

Malaysian PBL Approaches: Shaping World-Class TVET Skills towards IR 4.0

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Abstract--- *An Industrial Revolution 4.0 promoted by Malaysian government entitles the rapid growth of manufacturing sector thus promotes a multi-level of workforce and skilled work force needed to satisfy the rapid technological development application. The challenges arise on preparing the individuals to meet with the current business at adequate skills level and the student need to be prepared in such way satisfied the business expectations. Looking into this situation, this paper aims to study the concept of correlation between active learning method known as Problem-Based Learning (PBL) Method and required employability skills in TVET. As an initiative to enrich the future opportunity on empowering TVET skills, this study assumes that there is positive relationship between employability skills and PBL approaches in improving student's quality and skills. The method of study involves documentation analysis on previous research to proves the importance of employability skills in enhancing student's competencies and the effectiveness of Problem-Based Learning Method in preparing the students to meet the expectations. The main findings of this study claimed that there was a positive relationship between employability skills and PBL learning method. Result acknowledge that PBL has the ingredients to help develop employability skills and student's behavior. Through PBL, students learn to become more associates in the teaching and learning processes as they take responsibility throughout the learning process. It would suggest that the educational institution should emphasize the needs of the industry and students by creating awareness and guiding the students in self-analysis and in acquisition of skills.*

Keywords--- *TVET, Employability Skills, Active Learning, Problem-based Learning.*

I. INTRODUCTION

Malaysia is now on their end-point journey towards Vision 2020 and is now ready in transforming to become a developed nation during the second phase of fifteen-year period. Every single thing that now serve the world nation has changed tremendously in terms of technological development and urged the rapid growth in manufacturing sector. As the consequences, a multi-level of workforce and skilled work force needed to satisfy this rapid technological development application. This change has created impacts on the nature of work where a high level of use technology is a necessity to compete in the global arena (Jailani et al., 2015) The challenges arise as a more flexible workforce with advanced technical skills coupled with well-developed generic skills such as creative thinking, problem solving and analytical skills, is greatly needed by the employer in industry in order to meet the current business challenges.

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A recent study on the mismatch skills performed by data from by Idham et al. (2017) found that the result of the study agrees that job mismatch and English proficiency and employability skills influenced unemployment among graduates.

According to annual report made by Bank Negara Malaysia in 2017, it proves that the factors underlying high youth and graduate unemployment comes from labour market mismatches arising from both limited high-skilled job creation and inadequate supply of industry-ready graduates. Therefore, employability skills play an important role to helps in creating a better job security and without employability skills there will be a decline in competitiveness and diminishing in economic return (Bakar et al., 2013).The initiative on educational institution should highlight the needs of the industry and students by creating awareness and guiding the students in self-analysis and in acquisition of skills (Kaushal, 2016).

A. Research Purpose

This paper aims to study the concept of correlation between active learning and employability skills in TVET. Perhaps, this research could enrich the information on enhancing employability skills among TVET graduates and proves clarification on the suitability of using PBL method as a teaching medium to improvise employability skills.

B. Research Assumption

The study assumes that there is positive relationship between employability skills and active learning in improving student's quality. This indicates assumption that the employability skills among TVET graduates can be improved through the application of Problem Based Learning as a teaching medium. It can be stated that the more comprehensive PBL teaching method being delivered, the better quality of individual skills can be resulted.

II. LITERATURE REVIEW

A. A review of employability skills requirement towards Industrial Revolutionary (IR) 4.0

Industrial Revolution 4.0 or formerly known as IR 4.0 concerning in the development of technology which acquire a fast pace of technological applications in performing any job / task. IR 4.0helps to nurture better quality of business making environment and generally affect in both positively and negativelyoutcomes. As in Malaysia perspectives, IR 4.0 comprise the spearheading the formulation of national policy in every economic sector including formulation on developing a good talent and human capital. A report by Institute of Labour Information and Analysis (ILMIA) Malaysia stated that among elements that needed to drive IR 4.0 is by empowering the policy on competent human resources and employment and the top challenges comes from the lack of talent. This opportunity has brought us to a larger view of perspectives on the importance of education in preparing the competent human resources. In the context of education, IR 4.0 demands changes in the contents of not only technical education, but also education in general and plays an important role in making labour force industry ready (Aulbur et.al., 2016). It is vitally important to impart appropriate education to the future workforce. The education system itself should provide access to update curriculum which is in-line with industry problems and skills and at the same time creating a holistic learning environment by providing access on updated technology of machinery or equipment. IR 4.0 implies the fast past of improvement in resources capabilities, resources allocation and cost incurred to update resources and thus affect to some implications.

