PROBLEM BASED LEARNING: ADAPTING MODEL OF MONITORING AND ASSESSMENT TOWARDS CHANGING TO STUDENT CENTERED LEARNING

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ABSTRACT

Exam oriented system has long time been practiced whether in the school or at higher educational level. It is common to see that students learn to rote memorization as preparation to pass in the examination. As consequences, the graduates' ability to apply knowledge in the workplace becomes an issue to be debated. This has led to the loud calls for the new authentic learning environment that may increase students' ability to apply knowledge, skills and at the same time promoting students' with higher order thinking levels such as problem solving and critical thinking skills. Within this, the need on educational revamp is seem crucial, and this should be done from the grass root levels. Therefore, student centered learning using Problem Based Learning (PBL) approach is suggested to be introduced in integrated living skills subject. The model will be designed to focus on monitoring and assessment methods in fostering student continuous development in three domain areas of knowledge, technical and personal skills. Moreover, this method is believed to be able to incorporate lifelong learning and self directed learning skills that helps student to sustain in our educational system. Thus, the study aims to look into the possible ways of adapting PBL monitoring and assessment methods into existing practices in lifelong learning settings in TVET.

Key words*: problem based learning, monitoring and assessment, rubric, personal skill, lifelong learning.*

INTRODUCTION

As part of the lifelong learning process, the Student Centered Learning (SCL) is an innovative learning method that believed could increase student engagement in learning process. The learning process occurs when student started to work on the task assigned. This speculated could trigger student's development especially in both technical and process skills. This becomes obvious when student works in a group setting, whereby the skills are developed through activities in problem solving, communicating, discussing, ice breaking and collaborative learning (Brodie and Borch, 2004; Salleh, *et al*., 2007). They establish knowledge through investigations and this occurs mainly without the presence of the teacher (Enemark *et al.,* 2006). All these advantages have brought SCL as distinctive experiential learning method, and it has been treated as a future method of teaching and learning to take place in the most classes and laboratories.

SCL can be implemented in many forms and approaches. One of the approaches that newly introduced in technical field in engineering is Problem Based Learning (PBL). Based on the local literatures, PBL presumes entering the second phase in universities' delivery system after several pilot projects were conducted since 2004 (Ahmad and Jabar, 2007; Yusof *et al.,* 2004; Yusof *et al.,* 2005). But this approach is yet to be seen and piloted in the school delivery system. Since it was introduced as a new way of teaching physician in one of the medical schools in Canada (Rosenørn, 2006), its rapid growth and adapted variedly into various field of learning disciplines in the universities programs. Moreover, at international level, this approach has been implemented in K12 setting (Torp and Sage, 1998). But in our school delivery system, the teaching and learning is dominated by the traditional approaches. Thus, there is a clearly needs to revamp the current practice in school in line with global educational changes. Adapting PBL into current practice is not an easy task. Several elements of curriculum need to be scrutinized before it could be adapted into existing curriculum. The elements such as student profiles, curriculum requirements, institutional needs and even local industrial needs must involve a careful consideration in the curriculum development (Brodie and Borch, 2004; Kolmos *et al.*, 2007). Likewise the method of teaching and learning must adapted according to the curriculum itself (Savin-Baden, 2004). It is within this context, as one of the curriculum elements, the proposed model of monitoring and assessment also according to several steps of development and this paper intended to describe in details in the following sections, before it suggested to be implemented in integrated living skills subject in lower secondary school level.

BACKGROUND OF THE STUDY

Integrated living skills subject is one of the subjects taken by the lower secondary level student form 1, 2 and 3 in Malaysian school system. From the life wide and lifelong learning perspectives, this subject provide an early insight into the demand for learning in the knowledge-based society, which will entail redefining basic skills, to include for instance the new information and communication technologies. The subject also takes into account the foreseeable labour market trends in the country. This scope of this subject offers an expository core in designing and technical skills with four options on

elective component. The component such as technical skills, home economic, agriculture and commerce and entrepreneurship, seems in line with the subject aims to produce independent, creative, initiative and knowledgeable student in facing with everyday lives (Centre of Curriculum Development, 2002). Besides that, more values, positive attitude and good working culture are also hope to be incorporated during the practical activities. Other specific objectives outlined in integrated living skills are (Centre of Curriculum Development, 2002):

1) to encourage self improvement, being creative and innovative in designing and producing products out of variable sources.
2) to be conscious of surrounding matters and getting the ideas from multiple sources in designing and producing products.
3) to carry out do-it-yourself tasks, simple repairs and maintenance of electrical and pumping work in everyday lives.
4) to choose the right equipments, tools and materials and use it with the correct technique.

