3 in 1 Effect When Using Adventure Based Learning Approach in Basic Statistics Class

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This research aims to study the effect of adventure-based learning on students' basic statistics achievement, critical thinking, and leadership skills. The quasi-experimental method was used in this study through quantitative research design. The sample consisted of 30 year 1 students of one of the Teacher Education Institutes. The institute itself determined this group of students. They are in the context of an intact group. The data were analyzed inferentially by using MANOVA. The results of the MANOVA test analysis showed that there was a significant difference in the mean post-test between groups for the achievement of Basic Statistics and leadership skills. At the same time, test analysis showed insignificant results for critical thinking skills. Thus, there was no significant difference in the mean post-test of critical thinking skills between the treatment group and the control group. There is a significant difference in the mean of the second post test between groups for basic statistics achievement and critical thinking. While test analysis showed insignificant results for leadership skills.

Keywords: adventure based learning, statistics, critical thinking, leadership skills, mathematics education

INTRODUCTION

The current trend requires a transformation of mathematics teaching and learning practices. The main focus of success is not just on the academic field, and it covers various aspects of developing human capital.

This is clear when the study's findings show that graduates with excellent achievement alone are no longer guaranteed to get a job but need those with other soft skills (Muhammad Hazrul, 2012; Noor Azina, 2011).

This transformation is also an obligation of educators when the achievement of mathematics and science of national students in the two international assessment tests is alarming (Wan Nor Atiqah & Muzirah, 2016). This problem is associated with national mathematics and science teachers' less competent teaching and learning practices (Azhari & Zaleha, 2013). Teaching and learning practices are teaching processes or methods used by teachers or lecturers while imparting knowledge (Nurulhuda, 2014). Introducing new teaching approaches is relevant to diversifying teaching and learning approaches, especially in mathematics. This is because mathematics teachers still use lecture delivery methods, individual exercises, discussion of answers, and blackboard methods in the classroom (Azhari & Zaleha, 2013; Koh et al., 2008; Richmond, 2007; Yeo & Zhu, 2005). Teachers are also more focused on completing the syllabus and exams (Wan Nor Atiqah & Muzirah, 2016; Mohd Afifi et al. 2017). In addition, teachers are also found to often practice methods of explaining topics along with examples during the teaching and learning of mathematics (Nor'ain et al., 2015). This matter should be given priority because teachers' teaching and learning methods are the main factors of student success (Marlina & Shaharom, 2010).

Adventure-based learning (ABL) method is a teaching approach that has the potential to develop students' talents in various aspects such as physical, emotional, spiritual and intellectual. The ABL has basically existed for so long. The history of this education began with the establishment of Outward Bound by Kurt Han in 1941. The mission of establishing a school in Aberdovey, Wales aims to increase confidence, perseverance, and building experience for young sailors. ABL is defined as an extracurricular activity, has an element of adventure and involves learning (Sibthorp & Jostad, 2014). This method generally uses outdoor education, camping, and physical education.

ABL strides of teaching and learning, from teacher-centered to student-centered teaching, using technology, provide meaningful experiences and opportunities for students to explore and investigate in the scope of what is in the ABL (Mohd Afifi et al. 2019). Students have the opportunity to use the space provided in the ABL environment to communicate, write and send views. Communication within the scope of the ABL for researcher research has two approaches: face-to-face and non-face-to-face. The teaching and learning process within the scope of adventure-based research is conducted based on the elements of classroom learning. Students also experience learning in the real world and can share experiences with their other peers (Nor'ain et al. 2019). Students experience mathematical learning by completing assigned tasks while enjoying pre-arranged adventure situations.

Teachers no longer provide immediate solutions, but the function of teachers in this research program is as facilitators. A space for cooperation between students, teachers, and experts should be created as a space for sharing ideas, giving opinions, discussions, and asking questions. Students are given flexibility during the teaching and learning process. The simultaneous use of these two approaches gives students the opportunity to actively learn where it can fill the diversity of learning styles available among students. For example, a handful of students are embarrassed to ask face to face. Therefore, virtual space is provided to meet the needs of students and vice versa (Mohd Afifi et al. 2019). Therefore, this study wants to track the impact of the implementation of adventure-based learning approach in statistical subjects on statistical achievement, leadership skills and students' critical thinking skills.