Below are the details of the implication:

1. Increasing the fast pace of industrial automation application which require a higher production cost allocation.
2. Needs on updating the current business / service situation to meets satisfied level of technological application.
3. The introduction on the new multi-levelskilled of task or job such as smart animator, cyber psychologist, cloud service specialist and etc.

This implication of IR 4.0 creates a higher demanding on most of world jobs and it must be aligned with updated technology over the time. The challenges require a bigger shift on company abilities to provide adequate workforce and to locate resource and allocate cost at a right place.

This implication however brings us the exposure to explore the current needs on skills that should be highlighted in shaping a competence individual towards IR4.0 development. The phenomena of fast pace production in industrial automation definitely requires a good personal quality of individuals to maintain with the business pressure and the ability to think critically to solve the multi-level of problems. This could also affect the coordination of job among others where the skills in people management should be placed in such way that the workers are competent to perform the job. Moreover, the negotiation skills in communicating and transferring the information is important so that the information could be processed in the effective way throughout the level of organization. This could help to improve the visibility on tracking the individual work progress towards achieving the business objectives.

Apart from that, the usage of new technological application in communicating and organizing business are among the best ingredients to sustain quality but it is somehow requiring the adequate capabilities of human workforce to deal with the technology. The needs on updating the current business / service towards satisfied level of technological application enforces workers to adapt with the changes progressively and the ability towards high order thinking must be considered in the future. Similarly, a Future of Jobs Report by World Economic Forum enlist the skills needed in achieving era 2020 and particularly highlight the acquisition of skills related to emotional and physical abilities such as thinking skills (critical and creative thinking), management skills (people management) and as well as cognitive flexibility towards a fast pace of future working environment. Moreover, the study also found that the highest percentage of jobs requiring skills are complex problem-solving skills followed by process skills and social skills. Thus, the challenges of creating skills in era of IR 4.0 focus on the empowerment of human workforce to adapt with fast pace working environment and to adapt with current technological application in making a business. The skills within individuals should be assessed in a way of developing a good personal quality with a good capability skill to solve the complex problem and as well as good communication skills in delegating and negotiating task or any related information within working system and organization.

B. The importance of employability skills in TVET

Employability skills or workplace skills can be defined as transferable skills needed by an individual to make them to be employed. It is also comprising a set of skills that needed by an individual to make them perform in job. Employability in TVET plays a significant impact in preparing individual to perform well in the job.

In other words, employability skill is a group of important skills instilled in each individual in order to produce productive workforce. The importance of employability skills in TVET has shown its continuous significant contribution in preparing the student with adequate working skills and strong personal quality. As in earlier of 1964, a study by Becker defines the importance of employability skills. He stated that education and training raise productivity of workers by imparting them with useful knowledge and skills that increase their lifetime earnings and profits of the enterprise. In addition to, employability skills make TVET graduates to gain employment and make them successful in their occupations (Lees, 2002). Regression result by International Labour Organization (ILO) claimed that the impact of TVET on employment was strong and the increments of TVET cause the increments of employment in developing economies.

Employability skills also have been chosen as a most favourable aspect needed by the employers. It acts as a performance indicator for employers in hiring new employee. In employers' perspectives, employability skills of the students will help the employer to combat challenges faced by the company and effectively helps in resolving all or any problems encountered. Previous study proves that employers rated the importance of employability skills at a high level (Husain et al., 2010). As such, skills in problem-solving, tool handling competency, presentation skills and team working skills feature highly amongst the employers as important skills demanded from the students (Md Saad & Ab. Majid, 2014). Ultimately, employers want graduates that able to help them in dealing with changes, and skillful in solving matters related to technical or non-technical problems and able to work independently. The challenges now rely on the understanding of students towards the world of work and the awareness on business making is desirable. Therefore, enhancing the employability skills requires a holistic approach in refining the needs of employability skills among the graduates and the participation of real industry experience in active learning concept must be justified.

