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An application of Project Based Learning (PjBL) module

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ABSTRACT

This article (who's most parts are taken from Mr. Md. Baharuddin Bin Abdul Rahman PhD thesis proposal U.S.M, 2007-2014) to discuss about an introduction of Project Based Learning (PjBL) process. This paper also focuses for the development of engineering product by implementation of PjBL module (prefer to PjBL model & theory). This pilot testing of *Project-Based Learning (PjBL) module* that was significant with research proved of success in the engineering products/projects development and typical of socio-constructivist with positive impact in student approaches.

Introduction

Through this study, researcher focused more on the importance and effectiveness of project-based learning (PjBL) module implementations, the construct selected in influencing the concept of Project Based Learning (PjBL) in producing an innovative projects, this study specifically to exploring the role of PjBL concept and its relationship variables that significantly with meta-cognitive, self-regulation and motivation among the students of Mechanical Engineering at the Politeknik Kota Bharu of the Ministry of Higher Education. All three constructs are believed to be interrelated and are expected to play an important role in influencing the effectiveness of the module PjBL among engineering students at the Polytechnic of Malaysia (Laporan Penilaian Akhir, 2007. In Malaysia, the Ministry of Higher Education, Malaysia. Based on the curriculum that focuses on producing engineering students who are skilled in engineering works and related to project development with expert in engineering technology (Wan Zah Wan Ali, 2000). Technical Institutions should apply the latest teaching methods in producing students who can produce a quality of product or project, and recognized both at national and international level (Nasr, K. J and B. Ramadan, 2005). Recent issues of dumping graduates in most areas of the market is caused by a lack of skills in self management and self motivation for graduates to make them an employee who is capable of (employable) as required by the employer (Annual Report, 2006). In addition, communication skills, learning (meta-cognition) and innovation and job training are also causing students to be weak in facing the challenges of an increasingly match with global requirement (Perrenet et al., 2000). In an effort to improve the quality of student learning and produce quality students and provide high quality human capital, each student must be educated to be able to develop their potential to the maximum level, as well as be able to develop creative and innovative student (Bennedsen, 2004). Project-based learning (PjBL) as applied in producing students of high quality and features of the human capital required by the government in achieving the goal of Vision 2020 (Ab. Rahim Selamat, 1990).

Project Based Learning (PjBL) is an innovative teaching strategy (Blumenfeld, 1991). It is a pedagogical strategy that includes aspects of contextual learning in real situations and problems that provide learning resources that are relevant to the modules to be studied, focused guidance and direction in developing the knowledge and skills to solve problems among the engineering students (Mills et al., 2003). The atmosphere is a significant project based learning and training opportunities for students to solve all the problems arising from production projects alone or in groups without involving teachers or lecturers (Shapiro, 1994). Teacher or lecturer is acting as a facilitator in learning by providing guidance to students in solving a problem, monitoring the learning process so as not to come off the platform proper, always look for their learning progress of students is always directed to achieve to predetermined product development objectives (Polman, J.L., 2000). Project based learning is a teaching method that is different from conventional methods of learning (Helm et al., 2001). Conventional teaching is more focused on content while PjBL module is more focused learning for engineering students and the problems will be solved by the group of student. PjBL activities in the learning process are more focused on students than teachers or lecturers (Dym et al., 2004). Students played a key role in the solution to the problem of project activities, while the teacher / lecturer is serving as an instructor who provides guidance, mentoring and monitoring students' learning process to stay focused in achieving their learning objectives (Wilkerson, L., 1995)

Literature View

While the concept of "project-based learning" using a set of self that will continue to make student-centered learning which involves students directly in the production activities of their group projects (Felder, et. al, 2000). Project-based learning methods to train students to be more responsible in managing their own learning (Malicky, et al, 2006). Through project-based learning methods, aspects of self-management skills will be developed.

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Among the skills students can develop self through PjBL are as follows: 1. Problem-solving skills. 2. Critical thinking skills. 3. Communication skills. 4. Skills required information. 5. Time management skills. 6. Anticipate potential skills that will happen. 7. Skills to work as a team (Kamaruzaman Jusoff et al., 2010). Categories include observations of problem solving project ideas and applications in analyzing each problems related for engineering work that may arise with the collection of information that contributed to the contraction of the technical problems that will arise (Mat Husin et al., 2010). It can be resolved through the revision of the standard design drawings and use machines in production engineering (Md. Baharuddin et al., 2009).