Research Hypothesis

H01: *There was no significant difference in mean pre-achievement of Basic Statistics, critical thinking skills, and leadership skills between an experimental group and the control group.*

H02: *There was no significant difference in the mean post-test of Basic Statistics achievement, critical thinking skills, and leadership skills between the experimental and control groups.*

H03: *There was no significant difference in the mean post-test mean of Basic Statistics achievement, critical thinking skills, and leadership skills between the experimental group and the control group.*

LITERATURE REVIEW

It is common knowledge that teaching and learning approaches impact students. Careful planning will give the optimum effect. Mohd Taib and Norlena (2010) state that this approach is capable of creating integration and integration between groups. Through the activities involved, students start working as a team, helping each other. There is friendship, cooperation, and tolerance. He and his colleagues have conducted a quasi-experimental study on 671 students consisting of prospective teachers from Universities and Institute of Teacher Education throughout Malaysia. Participants were then divided into control groups and treatment groups. Using the instrument Life Effectiveness Questionnaire, pre-test, post-test and post-test are given to the participants. The constructs assessed are related to psychology and behavior i.e. cooperation, leadership skills, self-confidence and readiness for change. The results show that there are significant differences in the constructs assessed. The findings were further analyzed using Cohen d to assess the extent to which the impact of adventure education on constructs. The results found that adventure education contributed 34 percent (cooperative), 53 percent (self-confidence), 60 percent (Ability to lead), and 61 percent (willingness to face change). This has also been confirmed that there is a significant difference between students who participate in the program and do not participate in the PBA program for their development (Fadhilah, Hamid, and Mohamed 2016).

ABL is seen to have an impact on students' self-development. Studies in the field of counseling and psychology support this. Human (2012) conducted a study on 19 postgraduate students. Four people are male, and 15 are female. Selected students use a purposeful sampling process. The study aims to describe the improvement of students' self-development through adventure activities. The division of two groups, the control group, and the treatment group, was done. Activities for one day from 7.00 am to 10.00 pm were carried out. As a result of these activities, there has been an increase in self-development after the activity is carried out. This is assessed based on the reflection of the writing. Data were analyzed using the Duquesne Phenomenological Research Method (DPRM) in interpersonal and intrapersonal aspects.

In addition, a self-development and professional module has been developed by Universiti Kebangsaan Malaysia researchers. The module contains three outdoor activities that emphasize teamwork and leadership. A survey study on the perceptions of 222 medical course students was conducted. Pre-questionnaires were given before the activity was carried out. At the same time, the questionnaire post is given after the activity. In general, there is a change in perception before and after the activity is carried out (Juriza et al., 2011).

Anderson (2014) states that ABL is an appropriate educational tool for self-development in various aspects. Such aspects are personal, moral, group and leadership development. A meta-analysis was performed regarding the results of this ABL. The meta-analysis was conducted based on the effect size of 1.728. This is illustrated from 151 samples representing 96 studies. The average effect size at the end of the adventure program is 0.34. Analysis shows that there are 40 ABL effects on students. However, the effects were grouped into six categories. ABL has impacted on academic, leadership, self-concept, personality, self-challenge and interpersonal aspects (Hattie et al., 1997). Cooley and colleagues also reviewed the ABL results. The ABL method is seen to bring results in terms of leadership, communication, trust, and decision-making (Cooley, Burns, & Cumming, 2015; Weilbach et al., 2011).

Carrier et al. (2013) conducted a study on ABL. He and his colleagues have implemented a mixed method where quantitative methods aim to test the impact of ABL on student achievement in science and attitude in the outdoor education environment. At the same time, qualitative methods are collected based on interviews with principals, teachers, and students. One of the instruments used is the assessment of scientific knowledge. The pre-test and post-test analysis results for the test found a significant difference between students before and after the intervention, with the value of t-test is $t = 7.81$; $p < 0.001$. This proves that the ABL can improve academic achievement.

