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Adventure Based Learning Module in Statistics: Development and Impact on Students Achievement, Critical Thinking and Leaderships Skills

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Abstract

This proposal article has two aims which is developing a module using adventure-based learning (ABL) method and test the effect of the ABL modules on three variables. The variables to be tested are the Basic Statistics, critical thinking and leadership skills of students. This research involves development design and quasi-experimental pre-posttest nonequivalent design. So this research involved two phases: development and testing phase. In the development phase, three important steps that should be followed is the process of building modules, validity and reliability of the module and do pilot study of modules. Modules that have validity and reliability were tested at the Institut Pendidikan Guru Kampus Ipoh which selected by purposive sampling. While the sample is selected among the student population of the campus is the second semester Preparation Bachelor of Teaching programed. The samples were randomly selected using cluster sampling and divided into a control group (conventional method) and the treatment group (ABL method). The results of this study are expected to open educators minds to doing innovative teaching methods. It thus is able to guide the implementation of the 21st century teaching methods. The impact of this research is also expected to assist the Ministry of Education to achieve the vision and aspirations of the country.

Keyword: Modules, Critical Thinking, Leadership Skills, Adventure Based Learning, Development

Introduction

Every child has given the high potential and remarkable talent. Potential and talent that will be achieved with the continued development and achieved through education. Siti Zabidah (2006) asserts that children's potential are able to enhance and this depends on the teaching and learning environment. So, teachers should provide two ways interaction, positive

environment and apply various teaching and learning methods that are capable of forming a child's potential. This is in line with the National Education Philosophy of developing a balanced human to an optimum level (Azhari Mariani & Zaleha Ismail, 2013).

Accordingly, the Ministry of Education (MOE) under the National Philosophy of Education wants to create a better overall view of student in physical, emotional, spiritual, intellectual and personality aspect. Change by change made by the MOE in line with current developments and demands. A variety of skills has to be supplied and applied on students to enable them to be competitive and have an added value, thus it can increase their potential and talent at the highest level.

Malaysia neighboring countries like Singapore have implemented the teaching and learning oriented Higher Order Thinking Skills (HOTS) since 1997 (Yeo & Zhu, 2005). This is evidenced by the country's achievements in the Trends in International Mathematics and Science Study (TIMSS) and the Programmed for International Student Assessment (PISA) in which they have occupied the top five in both the assessment test. While in Malaysia, teaching-thinking skills oriented began in the early 1990s (Rajendran, 2010). However, the performance of the country is still not encouraging. Creative and Critical Thinking Skills (CCTS) was introduced in 1989 after the national curriculum changes implemented. Generally the country has long been exposed to the thinking skills in teaching and learning. But sadly, teachers still not imply any changes in thinking skills while teaching but executed it individually (Yee, Jailani, Suzanna, Widad, & Tee, 2010). Math teachers still use the delivery methods lectures, individual work (training), and review the answers in their class (Yeo & Zhu, 2005). They also operate the exercises drill and focuses to finish the syllabus (Azhari Mariani & Zaleha Ismail, 2013; Koh, Choy, Lai, Khaw, & Seah, 2008). They also emphasize the exam marks (Wan Nor Atiqah & Muzirah Musa, 2016). This clearly shows that changes in teaching practice still does not apply. This change is necessary in order to produce a balanced generation.

Noor'ani Ahmad, Nor Rahmah Abdul Hamid, and Nor Shamsidah Amir Hamzah (2008) states their opinion that the method meets the syllabus and the students' attitudes is the best method. But Noraini Idris (2005) said, teachers are advised to use methods that are appropriate to the topic of creating a learning environment. Teaching methods that can be practiced such as problem-based learning, lecturing, discussion, inquiry learning, cooperative learning and projects based learning. However, teachers need to shift the new paradigm in teaching and learning especially enhance students' thinking skills element. Then, they can enhance students' soft skills as required. Through the Malaysia Education Blueprint (PPPM), 2013-2025 (Ministry of Education, 2013) has outlined a number of student aspirations to be achieved through education. Among them are thinking and leadership skills. In addition, the skills of the 21st century should also be emphasized in order to produce human capital that can be competitive. Human capital is meant is quality students from a variety of physical, emotional, spiritual, intellectual and personality can be enhanced through teaching methods.

Among the issues of education, especially in terms of teaching and learning methods that are still going on which has implemented a number of programs around the beginning of 2000. This program combines elements outdoor learning and adventure. That approach is called adventure based learning (ABL) methods. ABL is a new teaching and learning method.

This method based on theory of experiential learning and inquiry learning (Veletsianos & Kleanthous, 2009). ABL provides opportunities for students to experience learning in the real world. According to Doering, Miller, and Veletsianos (2008), PBA produce authentic learning and create a collaborative environment for teaching and learning.

