Problem-Based Learning in the 4 Core Areas (PBL4C) – preparing children for the future
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Problem-Based Learning the 4 Core Areas (PBL4C): Preparing Children for the Future

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Abstract

Problem-Based Learning the 4 Core Areas (PBL4C) that emerged from SEAMEO RECSAM to promote the learning of the 4 core areas namely: content knowledge, thinking processes, skills and values. In a PBL4C classroom, students work in groups on developing skills and the content knowledge needed to build a solution to an assignment. Teachers act as facilitators to guide students by assigning real life problems aimed at probing the content knowledge and using harmonious peace values in decision-making to figure out the possible solutions and appropriate thoughts. This paper intends to discuss the implementation of PBL4C assignments on four groups of teachers from Southeast Asia countries. Each group was given the same context problem entitled “making wise decisions”. All group members were cooperative to solve the real life problem. They came out with various thoughts and their applications not only learnt the content knowledge and skills but also use creative problem solving for harmonious values in decisions. As parents, teachers or educators, we should ask ourselves “What do we want children to be when they grow up?” and “How do we prepare children for the future?”

Keywords: Problem-Based Learning 4 Core Areas; PBL4C; real life problem; cooperative learning; creative thinking

Introduction

As Willard R. Daggett said education is integral to maintaining the culture and structural stability of society. Society, whether it is viewed on a local, national or global scale, is in a perpetual state of flux. An effective education system is one that is adaptable to change. Stephanie Bell-Rose and Thomas W. Payzant also addressed that preparing today’s students for success and eventual leadership in the new global marketplace is the most important responsibility in education today. Entrepreneurship education is an important tool to achieving these objectives and should be universally available to provide all students with the opportunities to explore and fulfill their potential.

The convergence of globalization, technological, innovations, knowledge-based economies and demographic trends has led to an increased focus on the effects and importance of entrepreneurship. In this context, entrepreneurship is a driving force of economic development,
structural change and job creation. It is also a way to address the challenge of poverty reduction (Vyakarnam, 2008). Making the change to universal availability of youth entrepreneurship education is, of course, a monumental task. Changing existing school systems will take time, especially because teachers will need to be retrained for the experiential, hands-on approach entrepreneurship education requires. A major key to success will be putting experiential techniques and entrepreneurship content into the basic training aspiring teachers receive at schools of education and teachers’ colleges. Entrepreneurship education can help promote an entrepreneurial and innovative culture by changing mindsets and provide the necessary skills. School systems have traditionally focused on providing basic skills and ensuring students can secure future jobs—not on teaching students to become entrepreneurs. Meanwhile globalization, the rapid development of technology and the lower cost of travel have changed the nature of work. It is no longer enough to train students for a career. Schools and universities must prepare students to work in a dynamic, rapidly changing entrepreneurial and global environment. Entrepreneurship is critical for understanding operating in the current and future global economy.

Helping young people literate their innate entrepreneurial skills and learn about entrepreneurship calls for educational practices that differ in key ways from those used in workplaces, in universities, and in other adult learning environments. Doing so also means potentially radical changes to mass industrial-age primary and secondary education as it has developed in almost every country—entrepreneurship education must itself be entrepreneurial, the entrepreneurship ecosystem must bloom. Before the entrepreneurial ecosystem can bloom, systems of education must embrace the idea that entrepreneurship is a “good thing” A greater or lesser degree in just about every culture there are sceptical or even hostile attitude barriers to entrepreneurship. Intuitively, people seem to understand the “creative destruction” that accompanies entrepreneurial business enterprise, hence the fear and suspicion it can confront. And hence the need for entrepreneurship education aimed specifically at young people, who are typically more open to self-exploration and usually more willing to challenge received wisdom and societal prejudice than are most adults.

