

Impact of Statistic Adventure Based Learning Module on Students Achievement

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Abstract: *This article presents a proposal that aims to develop and testing effect of adventure-based learning module on fundamental statistics achievement, critical thinking and leadership skills. This study will employ a quantitative approach research using a quasi-experimental pre and post-test non-equivalent control group design. The sample for this study will be selected randomly at one Malaysia Teacher Training Institute and will be involved semester two students in Program Persediaan Ijazah Sarjana Muda Perguruan. Three main instruments will be used in this study such as The Fundamental Statistic Achievement Test, Critical Thinking Test and Leadership Assessment Questionnaire. The sample will be divided into two groups: the experimental groups will undergo an adventure-based learning approach while control groups remain to the conventional approach. The results of this study are expected to provide an alternative teaching approach that can be implemented by lecturers, teachers and educators in practicing the teaching and learning for the 21st century. This study is also expected to assist the Malaysian National Aspirations and Mission in developing successful human capital.*

1. Introduction

Innovation and transformation in education is often the case. This matter must be addressed by educators in the country. Dropping knowledge in the field of teaching and learning will impact negatively on the country's students. The effects of the approach to teaching and learning issue is still hotly disputed. Yeo and Zhu (2005) stated that teachers still use the approach delivering lectures, individual exercises and discussion of answers in math class.

Hence, a new transformation of education, especially the teaching and learning needs to be done. The transformation is expected to be covered various aspects and one of them is the skills of the 21st century. 21st century skills required as digital literacy (ICT), inventive thinking (problem-solving, higher order thinking skills, critical, creative and innovative), and interactivity (Binkley et al., 2012).

Strengthening teaching and learning approaches seen is one way that can be used.

Adventure-based learning (ABL) is an approach that provides opportunities for students to learn through experience and create soft skills such as thinking skills, problem analysis, problem solving skills and personality development. According Veletsianos and Kleanthous, (2009), this approach has the basic features of the theory of experiential learning (Kolb, 1984) and inquiry-based learning (Dewey, 1938). Both approaches have proven to have a good impact on the skills. For examples, experiential learning give an impact to the social environment and raising the skills of observation, collect and analyze data and complete the tasks that have been assigned (Ahn, 2008). Whereas inquiry-based learning is a learning which has features such as identify, explore and investigate information to a problem (Thangavelo Marimuthu, Azman Jusoh, and Rodziah Ismail, 2003). Therefore, we predict the ABL will also give a same or better impact on these aspects.

There are several examples of ABL programs that have been implemented, GoNorth project 2006-2009, Arctic Transect 2004, the Jason Project, The World of Wonders, The Blue Zones, Expedschools and Field Trips (Veletsianos & Kleanthous, 2009). However, the approaches and strategies used in each adventure-based learning above are varied. For example Expedschools using project-based approach, and eField Trips based on online learning.

Therefore, the ABL seen is an alternative approach that gives students the opportunity to learn through experience, enhance the thinking element in the inquiry. Even ABL also integrated element of information and communication technologies. Therefore, researchers are recommending that the ABL can be implement and evaluate their effectiveness.

2. Problem Statement

In 2004, the ABL Arctic Transect 2004 program has made history in which more than three million students and teachers around the world are involved in this program (Doering, Scharber, Riedel, & Miller, 2010; Doering, 2007). The program successfully motivate students to follow developments in internet surfing lessons learned. This proves ABL indirectly help to increase information and communication technology skills of students. History ABL approach starts from the launch of Outward Bound by Kurt Han in 1941. He has used the ABL approach to enhance the confidence and determination of the young sailor (Hattie, Marsh, Neill, & Richards, 1997). In fact, students are reported to have established a variety of skills in teamwork, adaptability, perseverance, planning, problem solving, time management, communication, leadership, cooperation, reflecting the group and team spirit, and benefits of physical activity, self-confidence, awareness themselves, and strengthen peer relationships (Cooley, Holland, Cumming, Novakovic, & Burns, 2014). ABL seen an alternative approach that characterized the development of human capital. Hui and Cheung (2004) consider that ABL is a method that is suitable for the development of personality and society. This statement is supported by (Weilbach, Meyer, & Monyeki, 2011). In addition, the ABL is often used in various fields to enhance interpersonal and intrapersonal skills of individuals in leadership (Rhodes & Martin, 2013; Sutherland & Stuhr, 2012). In fact, the ABL seen a multi-dimensional approach which involves students in terms of intellectual, ethical, physical, and spiritual (Larson, 2010). Therefore, researchers wanted to test the implementation of the ABL in order to help build a first class human capital.