ABL visible benefit to the closeness of the relationship and friendship among students (Cooley, Holland, Cumming, Novakovic, & Burns, 2014). The relationship was forged lasting friendships while performing outdoor activities together. This method also seen a fun method in which students do not have to sit in a chair and table, listening to a lecture from the teacher or lecturer, writing and reading, but this method is open to students an experience that is not boring. Students also have the opportunity to be outside while applying classroom learning to real life (Larson, 2010). This method wants to try something new to support the concept that someone could learn most effectively when they do fun learning activities, interested in what they have learned, active learning, feeling controlled on what they have learned, able to reflect the experience afterwards, and make connections to other learning or other life situations (Mohd Afifi Bahurudin Setambah, Nor'ain Mohd Tajudin, & Mazlini Adnan, 2016). Thus, students no longer feel mathematics as something that has nothing to do with reality

Thus, educators suggest an open mind and give students the opportunity to experience the atmosphere of the times. In the past, teachers only taught through a textbook, and a blackboard. Then, the teacher began to use overhead projector, further teach using a computer and liquid-crystal display (LCD) projector. So, it's good when the teachers of this age try to implement ABL method in their teaching and learning. ABL provides an opportunity for students to enjoy their learning with some investigative activities. Investigative inquiry activities aligned with adventure may improve students' thinking skills. Investigation group will also will be enhance the students' leadership skills. The Literature of ABL show this method is in line with the requirements of human development and is also one of the alternative methods of teaching and learning in the 21st century.

Problem Statement

The question is, how far the willingness of teachers or lecturers to change and use innovative ideas to improve their teaching methods? This is a fundamental problem in which they are not prepared to implement the transformation (Azhari Mariani & Zaleha Ismail, 2013; Wan Nor Atiqah & Muzirah Musa, 2016). It requires training or guidance of the implementation of innovation so that they can carry out the teaching and learning innovation. The need to help teachers make these changes very urgent (Rajendran, 2001). These requirements also need the support of various parties (Sukiman Saad, Noor Shah Saad, & Mohd Uzi Dollah, 2012). So, this may be addressed through the development of training modules based teaching and learning adventure in which this module can be used as a guide to the implementation of teaching and learning. It is also an urgent need because qualified teachers also do not have the ability to implement this learning method (Carrier, Tugurian, & Thomson, 2013). Then, test the impact of PBA is important because this research findings can be used to prove this method can develop human capital as required.

Doering, Scharber, Riedel, and Miller (2010) states two thirds of the ABL method was carried out on students' level of six or younger and 10% ABL method is carried out in secondary schools. According to him and his colleague as well, 34.9% conducted research in the social sciences, 25.7% of the curriculum of primary education, 18.2% science and 8.2% in

the field of special education. ABL and its benefits have been study by researchers in and outside the country. In fact, the study was conducted before this is not mathematics education. Thus, the implementation of the ABL's in mathematics education to give additional knowledge to the teacher or lecturer to implement this method in teaching and learning. In fact, this study will also prove PBA impact on student achievement, thinking skills and leadership skills.

Research Objectives

This study aims to develop and test effect of ABL modules on mathematics achievement, thinking skills and leadership skills.

Literature Review

Develop modules using the new method requires a review of the literature. This step is very important to guarantee the quality of the modules developed. The literature review shows that teachers need to focus on four different elements to create an ABL environment such as curriculum, activities, standards and media (C. Miller, Veletsianos, & Doering, 2008). According to Miller, Hougham, and Eitel (2013) using media such as android phones and digital cameras are sufficient for creating an ABL environment. Integration of the four elements that will create an atmosphere of learning ABL motivated, exciting and fun. The study, conducted by Doering and Veletsianos (2008), found that students enjoy participating in the ABL, exhibit behavioral changes in the program and discuss ABL outside the classroom.

Riggins (1986) suggested several factors that influence the effectiveness of PBA environment. The results of his research, there are five key factors that have been identified, namely the number of small groups of students, cooperative learning environment, frequent communication between students, focusing on the successful completion of the task and create a positive culture such as mutual support to each other. These factors should be emphasized when undertaking ABL and the ABL effectiveness can be improved.

In addition, there are other guidance suggested. Veletsianos (2010) has posted a guide for implementing the ABL in teaching and learning. PBA implementation guidance he is as follows:

i. Determine the issue or problem to be solved by students.
ii. Identify the location, population and experts on the issue.
iii. Developing curriculum and design online environment that involves collaboration.
iv. Exploring the selected location and collect data related to the curriculum.
v. Share data collected online and leads to the goals of the curriculum.
vi. Collaboration between students in the classroom or outside to explore and learn.