In this global economic era, graduate from higher learning institutes are faced with the challenges of finding adequate jobs. Most of the employers seek graduates who have the ability to solve authentic problems encountered in the workplace. Unfortunately, the current curriculum and pedagogy employed in higher learning often fail to prepare graduates for the challenging workplace (Sharifah & Lee, 2005). Woo (2006) indicated that most of the employees who hire fresh graduates lack of the soft skills which are the core requirement for any job. The soft skills can be categorized into three areas: character, interpersonal skill and critical and creative thinking (Nor Hartini, 2007). These skills enable one to communicate effectively, manage relationships, lead a team, and solve problems. In order to assist students, educators/teachers may use several approaches to enhance their skills and knowledge. It is suggested that these educators/teachers may consider introducing Problem-Based Learning (PBL) approach in teaching which is believed to increase soft skills and independent learning (Sharifah & Lee, 2005).

Hmeolo-Silver (2004) described PBL as an instructional method in which students work collaboratively to find possible solutions for a problem scenario. The students formulate and analyse the problem to generate hypotheses about possible solutions which leads to a brainstorming session and self-directed learning. This encourages the students to more research
and to find new possible solutions for the problem. The teachers/educators act as facilitators throughout the PBL session. The underlying principle of PBL is that “all lesson begins with a context problem” where it provides a new dimension, direction and motivation for learning. Students are provided with open-ended and real world problems which help them to enhance their problem solving skills, analytical skills and gain new knowledge on subject matter (Barrows & Tamblyn, 1980; Boud & Feletti, 1991; Schmidt, 1983).

In support to this claim, we introduced the Problem-Based Learning the 4 Core Areas (PBL4C) as one of the learning approaches that emerged in Southeast Asian Ministers of Education Organisation, Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM). The 4 core areas incorporated in this form of PBL are strong connections across contents knowledge, thinking processes, skills and values. It was implemented with the educators/teachers from 11 Southeast Asia countries namely: Brunei, Cambodia, Lao PDR, Vietnam, Malaysia, Singapore, Thailand, Myanmar, Philippines, Indonesia and Timor Leste. The interconnectivity and significance between these core areas are illustrated through a PBL activity.

**Implementation of PBL4C in RECSAM**

The representative participants from Southeast Asia member countries who attended the regular courses were divided into 4 groups, each group learnt to occupy leadership roles which have helped to develop their interpersonal skills. In the PBL4C classroom, the teacher acts as a facilitator rather than a source of solutions. Context problem, Scenario 1 and Scenario 2 (as shown below) were distributed sequentially after a duration of time to all participants.

**Activity Title: Making Wise Decisions**

<table>
<thead>
<tr>
<th><strong>Context Problem</strong></th>
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<tbody>
<tr>
<td>You are the siblings of a family. Suddenly, your father receives the medical check-up report from the doctor. He is given only 4 days as preparation to leave for some very urgent matter in Japan for one month, all funded by the hospital. Your mother will be following to take care of his needs. Your parents will be depending on you to take charge of the family for a month.</td>
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<tr>
<th><strong>Scenario 1</strong></th>
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<tr>
<td>Your parents gives you RM2,000 (Two thousand Ringgit) as expenditure (food, groceries, utilities, house rental, electricity, transportation, and so on) for the time they are not around. Your responsibility is to plan to use this amount of money effectively in one month. You must explain your plan to your parents before they leave their house. They want to know how you can maximize the benefit of the amount of money.</td>
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</tbody>
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<tr>
<th><strong>Scenario 2</strong></th>
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<td>Life is unpredictable. While you are watching TV and expecting your parents to return tomorrow, the news announcer reports that a huge earthquake and a tsunami hit Japan. The airport will be closed and your parents will not be back for at least another week. What are your plans? How do you further take care of your siblings?</td>
</tr>
</tbody>
</table>
The PBL4C Learning Process

The context problem provided the opportunities to examine and try out what do they know and what do they need to know, discover what did they learn, develop skills for achieving higher performance in team, improve communications skills. The participants discussed the context problem and list its facts/information parts.