The elective components are designed to provide a pathway to the next education level at higher secondary (Centre of Curriculum Development, 2002). This subject becomes the introduction to several further education streams at form 4 and form 5 level such as science stream (pure science and applied science), religion stream or technical stream (electrical, mechanical and civil engineering). However, these options are normally based on the examination result. Therefore this subject must be taken into account because it is believed that this subject could trigger student interest in technical skills and leads to the increasing student enrolment into technical field and engineering. Eventually, we believe that this is link to the production of more k-workers in the future.

Under technical skills option, some of the contents are incorporated with SCL approach. Students are required to complete several practical activities of coursework including electric and electronic project (Centre of Curriculum Development, 2002). All too often in this practice, the teacher will demonstrate the work, and then students were given guidelines to work on it. Here, students begin to work by themselves and at the same time developing technical skills, values and understanding the procedural of work. The student work were monitored and evaluated based on school based assessment system by using predetermined specific criteria (Centre of Curriculum Development, 2002). The project is normally conducted individually and also counted as a part of final examination marks.

In this context, there is something seems not align in our concern in pathway to achieve the subject objectives 1 to 4. The pedagogical method seems flawed in term providing a specific method to achieve the learning outcomes. Within the range of teacher maximum guidance, students were not be given opportunity to work by themselves on their own methods. In our views, this process should be ongoing with minimal guidance but with freedom to student in term of methodology to solve the problem. We believed this method will increase the possibility in meeting the objectives especially 1 and 2. At other context, teachers are accountable to perform the monitoring and assessment task however, teacher's integrity, knowledge and skills in undertaking school based assessment system become another issues of debate (Yahaya, 1998; Ali, 2008). In line with the National

Education Assessment System (SPPK) that scheduled to be implemented in 2010, at this stage, we think that it is possible to add some interventions that purposely to encourage student development on technical and other skills too such as ability to 'learn how to learn' and lifelong learning skills as they work in a team setting. At the same time, teacher will be provided with monitoring and assessment guideline on nurturing student's both technical and personal skills development.

As these skills are ready embedded in PBL approach, we will incorporate PBL environment and focus on the component of monitoring and assessment as a tool to initiate our intention. This PBL environment creates framework for monitoring and assessment to align with instructional principles as highlighted by Sergers and Dochy (2001):

1) Student solving the problem that similar to what student will have to apply knowledge in the future or in everyday life - an authentic instrument (rubric) required to evaluate student competencies.
2) Assessment involves knowledge application when solving a problem – student learns to apply knowledge after short theoretical learning session, the assessment must include the ability to apply knowledge but taking into account student level and cognitive capabilities.
3) Student works throughout the project must include social interaction – this is true when student work in team, they learn to critically reflect on the process and product of their peers. The assessment must include the group process and individual contribution.

Current practice of SCL is the best method to infuse student with intended learning outcomes. However, this method seems require some improvement in the monitoring and assessment system to focus more on nurturing technical and personal skills development based on PBL approach. According to Kolmos *et al*. (2007), beside focus on student's attitude and skills training, others skills also need to be infused into student professionalism such as communication, teamwork, lifelong learning and ethic. This has led to our effort in designing our own version of PBL to be implemented in integrated living skills subject.

STATEMENT OF PROBLEM

The purpose of the study is to develop a model of monitoring and assessment within PBL context to enhance student learning (short term and long term), and it further to investigate the effectiveness to promote student's continuous development in both technical and personal skills. Without specific model, the testing seems more focus on assessing and awarding student with grade rather than monitoring the development and providing meaningful feedback for student learning.