The breakdown of categories of work to solve this problem is a consequence of the best methods in the "Project-Based Learning" by using directional modules designed for specific purposes (Md. Baharuddin et al., 2011b). The new project-based learning method that can generate the level of student meta-cognition is an important component in the improvement of meta-cognition in relation to knowledge about cognition and the ability to monitor, regulate and control any cognitive affairs in the production project (Md. Baharuddin et al., 2010). Learning should be in line with the recent emphasis on the transition from theory to the theory of cognitive behavior in the field of psychology (OBE, 2011).

Development of project-based module that is based on the theory of motivation theory approach goals, performance goals will affect the performance by a variation in the quality of self-regulatory processes in the production of products (Covington, M.V., 2000).

The process of self-regulation and management is very relevant to the ability / skills of meta-cognition someone. This shows that there is a direct relationship between motivation and achievement through meta-cognition (Md. Baharuddin et al., 2011c). Past studies also showed a correlation in direct and indirect between motivation and effectiveness of products (Md. Baharuddin et al., 2011a) and the possible existence of an indirect relationship between motivation and achievement of quality products through meta-cognitive variables (Van Zile-Tamsen 1998, Covington, C.V., 2000). In addition, some constructs such as motivation and self-learning goal orientation is also said to contribute to the relationship between meta-cognition and academic achievement (Md. Baharuddin et al., 2010).

Model & Theory of PjBL

In PjBL, are at solving problems related to the project, which includes colabrative activities to the method of learning. At the same time, the supervisor or supervisors can change the rules, forms and management techniques for monitoring the work of students. Following the principles of design & Model PjBL suggestion Barron, B. (1998).

The Principles of PjBL

a)Learning methods of data - targets / goals to be obtained or understood by users

b) Is the main frame in the "instrument of learning", "Learning tools", set to "Direct the direction of the case work" and is based on PjBL or PBL in the production activities of the project.

c)Taking into account the diverse needs of the formative evaluation and quality improvement projects.

d)Building a social structure in the reaction of students to manage and respond to external factors in producing the project.

The Purpose of PjBL

a)PjBL experience and results based on past data or the results of the design, a comprehensive management through self-instruction set (Blumenfeld, P.C., 1991).

b)Help build students' needs in understanding how and why the tax needs of the project.

c)The Frame PjBL should focus on "process that helps students to organize teams in solving problems covers overall process, product development task & work procedures, and cover almost of each engineering product development objectives / the requirements of the project (Wood, D. R., 1976)

d)Collins, Brown, and Newman found that three kinds of matters, namely: (a) instruments capable of functioning for communication process, (b) The instrument can be a guideline in directing the work, and (c) the instruments to dominate the whole process until the monitoring project.

e)One of the main points in drafting the beginning and the end of the process of completing the project, which will help the learning process with the supervisor of each activity on an ongoing basis through the student responses to the key activities that lead to project objectives

f)Evaluation through monitoring or evaluation of the work and progress to help students who are able to evaluate their score category assess their capabilities in managing and producing the project through PjBL instruments produced (Md. Baharuddin et al., 2011b)

g)It is generated by a variety of assessment skills and the ability to manage, produce and develop components of the project through continuous assessment.

h)Menrangkumi three types of key principles that support the behavioral / directing the work of students, students' understanding of change processes to the mastery of production projects and makes them aware of environment of engineering works. With this method the motion of the atmosphere of learning and new comprehensive works to the built-in project revenue.

i)Each small group will communicate with the capable of problems mastering, studied the process of how things work, and ability to manage data and resources in solving the case seiap directionally.