**Figure 1 What do we know?**

The facts/information came from the group’s analysis of what they know. This includes both what they actually know and what strengths and capabilities each team member has. Consider or note everyone's input, no matter how strange it may appear: it could hold a possibility! They wrote out the problem statement in their own words (as shown in Figure 1). The problem statement should come from their group's analysis of what they need to know to solve it (as shown in Figure 2). The problem statement is often revisited and edited as new information is discovered, or "old" information is discarded.

**Figure 2 What do we need to know?**

In scenario 1, the participants may be repeated and reviewed as new information becomes available and redefines the problem. They listed out all possible solutions, then order from strongest to weakest. Choose the best one, or most likely to succeed (as shown in Figure 3).
Figure 3 Maximize the benefit and Possible Solutions

According to scenario 1, each group presented their plan and/or recommendations to a group and classmates. This should include the problem statement, questions, data gathered, analysis of data, and support for solutions or recommendations based on the data analysis: in short, the process and outcome. In their plan, they not only learnt the content knowledge, thinking processes but also practiced the skills and harmonious peace values in decision-making to figure out the possible solutions and appropriate thoughts (Teoh, Preechaporn & Leong, 2010).
Scenario 2 enables participants to learn about the changes and experience the financial crisis that nowadays it is happening in families, local, national and global. As shown in Figure 4, the decision-making involves problem solving skills. Decisions made with due considerations can be discussed that can make learning meaningful. They practice their communication skills, exhibit their thinking processes during the Q&A session and exercise good assessment qualities when self & peer-assessments are conducted.

The 4 Core Areas Embedded in Learning Process

The PBL4C has become a recognised and accepted educational approach to curriculum delivery. Profoundly different from the traditional approach to education, it aims to optimize students’ growth in knowledge and understanding, promote thinking processes, enhance team building and foster active learning. The participants engaged in the PBL4C approach become active learner, practice their leadership skills, enjoy learning mathematics, enhance the ability to make decision and problem solving skills. The above learning process also indicated that PBL4C promises enormous advantage to the students.

In PBL4C implementation, class activities are constructed around open-ended problems. Problems are used as a stimulus for students to start the learning process. However, teachers no long lectures. They are not the authoritative source of information and knowledge. They must guide, probe and support students' initiatives. Students are empowered to take a responsible role
in their learning. Students have to take the initiatives to inquire and during their self-directed learning must be applied back to the problem with reanalysis and resolution. Students reason through the problem and find out what they already knew and what they should know in order to solve the problem. It is through this active and reflective thinking process that students become responsible for their own learning. It is the application of their knowledge to the problem that students test and integrate what they learn. PBL4C motivates students to participate in the learning process and enhance learners' problem solving skills. In this sense, problem-solving skills include both subject knowledge and general analysis/synthesis skills. A good problem solver has to understand the content/concepts, rules and principles related to the problems, and the hypothetical-deductive inference skills to generate hypotheses and formulate solutions. Enhancing students understanding of and positive attitude toward PBL4C process can help prepare students to face the challenges of PBL. If teachers perceive that students will have difficulties in self-directed learning, they may either provide more support during the process or accommodate students' different learning styles by balancing the learning activities via group discussions, and self-directed inquiry.

**Preparing Children for the future**

In a role as parents, teachers or educators, we should ask ourselves “What do we want children to be when they grow up?” and “How do we prepare children for the future?” As Abraham Lincoln once said; the children are the message that we send to the future, and today is the future of yesterday and the young adult community today was once the children of yesterday so with the increasing social, cultural, economics, religious and environmental issues and problems we can start rethinking of education that brought this present young adult generation’s now. If we are preparing to send and new batch of generation to the future do we still insist of the same outcomes of learning as was we have today. Or if we want something to change in the near future, we need to do something for it. We need to redefine and transform the education system in such away it will be more relevant and it will serve the needs of the young generation.