OBJECTIVES OF THE STUDY

The purpose highlighted above leads to several objectives outlined in this research:

1) to develop a rubric and assessment plan that aligns with the integrated living skills subject objectives with regard to the technical and personal skills requirement in industrial sector.
2) to investigate the rubric and assessment plan effectiveness in enhancing student learning (short term and long term).
3) to investigate the monitoring methods and assessment strategies to promote student's continuous development in technical and personal skills context.
4) to compare the model developed and the current assessment practice in term of effectiveness to promote students continuous development in technical and personal skills context.

RESEARCH QUESTIONS

The research questions outlined are as follows:
1) What are the current criteria demands on technical and personal skills as desired by the industrial sectors in technical field that align with integrated living skills subject?
2) How is the student perception on the novel rubric and assessment plan to help them defining their learning outcomes?
3) What are the forms of monitoring and assessment method that could promote student's continuous improvement in technical and personal skills?
4) To what extent the model is effective compared to current practice in promoting student's continuous improvement in technical and personal skills?

CONCEPTUAL FRAMEWORK

Adapted from Oon-Seng (2004), Moesby (2005) and Moesby (2002), this rubric concentrates to cater on 3 phases on PBL process which are initial phase, PBL stage phase and final product phase. Moesby (2002) highlighted that at first steps in PBL must focus to infuse student with personal skills attributes such as ability to learn how to learn. Therefore, monitoring and assessment on personal skills must be intensified during the PBL stage.

The monitoring and assessment process should follow the bell curve grading scheme in line with the focus on PBL stage. Here, the independent variable f*(x)* might be referred as the grading proportion, frequency of assessment, frequency of monitoring, frequency giving feedback, and criterion emphasized. Whilst dependent variable f(y), it might be referred as a student performance towards project completion and also as a student overall achievement. The graphical explanation clearly defined as in the Figure 1.

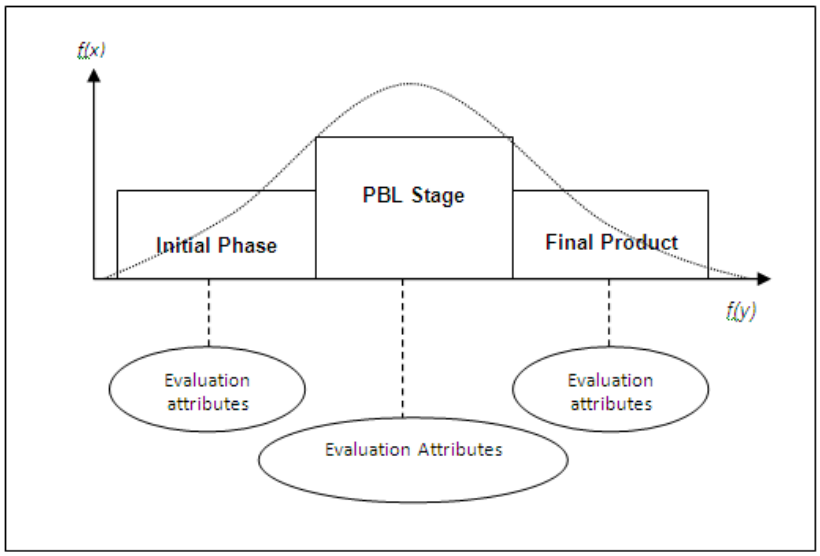

Figure 1: Monitoring and assessment focus on PBL stage

Adapted from: [Moesby, 2005; Moesby, 2002].

Aware on both content knowledge and process skills are equally important to student however, in the reason that student could learn much throughout PBL [Ahmad and Jabar, 2007; Salleh, *et al*., 2007; (Yusof, *et al*., 2005), student taking responsibility and independence in their learning (Yusof, *et al*., 2005; Moesby, 2002] and constructing knowledge through self directed learning (Yusof, *et al*., 2004; Hmelo-Silver, 2004; Moesby, 2002), the framework of monitoring and assessment focus equally on the development of technical and personal skills within the PBL stage. It is speculated that focusing on these elements as early as in lower secondary school level eventually leads student to have ability to gain content knowledge through personal skills that developed.