C. Problem-Based Learning Concept

PBL used to provide a learning environment to integrate the development of these skills and behaviours into curriculum in a holistic way and utilise the diversity of student experiences to develop problem-solving skills, improve intrinsic motivation and quality of learning.

PBL was developed in response to the problems and limitations of traditional teaching approaches. It is an encouraging way to learn, as students work with problems that are challenging and observed in their real life. Students realize that the learning needed to solve and understand existing problems is valuable (Barrows, 2002).

PBL method has been widely used in medical study as student will experience an active learning towards the real problem-solving situation. Among the effectiveness of this PBL method was literally been justified from previous study by Alrahlah (2016) clearly supports the effectiveness of PBL in dental education. Through PBL, students learn to participate actively in the teaching and learning processes as they take responsibility for their learning, successfully work as part of a team, and nurture their long-life learning skills.

Although there are different models of PBL has been used by past researcher, they commonly share the following characteristics:

- Learning starts with problem, question, or scenario to be investigated. The problem is typically interdisciplinary, related to the real world and ill defined. This is however promoting investigation on a number of solution and selection on final solution must be defined with fairly reasonable. The key point

in PBL is that problem is introduced before the students know how to solve it. Hence, solving the problems will be the element to drives the learning.

- Students are then will work in a small team, self-directed teams with a facilitator. The facilitator can be dedicated to one team or between numbers of team depending on the coaching needs. Facilitators can be selected among the students or any faculty members. Students need to identify the learning issues, work individually and then share the knowledge or results as to teach each other. After that, the team will work together in collectively applies the cumulative knowledge to solve the problems. The level of problems can be last from one session or even in longer periods (throughout semester) depending on the subject requirement.
- PBL claimed to produce independent learners, and allows students to create their own understanding towards their own motivation and passion. It introduces students to realize that the learning needed to solve and understand existing problems is valuable. Similar to study of PBL in TEVT, the findings of study suggest that PBL has a positive impact on students' learning, technical and social competencies in the TVET (Mohamad, 2017).