ABL currently are large in size, scope, duration, and funding. However, the ABL also can be implemented on a small scale in various areas (Veletsianos & Kleanthous, 2009). It gives the sense that the ABL can be practiced by teachers and lecturers in teaching and learning. The study of the principles that form the basis of the ABL have been carried out, but the empirical data collected on the ABL itself is still less (Moos & Honkomp, 2011). He and his colleagues said it still lacks conclusive research on the relationship between ABL on student achievement. Besides, ABL program of small-scale practiced in this country, especially in view of mathematics education is still lacking. This statement is supported by Karppinen, (2012) in an actions research that have been implemented. The effectiveness of the ABL approach is still less studied by researchers, but the interpretation of this approach is still under discussion (Veletsianos & Kleanthous, 2009). Thus, the researchers want to

conduct small-scale ABL program in mathematics education and studying the impact of ABL is in some aspects related to mathematics achievement. Elements of human capital in terms of critical thinking and leadership skills also will be tested by researchers.

3. Purpose of Study

Based on the issues stated earlier, the general purpose of this study was to test the effects of ABL module on the fundamental statistics achievement of students.

4. Literature Review

Adventure-based learning (ABL) approach has the basic features of the theory of experiential learning (Kolb, 1984) (Cooley et al., 2014; Hans 2000; Hogson & Berry, 2011; Larson, 2010) and the inquiry-based learning (Dewey, 1938) (Doering, 2007; Veletsianos & Kleanthous 2009). ABL also be seen from the aspect of learning outside the classroom (Bunyan, 2011; Hogson & Berry, 2011). According Bunyan (2011), adventure learning environment consisting of certain ingredients. It requires a lot of support, leadership, physical training, mental strength and the natural environment.

Doering (2006), have put some of the key principles of the ABL. The ABL interrelated principles are as follows.

- i. A research- and inquiry-based curriculum.
- ii. Opportunities for collaboration and interaction between participating students, teachers, experts, and content.
- iii. Use of the Internet for delivering the curriculum and the learning environment.
- iv. Timely delivery of media and text from the field to enhance the curriculum.
- v. Synchronized learning opportunities.
- vi. Pedagogical guidelines for the implementation of the curriculum and the online learning environment.
- vii. Adventure-based education.

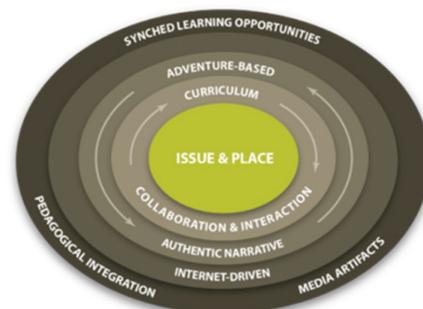


Figure 1: Adventure Learning Model (Doering, 2006)

Doering (2006) pointed out that identifying learning outcomes is a priority in planning ABL. This approach are not put adventure and exploration as a goal, but learning. Berry (2011), states that the implementation of the ABL must consider several factors, like the participants, group size, teacher character, environment, activities and processes ABL itself. These elements should be considered to get good results.

Veletsianos (2012) proposed two ABL situation that can be implemented. The first group of students perform adventure activities, gathering data related and share through online learning while remaining teachers and friends are in classes conducted investigations on the data in the area, discuss to each other until the goal is achieved curriculum. While the second situation, the teacher and a group of students went perform exploration activities outside the classroom, the information received is shared to different classes. Both of these situations have to approach and inquiry-based learning experience.