The works to develop the rubric and assessment plan refers to particular strategy adapted from existing literatures. The rubric and assessment plan involve three main elements which constitute industry, student and educator. The industry becomes the main element to be referred by both student and educator during the rubric development process. At the same time, student will also involve in the rubric development through "negotiable contracting" process that modified from the original authors (Moesby, 2005; Huba and Freed, 2000). Within this, student and educator will join together to construct the rubric contents, to critique and contribute to the rubric develop and as a result, educator could enhance in giving and receiving feedback to/from student (Huba and Freed, 2000). Moreover, student will understand the evaluation process and so they strive to achieve the criteria for good works (Savin-Baden, 2004; Stix, 1996). These elements are in contact as shown in Figure 2.

According to Finch and Crunkilton (1999), as one of the curriculum components, the assessment methods and procedures must be developed in systematic. Most of the curriculum development nowadays is involving the round table discussion with the industrial key players. Pertinent to this concept of the curriculum development, the rubric

of monitoring and assessment development will be based on the indentified occupational need of particular occupational field (Finch and Crunkilton, 1999). The specific competencies and requirements from particular jobs accumulated in the forms of criteria. However, this research limits to the scope of technical and personal skills criteria demand for one of the electrical engineering related position.

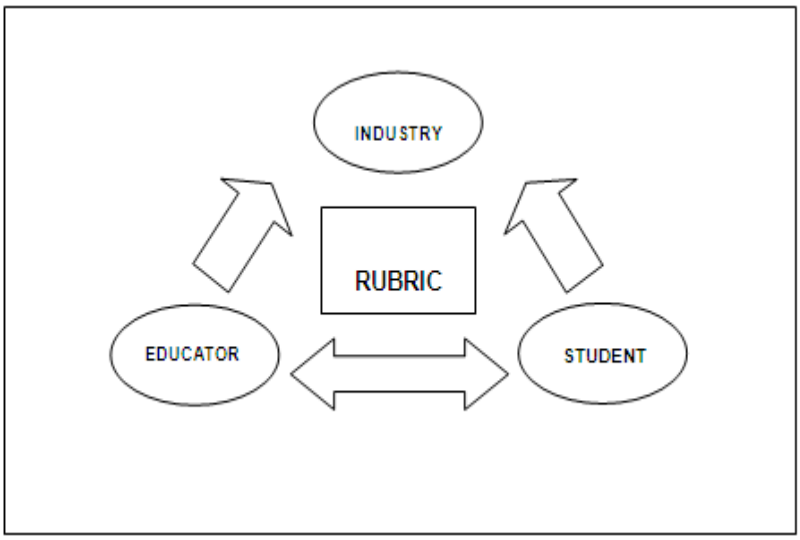

Figure 2: Operational development framework

Adapted from: [Finch and Crunkilton, 1999; Huba and Freed, 2000; Savin-Baden, 2004; Moesby, 2005].

Personal Skills

Many terms used in defining skills and abilities related to one's competencies beside technical skills competencies. The term used sometimes process skills, personal transferable skills, soft skills, generic skills, core skills, key skills, professional skills and etc. Each terms defined it owns attributes and some of it overlapped. Therefore, the long list of personal skills can be categorized into several domains which are social skills, cognitive skills, behavioural skills, affective skills and psychomotor skills. However, the final framework of personal skills attributes will include the input from the industrial sectors and the skills that commonly mentioned in PBL literatures. The personal skills in PBL that develop during group project may involve communication skills, teamwork skills, leadership and management skill, and problem solving skills.

THE PROPOSED RESEARCH METHODOLOGY

The research is organized into three phases which are the data collection phase, the instruments development phase and the experimental study phase.

Data collection phase

Based on latest publications and the jobs advertisement within this field, open ended questionnaire will be developed to investigate the current criteria demands in technical and personal skills. To be accurate, some samples will be randomly interviewed. Respondent will involve them among industrial workers (Electrical engineering related position). The expected output for this phase is the list of key criteria desired by industrial sectors on technical and personal skills context.