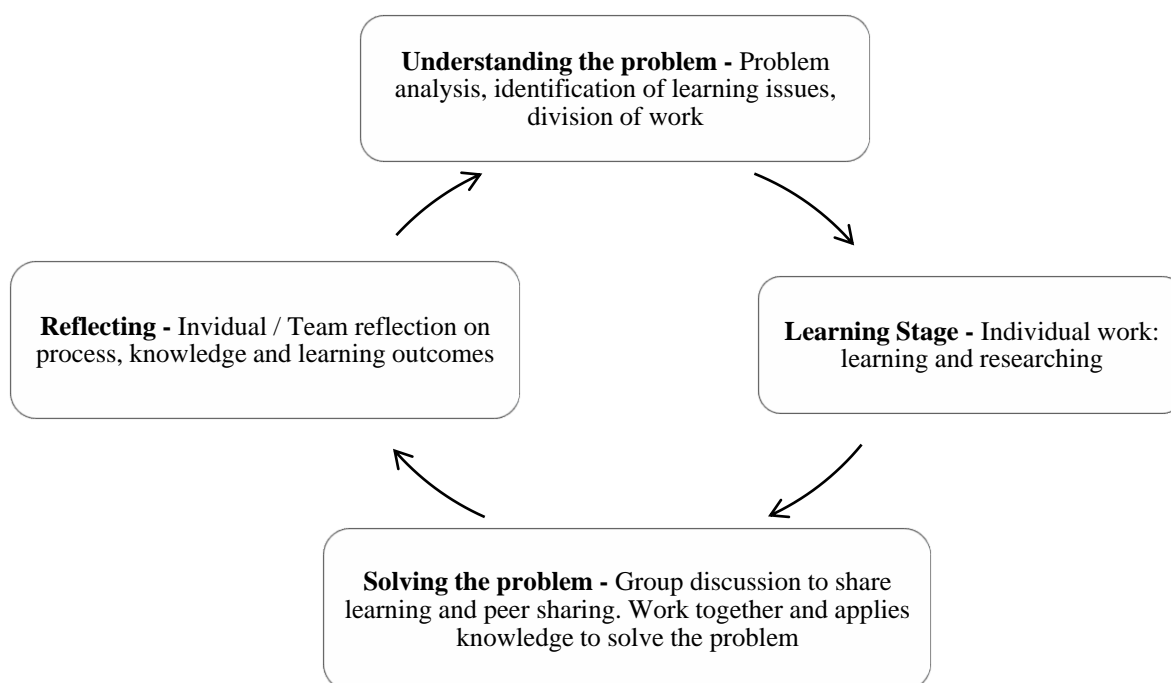


Figure 1: The PBL learning cycle

The effectiveness of PBL shows a significant impact in evidence clearly supports the effectiveness on assessing students on medical field and in TVET as well. Through PBL, students learn to become associates in the teaching and learning processes and able to develop the skills they require whilst at university and on into employment (Rosen, 2012). In TVET itself, PBL has a positive impact on students' learning, technical and social competencies in the TVET and the students were pretty much aware of PBL and its benefits towards learning (Mohamad, 2017).

III. METHODOLOGY

The main methodology in this research focus mainly in the critical review on previous research findings regarding to the topics of employability skills and active learning concept (PBL).

The issues to be addressed are the issue that much related to the study of employability skills including the importance of the skills and the potential skills needed by the students as cited by the previous research. Apart from that, the effectiveness of PBL method in teaching method also being discussed further and the reflection towards its contribution to improves employability skills are determined.

IV. RESULT AND FINDINGS

A. The real insight of PBL and employability skills

There is close alignment between the characteristic of good PBL and employability skills assessment. The relationship can be well defined through the real understanding on the concept of employability skills and PBL teaching method.

The assessment of PBL is challenging for the students as they are given autonomy to set learning goals that may or may not meet the tutor's expectations. PBL is questioning about problem and designed to be messy, ill-defined and inter-disciplinary and derived from the real-world situations.

One difficulty in evaluating PBL is that the process used to solve a problem and the solution reached are equally important. The students might easily immediately jump into their own conclusion when making a decision. This is however can be controlled if the effects of the complexity in assessing PBL method is clarified further.

The common effects of PBL method:

1. Social interactions - social interactions in a PBL group are complex as they unfold in sequence over time. Acquisition of collaboration skills during PBL is somehow may be vary depending to the student interest throughout the learning process. For instance, an understanding of effective teaching is necessary and the roles of facilitators could harmonize the group participation. The facilitators understanding must incorporate the skills and practices of effective teaching and the ways in which teaching is practiced shall overlapping with various contexts (Devlin & Samarawickrema, 2010). As a result, students will naturally develop their skills in communication and enhancing their team work skills.

2. Creativity and Innovation – In PBL there is no such way to solve solution at certain fixed answer or standard solution. The answer will be verified in accordance to the creativity of students to explain their solution. The guidance from facilitators must be placed in such way that the student understanding to be developed in the correct way of learning but not too direct them with real answer. Let the student to think wisely through the possible explanation on tools or resources to be taken when they answering the question. This could expose the students to sharpen their critical thinking and at the same time teach them to assess and answer the question in creative way.

3. Control – The pace of control should focus on student's self-development. Over period of time students will develop their confidence and will aware about their own strengths and weaknesses. The success factors will totally depend on the efforts and commitment that they show throughout the learning process takes place. For instance, this self-development helps to reduce the dependency on tutors / supervision and could gradually enhance self-reliance in performing job with less supervision.

4. Development of a wider perspectives - Since problems are devised to be quite general and messy thus it promotes investigation in a number of areas and elements such as business awareness and ethics can easily be promoted by the choice of problem.