The role of the teacher in the ABL no longer as trainers, facilitators or designers such as online learning space, but PBA is a collaborative between students, teachers, and subject matter experts to share information (Doering, 2006). Thus, the role of the students will become more universal, they are not only as receivers of knowledge. But they can even give their views on the issues discussed. According to (Doering, 2006), students under the ABL will be more excited and motivated as the collaborative environment can be created. So, role of students in teaching and learning will be more flexible.

In conclusion, the ABL is an approach that provides an opportunity for students to experience learning in the real world, collaborate using technology that is accompanied by various parties such as students, teachers and experts. This approach supports the basic theory of experiential learning and inquiry approach (problem solving). This approach is designed to develop and diversify online learning strategy. However ABL can be implemented in either method of learning outside the classroom, project-based, technology, virtual or a combination of these methods.

5. Methodology

A quasi experimental study involving semester two Program Persediaan Ijazah Sarjana Muda Perguruan students will be conduct to serve the purpose of the study. Sample of the study consists of teacher trainees from teacher training colleges in Malaysia. The sample will divide into two main groups: the experimental and the control group. The experimental groups will undergo an ABL approach

while control groups remain to the conventional approach. All groups were given a pre-test, a post-test and a post-posttest. A instruments will be used in this study is The Fundamental Statistic Achievement Test. Data will analyses using analysis is of variance (ANOVA) which is the test is used to distinguish the impact between two group. The figure 2 is a research procedure to be carried out.

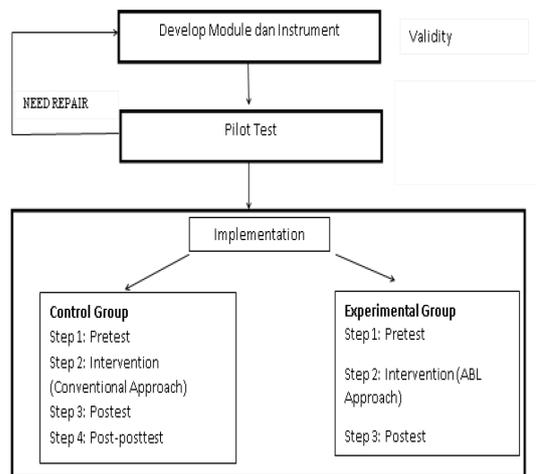


Figure 2 Research Procedure

6. Findings

Table 1 show the result of ANOVA test between treatment groups and the control group for the basics statistics achievement pretest. ANOVA analysis results showed there is no significant [F (1,28) = 3.88, p> 0.05].

Univariate Tests

Dependent Variable: Statistics Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	128.133	1	128.133	3.877	.059
Error	925.333	28	33.048		

Table 2 show the result of ANOVA test between treatment groups and the control group for the basics statistics achievement posttest. ANOVA analysis results showed there is significant between that group [F(1,28)=4.61, p<0.05].

Univariate Tests

Dependent Variable: Statistics Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	132.300	1	132.300	4.607	.041
Error	804.000	28	28.714		

Table 3 show the result of ANOVA test between treatment groups and the control group for the basics statistics achievement posttest. ANOVA analysis results showed there is significant between that group [F(1,28)=5.57, p<0.05].

Figure 3 show the result of experimental group versus control group for posttest. The test results of the experimental group was better than the control group during the posttest.

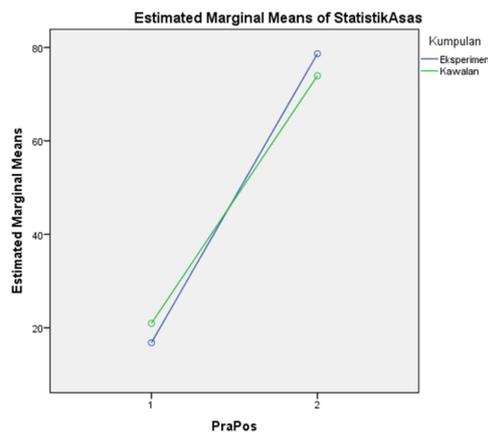


Figure 3: experimental group versus control group (pre to posttest)

Figure 4 show the result of experimental group versus control group for post-posttest. The test results of the experimental group was better than the control group during the post-posttest.

