge can be built as the result of a thinking process and a way to acquire knowledge and skills. This learning method is more effective than the teacher-centered learning and textbooks. PjBL can provide students with the opportunity to engage in projects that are realistic and can improve thinking ability in learning (Blumenfeld et al., 1991; Marx, Blumenfeld, Krajcik & Soloway, 1997; Thomas, 2000).

### 2. LITERATURE REVIEW

Patton (2012) and Railsback (2002) unanimously stated the (6) principles of PjBL (the six a's of Project Based Learning) proposed by Steinberg (1998) is the most important principle in carrying out the project-based learning methods. The six principles are (1) authenticity; (2) academic rigor; (3) applied learning; (4) active exploration; (5) adult Relationship; (6) assessment. Characteristics based on the principles of Adria Steinberg are as follows:

### **Authenticity**

Projects designed with authenticity infuse student work with purpose and passion by connecting project work to real-world issues that students care about.

### **Academic Rigor**

Projects that feature academic rigor challenge students to fully engage their minds by mastering content standards and using professional-level thinking skills.

### **Applied Learning**

Projects that integrate applied learning push students to use their learning right away and to practice important skills demanded by the workplace.

### **Active Exploration**

Projects with active exploration engage the bodies and minds of students through hands-on, field-based work.

### **Adult Connections**

Projects that incorporate adult connections support and inspire students through the meaningful involvement of adults beyond the classroom.

### **Assessment Practices**

Projects with quality assessment practices provide opportunities for students to receive relevant feedback during and after their project work.

However, a study conducted by Frank et al. (2003), Helle et al. (2006), Macias-Guarasa et al., (2006), Prince & Felder (2006) found that PjBL combine a number of other principles. First, problem solving or completion of a task that requires students to complete a number of educational activities that encourage learning. Second, students working in a group to complete the project. Third, the project assignment is similar to that carried out by an adult in the community or place of work and requires a long period of time. Fourth, the project involves the development of a concrete artifacts-design, model, thesis, computer simulation, and others. Fifth, the highlight of the project is a written/verbal which describes methods of the project and the end product. Sixth, teachers act as advisors.

Project-based learning (PjBL) is a method widely used and described in engineering studies (Dym et al. 2005). Moursund (2002) noted that researchers should develop a project-based learning method to teaching methods that can be used by technical education institutions to produce engineering graduates who are able to create innovative products that are suitable for the industry. The concept of PjBL training for engineering students will enable them to be prepared to face the tasks with the ability to formulate their own problems, guided by common goals that have been set (Collins et al., 1989).

The Malaysian Polytechnic offers courses at certificate and diploma level (Fakta ringkas, 2010). Polytechnic has been producing semi-skilled workers by the instructors, learning environment, a perfect situation and a planned curriculum (Halizah, 2010). Department of polytechnic education has established a number of initiatives to make Polytechnic an alternative catalyst to the success of the new economic model in line with the national higher education strategic plan (The Strategic Plan for Polytechnic University: 2007-2010). According to Dickson (2012), one strategy to facilitate teaching and learning is through transformation from traditional education to outcome based education (OBE). One of the teaching methods in OBE is PjBL (Md. Baharuddin et al. (2011). This is because the PjBL can be associated with elements such as motivation, motivational thoughts criticism, skills and knowledge for life (Thomas, 2000).

## **3. OBJECTIVE OF THE STUDY**

The main objective of the study is to identify the extent to which the six principles of PjBL were implemented in the final Semester of Diploma programs in Malaysia.

## **4. METHODOLOGY**

This study was conducted using qualitative approach (interviews) to identify the extent to which the proposed six principles of PjBL were implemented.

#### 4.1 Participants

The participants of this study were two Polytechnics lecturers that met the selection criteria as a participant, namely:

1. Lecturers were expected to engage in PjBL and had teaching experience of more than three years.
2. Lecturers were instructors in Polytechnic in Malaysia who are teaching engineering subjects.
3. Lecturers who are willing to participate in this study.