PjBL also has helped in shaping the face of competition for students in solving problems related to their projects. This is done through the development of pedagogical methods, curriculum, and focused learning environment, so developers designing instruments to be more focus on the objectives in designing the Project based learning (PjBL) module for producing products, project development, guidance / manual use and comprehensive content, which ensures that the use of instruments that meet the needs of curriculum objective product (Schawrtz et al., 1999). Following the recommendations of the learning cycle Schwartz & Theory selection;-

Cycle Based Theory

a) View of the future / far-sighted: It covers directing users to help them in understanding the content and objectives / learning needs.

b)Competition Needs : Competition exists to ensure that the students will construct / develop the idea that more critical as necessary, this will create a project results in accordance with the requirements of process grow for engineering knowledge in the production of the engineering project.

c)Development Ideas: Here he'll be able to help students to not only follow the model / design is bad, but will apply the idea of

developing a more critical and will be able to produce innovative projects.

d)Diversity of Perspective: It will provide guidelines for each phase in which the needs of students in mastering the learning process needs further improve each domain selected in accordance with the requirements. Giving a different score for each phase of problem solving is a major catalyst in improving students' abilities.

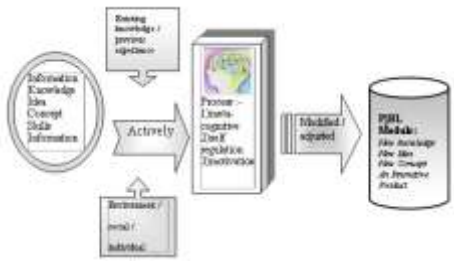
e)Investigation and Research: User needs / instrument should assist students in mastering the process established in the master PjBL competition. Research on problem solving will help improve the quality of the project.

f)Testing purposes: It is a major part of the students tested their ability to mastery individual learning of engineering-related needs through the quality of the project outside the project.

g)Its use in the market / external: It makes innovative idea developed, so each student and supervisor will be able to master the requirements / market needs in a project to produce quality students. It can be produced by building instruments that can PjBL controlled by a group with other groups in the coordination by the market.

Refer to Schwartz, et al. (1999)

New views on the theory of constructivism for PjBL Module development



Project-Based Learning (PjBL) Module

PjBL Module compact with self-organized form is designed to facilitate the movement of monitoring process for supervisors and students to conduct engineering product development. It started with the form for discussions and preparation of project proposal (P001).

Further, the use of forms for the submission of a sketch of the project to the supervisor (P002). For the confirmation and verification by the supervisor using the form of (P003). After approval of the project is given, students will use the form (P004) for the submission of the final project design drawings, so students will use the form (P005) for the design of projects on time has been set. Students will also use the form (P006) for a detailed drawing (Shop Drawing) of project components for development, and assisted by the form (P007) is to the work of the product/project.

While the form (P008) will be used for the selection of workshop and machinery to be used for producing each part of the project, then form (P009) will be used for critical components peyemakkan / left for work completion. Form (P010) will be used on the project pilot test while the form (P011) is a form of sketches and pilot test to additional components of the product.

After the product proved successful. Form (P012) will be used for the revision of the presentation materials (Power Point) for the final presentation of the product. (Md. Baharuddin et. al., 2009), (Kamaruzaman Jusoff et. al., (2010) & (Md. Baharuddin et. al., 2011b, 2011c, 2011d)

An Innovative product after implementations of Project Based Learning Module

Project Based Learning (PjBL) for Product HydroFuel 01/10 Development: An Innovative Product Finalist at Malaysia Inovatif (MOSTI) 2010

Figure 3.1 Figure 3.2

Figure 3.1 & 3.2: HydroFuel 01/10 (An Innovative Product presenting at Karnival Malaysia Inovatif (MOSTI) 2010 Zon Timur (30-31 Julai 2010); location> Terengganu Trade Centre:- TTC)

Project Based Learning (PjBL) for Product MBS Development: An Invention Innovation & Design (IID) UiTM Terengganu >Innovation towards Excellence

Figure 3.3 Figure 3.4 Figure 3.5

Figure 3.3, 3.4 & 3.5 (MBS) Magnetic Brake System Product & presentations:

An Innovative Product for presenting at Invention Innovation & Design (IID) Nov. 2010.

Project Based Learning (PjBL) for Product Chopper Machine code MR 01/07 Development: An Innovative Product Finalist at Project Presentation PKB 2007

Figure 3.6: Final product of MR02/07 by implementation PjBL module

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