**Conclusion**

The PBL4C has changed the learning process. It has observably increased motivation. It has helped participants learn more meaningfully and harmoniously in content knowledge, thinking, skills and peaceful values. And it has also created a feeling of excitement about coming to class. The children have become more self-directed learners after experiencing the PBL4C implementation. Participants attain increasing levels of individual achievement that prepares them for success in teaching. This approach has influenced the pedagogical developments in entrepreneurship education that prepares children for the future.
References


Bell-Rose, S & Payzant T.W., Educating the next wave of entrepreneurs: Unlocking entrepreneurial capabilities to meet the global challenges of the 21st century, World Economic Forum, Switzerland, April 2009.


Nor Hartini Saari, (2007). Unemployed Graduates: How can we address this situation?


Vyakarnam, S. Educating the next wave of entrepreneurs: Unlocking entrepreneurial capabilities to meet the global challenges of the 21st century, Driving force of entrepreneurship Education, World Economic Forum, Switzerland, April 2009.

Bio-data of Authors

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Dr Warabhorn Preechaporn is a Mathematics Education Specialist from Southeast Asian Ministers of Education Organization, Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM). She has 26 years of experience as a secondary school mathematics teacher in Southern Thailand. She was attached to the Research and Development Division, RECSAM where she was involved in research projects. She is currently in the Training Programme Division, RECSAM where she has facilitated and supervised the training courses for educators from the SEAMEO member countries, countries from the African continent and the Colombo Plan member countries. She has chaired and presented papers at international conferences. Her interests are in dynamic mathematics software (GeoGebra), universal harmonious values integration, observation skills and PBL4C.

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Mr Teoh Boon Tat is a Mathematics Education Specialist from Southeast Asian Ministers of Education Organization, Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM). He is currently humbled to be given an opportunity to present a paper at a UNESCO conference. He has 10 years of experience as a primary school teacher. He taught mathematics for 10 years in a secondary technical school. And he has 5 ½ years of fulfilling experience in making a difference in teachers in the Training Programme Division, RECSAM. His current interests are in peace culture, EIU, universal harmonious values integration, phenomenology, mathematics in nature & nature of mathematics, minding the mind, metacognition & metaaffection, observation skills, holistic nurturing, PBL4C and RME.

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Dr Leong Chee Kin is a Mathematics Education Specialist from Southeast Asian Ministers of Education Organization, Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM). He is currently the Chairman of the GeoGebra Institute of Malaysia. He has more than 24 years of mathematics teaching experience in both the primary and secondary levels. Since his secondment to SEAMEO RECSAM in 2008, he has been actively involved in conducting mathematics programmes such as workshops and training courses for educators from the SEAMEO member countries, countries from the African continent and the Colombo Plan member countries. He has chaired and presented papers at local and international conferences. He has reviewed mathematics textbooks and was an Editorial Board member for the translation to English, the Japanese “Study with Your Friends Mathematics for Elementary School” textbooks.
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Dr Fong Ho Kheong obtained his PhD from the King’s College, University of London. He is the former Associate Professor of the National Institute of Education, Nanyang Technological University, Singapore and he had been involved in training mathematics teachers in the university for 25 years. He was the founding-president for Association of the Mathematics Educators, Singapore from 1994 to 1998. He specialises in teaching high ability children and children who have problems in mathematics. His research work includes diagnosing children with mathematical difficulties, teaching thinking to solve mathematical problems and applying psychological theories for teaching and learning of mathematics. He has published more than 100 journal articles, research reports, as well as primary and secondary mathematics books. He is the consultant and principal author of the “My Pals are Here Mathematics Series” which is the most popular primary mathematics text book used in Singapore. His series of text books have also been translated into Indonesian language for use in Indonesia and also adapted to be used in United States of America. He is currently working as a Mathematics Education Specialist in the Training Programme Division, RECSAM.