Professional contacts were used to identify participants (polytechnic lecturer) who used PjBL in their teaching in the Polytechnics who are willing to participate in this study. Semi-structured interview was used to collect data for the studies. The interview lasted for 10-30 minutes and it took place after office hours. All interviews were recorded using an electronic audio recorder. Audio files were stored on a laptop computer for the purpose of transcription. A transcript of the interview process was managed and analyzed using Altas-Ti.

#### 4.2 Data Analysis

Data analysis was initiated by the researchers through collecting information from open ended questions and these were labeled as themes and categories (Creswell, 2003). Deductive theory approach was used in this study where it involved the use of framework of six principles of PjBL as indicated earlier to analyze the data. Data reduction began with open encoding directly from the transcript of the interview. The same codes were grouped into categories and the same categories were grouped into themes. Then, the codes were transferred to software (Altas-Ti), which allowed the formation of concept map. Later, the same category were grouped together to form the theme. Lastly, themes and subthemes reviewed reports and feedback are encouraged to engage their peers.

#### 4.3 The Reliability of The Instrument

Transcripts and lecturers' profile were sent via e-mail attachments to each of the lecturer, asking them to review the transcripts and make the necessary changes (Creswell, 2008). All lecturers responded and verified the transcript of interview and profile them without any changes.

### 5. RESULTS

Results from the analysis of findings is shown in the tables below,

**Table 1.0 :** Respondents view on the principles of PjBL

PRINCIPLES	RESPONDENTS	
	FIRST RESPONDENT(P1)	SECOND RESPONDENT(P2)
AUTHENTICITY	(P1-19) rarely involves a problem of student, involves objects, applications outside (P1:21) We ask that can give impact.	(P2-14) based on the client's request from the industry
ACADEMIC RIGOR	(P1-52) research knowledge	(P2-47) learning to solve problems yourself,
APPLIED LEARNING	(P1-25) Not be applied in full	(P1-26) do not reach the standard level
ACTIVE EXPLORATION	(P1-28) Student make a survey	(P2-11) students will make survey before (P2-12) not just stay in classroom
ADULT RELATIONSHIP	(P1-29) the project does not involve adults relationship	(P2-9) the lecturer asked students to deal particularly with the University in terms of areas of expertise.

PRINCIPLES	RESPONDENTS	
	FIRST RESPONDENT(P1)	SECOND RESPONDENT(P2)
ASSESSMENT	(P1-31) Student performance on product and exhibitions	(P2-10) outsiders and industry to evaluate projects that produced that either fulfilled the criteria for the industry (P2-13) a rubrik where each student is evaluated for instance in terms of cooperation

As it can be seen in Table 1.0, the first respondent's view about the first principles of PjBL which is authenticity showed that the project assignment usually do not involve student problem but involve the problem that is face by the industry and second respondent's view about project assignment is based on the client's request from the industry. The second principles of PjBL which is academic rigor, the first respondent's view that academic rigor principle lies on the research knowledge that the student must have in order to do the project assignment and the second respondent's view that the academic rigor principle lies on the opportunity that the lecturer gave to the student to solve problem. The third principles of PjBL which is applied learning, the first respondent's mention that not all the knowledge that the gain from their study apply on the project assignment and the second respondent's mention that the application of knowledge do not reach standard level. The fourth principles of PjBL which is active exploration, the first and second respondent's mention that the students carry out survey. The second respondent's also mentioned that in order for the student to do project assignment they need to go outside of the campus. The fifth principles of PjBL which is adult relationship, the first respondent's mentioned that the project assignment does not involve adults relationship whereas the second respondent's mentioned that the lecturer asked students to deal particularly with the University in terms of areas of expertise. The sixth principles of PjBL which is assessment, the first respondent's mention that the assessment based on product of the project and the exhibition that the students make whereas the second respondent's mention that assessment make by the industry expertise and based on rubric that has been developed.