5. Content learned is relevant to professional situations – This situation could affect to complexity and confusion in finding the solution. This is however can be solved by formulating the suitable curriculum that match with potential professional situations that best match with student's expectation. Educators should filter out unnecessary curriculum assessment. The curriculum shall meet the current demanding skills so that the survivability of students can be updated over the time.

As in employability skills, it related much with teamwork and others skills needed to adapt with real working situation. Generally, employability skills comprise the combination of skills of work readiness, personal qualities and work-related skills. There were studies on the framework of employability performed by past researchers in order to highlight the best formulation to design an adequate employability skill for TVET graduates. Unfortunately, employers keep continue to cite significant skill gaps among new recruits.

According to Rahmah et al. (2011), graduates are found to be lacking in employability skills, and have low performance in the work place. Zaharim et al. (2008) study found that required employability skills for fresh graduate engineer and engineer to be employed and successful are communication skills, problem solving and interpersonal skills. Most studies found in literature, showed that the highest ranking of employability skills from an employer's perspective was communication skills (Azian& Mun, 2011; Rahmah et al., 2011). Recently, Bank Negara Malaysia (2016) reported that a survey conducted by the World Bank and Talent Corporation10 found that 90% of companies believe that university graduates should have more industrial training by the time they graduate, and 81% of companies surveyed rated communication skills as a major deficit among graduates. Similar study also found by Azian and Mun (2011) where a survey conducted by the Malaysian Employers Federation showed that 68% of employers rated communication skills as being the most demanded skill in job application. It was also found that work experience, interpersonal skills, leadership and commitment are among the skills that also has been voted. For instance, Zaharim et al (2009) has literally summarize the list of skills for Malaysian Graduates and categorize employability as personal attributes, personal skills and TVET knowledge.

The correlation between employability skills and PBL teaching method lies on the agreement on preparing the good qualities of employability skills among TVET students through PBL curriculum assessment. As employability skills much related to teamwork and communication skills, PBL is the most suitable teaching method to enhance those skills as it introduces active self-learning concept and nurture group motivation. PBL focuses explicitly on these aspects and provides a very suitable medium for developing the following skills and behaviors:

1. Communication – verbal, written, sharing knowledge to others, writing reports and delivering presentations. Thus, it enhances communication skills effectively.
2. Respect and Self-reliance – Students learnt in accepting and commenting ideas or perceptions in positive way and critically evaluating contributions in making decision. The good interpersonal skills could be resulted as student able to learn on accepting and criticizing others idea in positive insight.
3. Problem solving – The effective problem solving can be produced as student learn on how to think creatively in planning for solution and decide critically method in solving the problems. The explicitly

taught continually developed all over the learning time. This could enhance students capabilities in making a good decision

4. Leadership – In PBL, students will work as a team and a leader will leads the group towards achieving the group goals. Hence, it practically exposed the students to be a leader and polishing the students to be a goal-oriented person and good team players.

A study by Beaumont & Frank (2003) also supported the above statement and literally measured the effectiveness of PBL teaching method in enhancing student employability skills. Thus, the concept of correlation will rely on the agreement among these both factors: the required skills on employability skills and the effectiveness from implementing PBL method. A similar study performed in Malaysia where the results from quasi-experimental analysis clearly confirmed that PBL have possibility to enhance employability skills among this group of students (Othman et.al. 2010).

B. The concept of correlation between employability skills and PBL teaching method

Table below summarize the concept of correlation between employability skills and PBL teaching method. The employability skills have been grouped into four main areas of skills as to simplify the concept explanation. Additionally, the below listed employability skills are being summarized from the mapping concept gather from documentation analysis on previous study and definitions from the international accreditation bodies such as UK Core Skills, US Workplace Know How (SCAN) and Canada Employability Skills Profile (Common Wealth of Australia, 2002).