Instruments development phase

During this phase, the key criteria become the main point of discussion and brainstorming between researcher and integrated living skills' subject teachers in selected school. The main aim is to develop the rubric and assessment plan drafts that fix into the subject objectives. Once the draft ready, teacher will introduce the rubric and assessment plan during the first laboratory meeting with student. At this stage, teacher should encourage student to familiar with the rubric and assessment plan and allow them to critique, discuss and they may contribute to the rubric or the method of implementation (Stix, 1996).

When the draft completed, as PBL advocates that students should work in a small group (Kolmos *et al*., 2007), they are assigned into a group of 3 to 4 members to encourage social interaction through the process of reflection and collaboration (Sergers and Dochy, 2001). The groups will be assigned with simple project but involves real life application such as water detector, electronic alarm circuit and etc. The project should schedule to be last for at least 10 weeks for appropriate timing for pre and post test to take place.

Experimental study phase

The experimental study will be designed to examine the effectiveness of the rubric and assessment plan developed. Samples will involve the students who undertaking the technical skills option (project) in integrated living skills subject. The comparison will involve 2 groups of students which are; a) Students who involve in negotiable contracting, and undergoing the monitoring and assessment using new rubric and assessment plan (experimental group), and b) Students who undergoing existing practice of monitoring and assessment (control group). Both groups will be scheduled to sit for pre tests at the beginning of the project and post test upon project completion. The perception questionnaires also will be deployed at the end of the project completion. The data will be analyzed quantitatively and will include the multivariate analysis. To support the findings, the qualitative data also will be collected through unstructured interview and observation.

SIGNIFICANT OF THE RESEARCH

The model will be used to create a mutual effective contact through monitoring and assessment between student and educators that is applicable in lifelong learning environment in TVET. This is speculated because the model is a rubric that constructed

according to exemplar criteria which is involved negotiable contracting process between educators and student. Thus, the model should facilitate educator's role to scaffold the student learning process so that the educator becomes the effective facilitator. The educator will understand the parts to be emphasized during monitoring student progresses, giving feedback, planning the right time to assess, and to evaluate the right area. This is in line with social constructivist perspective or dynamic assessment approach in which the performance of individual being assess is mediated or guided by another individual who intended to inform instruction (Palincsar, 1998).

By the adjustment on the grading proportion, frequency of assessment, frequency of monitoring, frequency giving feedback, and criterion emphasized is likely to increase student competencies in technical and personal skill. At this level, these competencies and abilities are believed could leads student to sustain in our educational system particular the skill 'learn how to learn' for the short term effect. As for long term effect, this seems significance for future engineer to deal with the continual changing of technological and organizational demands at workplace, because there is a need to prepare people who are capable to adapt with the challenges with certain special abilities and skills (Moesby, 2005).

Adapting the PBL environment that emphasizing on the monitoring and assessment method is believed could attract student interest, motivate to learn and at the same time encourage student to take ownership on their learning. As a result, student performance and achievement will rise in both content knowledge and process of learning and leads to the production of excellent student that meet the global demands.

CHALLENGE TO CHANGE

In changing current practice, several challenges have been identified based on previous research in adopting PBL approaches in lifelong learning settings in TVET. According to Pedersen *et al.* (2004), traditional assessment system is likely to continue because of the teacher belief that the practice of that assessment is what student as expected and as well as parent expectation. In addition, even though the rubric will be developed as a guide to assessment, teacher should have the skills to act as a facilitator and at the same time to act as an assessor. Therefore, teacher should posses with knowledge in designing assessment materials to avoid leading to another issue of validity and reliability of assessment (Savin-Baden, 2004).

CONCLUSION

As concluding remark, this research paper is a proposal to develop a model of monitoring and assessment of student in undertaking technical skills project that is also applicable in lifelong learning settings in TVET. We draw the model to focus on monitoring and assessment process within PBL environment to help student's meeting the subject objectives. We hope that the strategy to incorporate all three stakeholders in developing the model could yield valuable outcomes in supporting the school based assessment that will be implemented soon. The conceptual framework introduced that concern on

technical and personal skills hopefully will increase the impact of the monitoring and assessment practice especially in technical fields. Students should poses with personal skills particular the skill to 'learn how to learn' in order to sustain to the highest level in our educational system. This also is important in raising student's satisfaction and fairness to become more responsible and independence on their learning.

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