## 6.0 DISCUSSION

It can be said that the most important principle in PjBL is authenticity as it is to attract students to study with passion or enthusiastic because it involves things that happen in life. The validity of a job is one of the important features of PjBL where students to learn to work with the community and to establish cooperation requires the student experience in their real-lives (Dewey Decimal, 1933/1989; Helle, Tynjala, & Olkinuora, 2006; Lave & Wenger, 1991). According to Zualkernan (2006), PjBL involves the students in designing and producing products that meet the principles of authenticity. A valid and objective research is also an important principle in PjBL (Levstik & Barton, 2001). The characteristics of validity in PjBL must be like solving problems or queries that can increase knowledge to students; involves a problem actually handled by an adult in the workplace; produce something personal or social value beyond the classroom. In this study it was found that aspects of the project assignment that can increase student knowledge is not emphasized. PjBL offers an engaging instructional method to make learners active constructors of knowledge (Grant, 2002).

Projects that have elements of academic rigor will provide a challenge to students using the sharpness of their thinking in resolving the project and students also need to use their thoughts to dominate the standard content of a lesson. Trilling & Hood (1999) states PjBL promotes academic rigor. Approach to promote academic rigor in PjBL is different from other approaches such as focus on the attitude of students in an environment that is disciplined by encouraging the students to work harder (Tough, 2006) to conform to the standard basic of knowledge. According to Burns-Sardone (2008) projects that has elements of academic rigors exists when PjBL on the run. The characteristics of academic rigor: requires students to master and apply the standard content of knowledge in various fields using various research methods; develop skills to think high level and habit of mind (e.g. find a proof with a different perspective). In this study it was found that the lecturer encourage use of research methods and student were asked to try solving the problem of project assignment without the help of lecturers. PjBL students resolve issues or dilemmas by designing, critiquing, and evaluating concrete artefacts or products (Blumenfeld et al., 1991).

Project-based learning (PjBL) involves the in-depth exploration of issues, themes or problems without a predetermined answer (Harada, Kirio, & Yamamoto, 2008). Edward (1995) also says PjBL build knowledge through exploration. PjBL as a comprehensive perspective that focuses on teaching by engaging students in research (Blumenfeld et al. 1991). Research found that student make survey regarding the project assignment.

Md. Baharuddin et al., (2009) states that PjBL not only enhance cooperation among students but also between the student and the staff who are experienced and experts that are outside of the College. PjBL encourage students to discuss and share their findings with the scholars (Blumenfeld et al., 1991). In this study it was found that not all lecture encourage student to deal with the expert in the process of project assignment.

Assessment is an important part of the students' learning process, because it is an opportunity for students to reflect on what they have learned during the semester. In this way, assessment can be regarded as an important reflection-on-action that can prepare students for the studies that follow (Cowan, 1998). Bonthron & Gordon (1999) says in PjBL lecturers monitor project progress and determine grades. PjBL emphasize the importance of using formative assessment in order to maximize students' learning potential, especially to promote critical thinking skill during PiBL. ( Trauth-Nare and Buck, 2011). PjBL perform better on both standardized assessments and project tests than students in traditional direct instruction programs and that they learn not only real-world application of skills, but also analytical thinking (Boaler, 1999). This study found that several lecture determine the grades of the project assignment based on product that the student produced from the project assignment, exhibition of the product and rubric. Expertise from industry also part of evaluator of the project assignment.

## 7.0 CONCLUSION / RECOMMENDATION

PjBL supports students in learning and practicing skills in problem. Hence it provides opportunities for interdisciplinary learning by engaging students in applying the content of different subjects areas during various phases of project. PjBL helps the students develops real life skills like ability to collaborate well with others, make decisions and take initiative and face complex problems solving, communication and self-management. The interview results found that only five of the six principles of implementation of PjBL were implemented in the final semester project in polytechnics. One principle of PjBL that was not fully emphasized was Applied Learning while only one respondent emphasized on Adult Relationship. Therefore a further study should look at this issue closely and the implementation of PjBL in the future should be carried out intensively in accordance with the development of Polytechnic education nowadays.

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