Table 1: The explanation on concept of correlation

Theme	Potential Malaysian TVET Employability Skills	Expected Skills Outcome	PBL Teaching Method
Interpersonal Skills	Communication Skills	Listen, speaks, writes and negotiate effectively	PBL train students to explain knowledge among each other, defending findings and challenging others with critical evaluation on findings
	Teamwork Skills	Works well among peers with high sensitivity and respect each other	Teamwork is facilitated from coaching and commitment to solve experienced issues among team members
Workplace Skills	Basic Technical Knowledge	Understand the basic knowledge on related technical subject	Formulation on question that relevant to practitioners in the discipline
	Technology	Able to use related technology and update technology skills	Apply updated technology in the formulating question if possible
	Business Awareness	Aware on business goals	Problem can be designed multi-disciplinary involving business awareness aspect
Initiative and enterprises skills	Problem Solving Skills	Think critically and develop creative solutions	Structure problem solving; students are practised to solve real-world problem structurally
	Innovative and enterprise	Adaptable and develop strategic vision	Messy problem can have number of possible solutions and hence encourages innovation
Learning skills	Management skills (planning / organizing)	Good in self-management and efficient in making decision and utilize resources	Students engaged with the development of team and understand team maturity over active learning
	Self- awareness	Good ownership determination	Each student will hold specific roles in solving the solution and hence increase awareness on completing the task independently
	Learning	Has passion for active and ongoing learning	The team commitment encouraging motivation and self-belief

This integration of employability skills within the process of PBL provide a suitable medium for the incorporation of employability skills development among the TVET graduates and directly helps the educational institution to understand the needs of the industry and students by creating awareness and guiding the students in self-analysis and in acquisition of skills. As being discussed further earlier, each of stage involved in Problem-based teaching method directly exposed the students to real industry problem situation in which it may increase the creativity of the students to solve the problem in their own way of perception. This would absolutely allow students to explore their own way style of study to solve the problem and thus increasing their interest to follow the teaching and learning session. As communication skills has been cited as the main required skill, PBL train students to listen, speaks, writes and negotiate effectively explain knowledge among each other, defending findings and challenging others with critical evaluation on findings. Hence, this PBL teaching method reinforce curriculum in a holistic way and at the same time utilize the diversity of student experiences to develop problem-solving skills, improve intrinsic motivation and quality of learning. Hence, through the challenging situation of learning experience in PBL, it provides a great initial exposure to the students before they entering the real working environment right after graduated.

V. CONCLUSION

As a conclusion, it was believed that PBL has the ingredients to develop a good employability skills and personal behaviors development. Through PBL, students learn to become incorporate in the teaching and learning processes as they take responsibility for their learning, works well as a team, fast adaptation towards new environment and changing circumstances, and gain lifelong learning skills. It was believed that the concept of PBL teaching method that centered on students or students active learning, with learning style setting on actual condition at work location would totally have implication on existence of employability skills development of students. In practicing PBL in any educational institution, it would suggest that the educational institution should understand the needs of the industry and students by creating awareness and guiding the students in self-analysis and in acquisition of skills. As a part of planning towards shaping a good TVET skills in IR 4.0, the stated IR 4.0 employability skills should be prioritized and the execution of skills assessment must be well-characterized with the concept of PBL teaching method. The application on updated classroom technology such as Internet of Thinking (IOT) could be very suitable in harmonizing the mode of PBL teaching delivery and enhancing the student interest on the learning session.

Therefore, this concept paper can argue that PBL is effective in enhancing employability but we are not yet in a position towards providing a concrete evidence that the benefits are achieved. All the cited ideas and suggestion in this paper were collected as the understanding from previous study and gathering reviews from the expertise. Our main concern now is to share our opinions and explains clearly the positive relationship of using PBL method and its beneficial towards enhancing the TVET employability skills. This could open up the future opportunity of study on empowering our TVET employability skills through PBL teaching method. The recommendation on future study could justify deeply the effectiveness of this correlational concept by performing experimental study to provide a concrete evidence towards this understanding.

ACKNOWLEDGEMENT

This research work is a fully-funded research awarded by the Research Management Centre, Universiti Tun Hussein Onn Malaysia (UTHM) Johor under Geran Penyelidikan Pascasiswazah (GPPS), Vot No. H366.

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