According to Larson (2010), one of the activities that can be carried out as an adventure activity is providing daily tasks to students. For example, students are asked to go to the grocery store, make a purchase in cash and negotiate the price of the purchase. Whereas according to Karppinen (2012), ABL is different from traditional teaching in which teachers and students will jointly participate in planning and realizing the goals. Discussion theme should be applied in teaching and learning.

ABL method requires detailed planning. It involves a risk to the safety of students. Selection of appropriate activities should also be investigated. This is critical to enable the final results of teaching and learning can be achieved as desired. If the activity is too easy, the students will feel bored. Whereas, if the activity is very challenging, so students will be concerned with the activities (Stuhr, Sutherland, Ressler, & Ortiz-Stuhr, 2016). Therefore, the implementation of teaching and learning with the ABL should be focused on the selection of activities.

In conclusion, the ABL is a method that provides an opportunity for students to experience learning in the real world, collaborating with technology and accompanied by various parties, namely students, teachers and experts. This approach supports experiential learning theory and inquiry approach (problem solving). This approach is designed to develop a special strategy to diversify. However ABL can be implemented in several ways either learning outside the classroom, project-based, technology cyberspace or combination of such methods. Thus, module development should take into account the elements discussed above. Elements being considered is described by the Figure

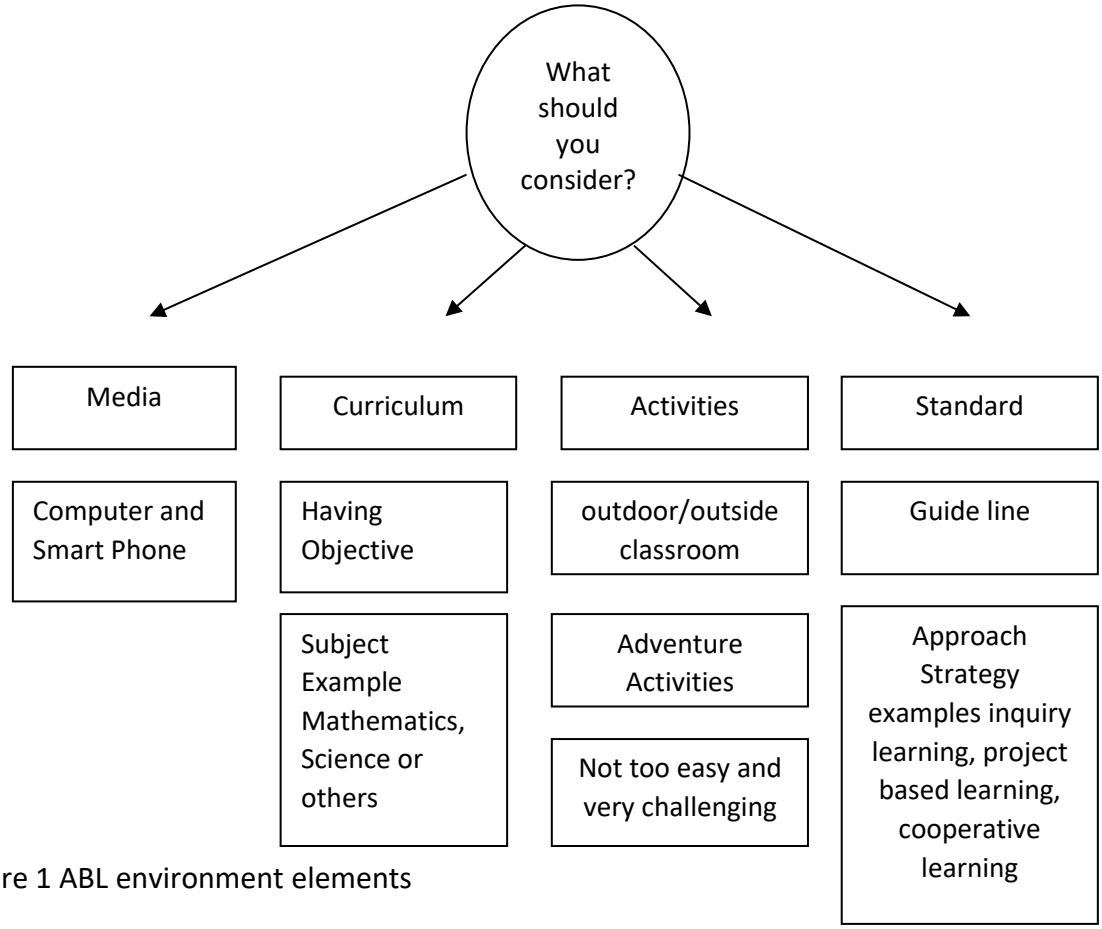

Figure 1 ABL environment elements

Research Methodology

This study aim to develop and test the effect of ABL module on the Basis Statistics achievements and create first class human capital. Depending on the purpose of the study, it can be determined the design of a study. The combination of a number of study design can be used in one study (Chua, 2006). According to Ghazali Darussalam and Sufean Hussin (2016), the development design research is the study about to develop modules, creating software

and building a model. Since one of the objectives of this study is to develop ABL modules. Thus, the study design was chosen for the first phase is development. The development of this module will involve three process that is build modules, validity and reliability of the module and the pilot study. The three steps are carried out to ensure that the module developed is really able to give optimum results.