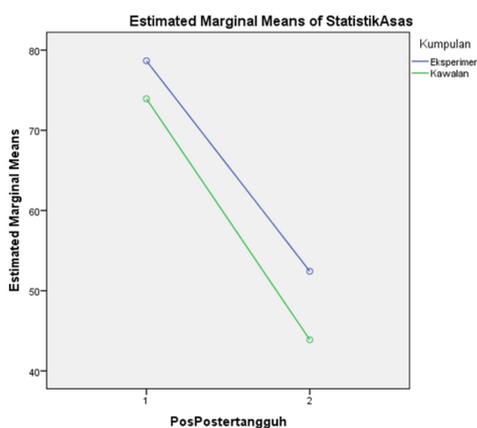


Figure 4: experimental group versus control group (post to post-posttest)

7. Conclusion

The aim of this study was to test impact of ABL Module on the fundamental statistics achievement. This study used quantitative approach with quasi experimental design of pretest and posttest group are not equivalent. An Institute of Teacher Education selected as the study area. The sample consisted of

two groups of students for semester two Program Persediaan Ijazah Sarjana Muda Perguruan. The Group is divided into the treatment group and the control group. It discusses the internal validity and external validity needs to be controlled during the experiment.

In the early stages of study, students are required to sit the pre-test achievement test covering fundamental statistics, critical thinking skills test and a test of leadership. Intervention will be included 20 hours of lectures. Once completed, the post-test will be given to the study. After eight weeks posttest, students will be given a post-posttest retained. Data collected subsequently analyzed using the SPSS software. Data for the pre-test, post-test and post-posttest will be retained in the test using Univariate Analysis of Variance (ANOVA) Assess the impact will also be reported. The results of this study are expected to provide an alternative teaching approach that can be implemented by lecturers, teachers and educators in practicing the teaching and learning for the 21st century. This study is also expected to assist the Malaysian National Aspirations and Mission in developing successful human capital.

Testing Statistics ABL module is important to test the effectiveness of this module. This proves that the developed module gives a good impression or not. The findings showed that there was no significant difference the pre-test Basic Statistics achievement between experimental groups and control group. This means that the level of achievement for the two groups were similar for all three elements under review. In other words, both groups were homogenous before intervention.

Based on the results of the second analysis, there was a significant difference for the post-test between the control group and the experimental groups of the variables achievement statistics. This study has confirmed that the meta-analysis was performed by Hattie et al. (1997). The findings of the meta-analysis, he and colleagues showed effects on academic achievement.

The third findings indicate that there is significant difference between groups of post-posttest for the achievement of Basic Statistics. This shows that the approach to teaching and learning both provide long-lasting effect on students' knowledge and skills.

The analysis showed very significant improvement in the experimental group compared to the control group. It is illustrated by the following:

- i. The mean value of the pre-test Basic Statistics for experimental group was smaller compared to the control group. However, the opposite happened to the post-

test. Mean posttest for experimental group show higher than the mean posttest control group.

- ii. Mean values for the posttest Basic Statistics achievement experimental group and the control group gap was originally small. After the post-posttest was given. It was found that the mean value of both groups are declined. However, impairment mean Basic Statistics achievement for the control group is more tangible than experimental group. This matter can be seen through the small gap at posttest mean became larger after post-posttest.

This statement shows that adventure based learning (ABL) approach is better than the conventional approach. Thus, the ABL is an alternative approach that is seen as capable of responding to the call of Mission and National Aspirations as stated in the Malaysia Education Blueprint. Then it should be given serious attention by researchers and educators out there. This is because the ABL approach of this research contribute to the development of human capital and also give all the element such as student centered, fun learning, participant become active in their learning process, able to reflect the experience afterwards and make connections to other learning or other life situations.

8. References

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