The second phase involves testing phase effect. The design of a quantitative approach using a quasi-experimental study of pre-test and post-test two groups of unequal very convenient to use and will be implemented. Samples were students from the Institute of Teacher Education Campus was selected. Purposive sampling techniques intended to be used during the election of campus. Students who in turn will be divided into two groups, the control group and the treatment group. Both groups will be given a pre-test, post-test and post post-test. Three instruments will be used during the testing phase of mathematics achievement test, the test of critical thinking skills and leadership skills questionnaire. Two types of statistics will be used during the process of data analysis descriptive statistics and statistical inference. Statistical inference is used multiple analysis of variance (ANOVA), analysis of variance ANOVA and Cohen's D in which use of this analysis to show the effect of the difference between the two groups. The methodology of this study illustrated by Figure 2.

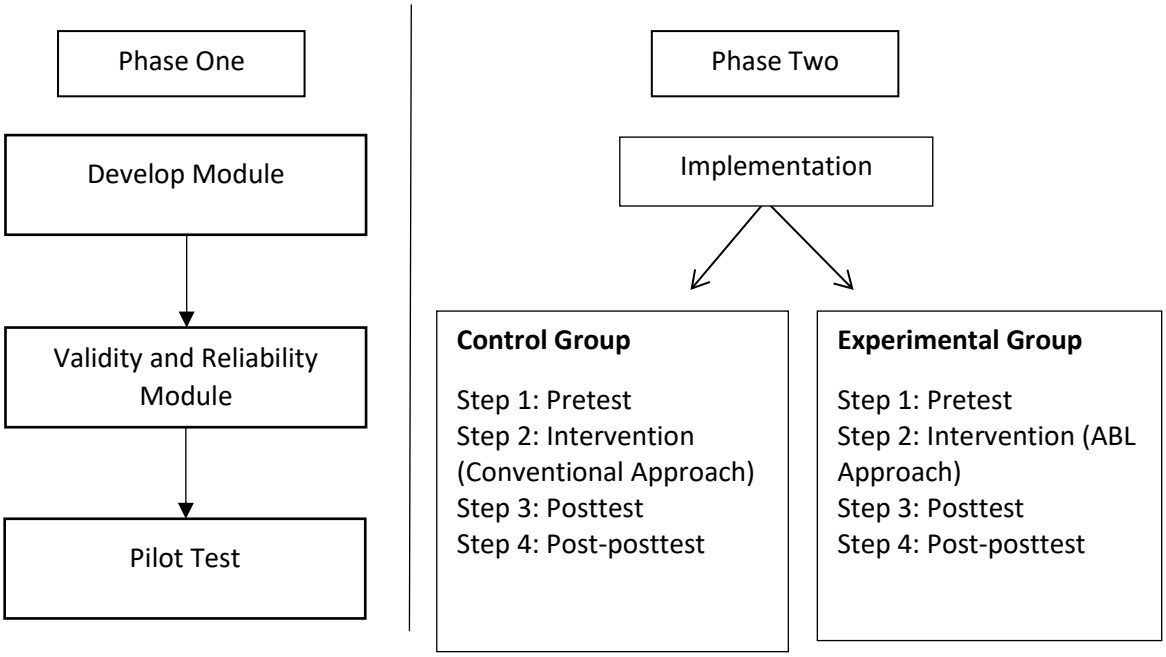

Figure 1 Methodology Process

Summary

This study focuses on two phases. The first phase is the development phase, the second phase is a phase of testing the effects of module developed. There are some things that need to be addressed in phase one is the validity, reliability and pilot of modules developed. This step is important to ensure the quality of the modules developed. The second phase is the testing phase module effect on mathematics achievement, critical thinking and leadership skills of students. This phase can also prove that the ABL may have a positive impact on the elements specified. Proof of that can provide additional knowledge to teachers and lecturers in the implementation of new teaching and learning. There can be an alternative learning methods

to be used by them in the future. It is hoped that this study will provide a good implication to the vision and aspirations of the country.

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