In addition, the ABL is seen to provide benefits to the relationship between students. The closeness of friendship can be strengthened while participating in outdoor activities. This approach is seen as a fun approach where students do not have to sit in chairs and desks, listen to lectures from teachers or lecturers, write and read-only. This approach opens space for students a fun experience. Students also have the

opportunity to be outside the classroom while applying learning in real life. Thus, students no longer feel mathematics as something that has nothing to do with the world of reality (Larson, 2010). The ABL is also seen to have a holistic impact. It also provides various learning experiences and transfers the knowledge learned into daily life {Formatting Citation}.

For the element of thinking skills such as problem-solving, a study has been conducted on the effect of the adventure approach on self-resilience. One of the elements tested was problem-solving. A quantitative and qualitative mixed study was conducted in the quasi-pre-post and post-post experimental designs. The results of the quantitative study did not show a significant difference between the treatment group and the control group on the pre, post, and post-test. However, qualitative data shows that elements of problem-solving developed based on the activities carried out (Beightol et al. 2012).

Therefore, ABL is an appropriate approach teachers, lecturers or educators use to develop human capital. This is supported by previous studies that emphasize students' self-development through outdoor activities or adventure learning. Students are reported to have successfully developed various skills in group work, adaptability, perseverance, planning, problem-solving, time management, communication, leadership, collaboration, and team spirit. In addition, the ABL also benefits physical activity, self-confidence, self-awareness, and strengthening peer relationships (Cooley et al., 2014). There are various benefits of ABL on student learning outcomes, especially from the aspect of social development and student self (Stuhr et al. 2016).

In conclusion, the implementation of this approach is expected to be able to produce students who master the content of the lesson. In addition, it can also apply other skills in shaping the human capital of the first class mind. This is in line with the national mission and aspirations that have been set for students. ABL impacts in various forms, especially from the aspect of soft skills. This is good and should be given attention to researchers so that the impact of ABL can be explored in other aspects.

METHODOLOGY

This study tests the impact of adventure-based learning on achieving Basic Statistics, critical thinking, and leadership skills. Therefore the selection of experimental methods using a quantitative approach is appropriate. The selection of experimental methods is appropriate if a study wants to see the relationship between cause and effect (Fraenkal et al., 2012). For this purpose, a quasi-experimental design was selected to test the effectiveness of the adventure-based learning approach.

This study involved 30 undergraduate degree preparation program students at the Institute of Teacher Education. Students are divided into two groups, namely the treatment group and the control group. Both groups were initially administered pre-tests. After that, the treatment group will follow the learning session using the adventure-based learning approach, while the control group will remain in the conventional teaching and learning session based on the weekly lesson plan developed. This process takes ten weeks. A senior lecturer from the Mathematics Department of Institute of Teacher Education Temenggong Ibrahim reviewed and approved the lesson plan.

Meanwhile, the observation process was also implemented throughout the session. After the intervention, both groups were given a post-test. After eight weeks, the ninth week, both groups will be called back and given a second post-test. Therefore, the total duration of this second phase is 21 weeks. The implementation of the study can be seen through the illustration of Figure 1.

FIGURE 1
EXPERIMENTAL IMPLEMENTATION

GROUP	PRE-TEST	INTERVENTION	POSTTEST	SECOND POSTTEST
Treatment group	STUDENT	Adventure Based Learning	STUDENT	STUDENT
Control Group		Conventional Learning		

Researchers carry out the ABL teaching and learning intervention process by performing three main activities. First, use cycling activities. Students are given a problem-solving question. They need to plan a solution strategy in group form. A leader is appointed among them and assigns tasks to each member. Next, they must collect data while cycling on campus to complete the data. Communication using the telegram application is required between group members. Finally, regroup and solve the given problem. Second, explore race activities. Researchers will use telegram applications to deliver keywords. The keyword indicates the name of the location where the group of students will go. Once the student arrives at the location, they need to selfie themselves with the group to prove they have reached and successfully decoded the keywords. Researchers will assign tasks to be completed to the group. This process continues until five tasks are completed. Successful students who complete quickly and accurately are counted as winners. Third, flying fox activity. Researchers will provide critical correlation-related tasks. For example, the correlation between the weight and speed of the student descending the flying fox rope. Students begin to discuss in groups to solve the problem. They divide the task to solve the problem. Planning is done and data needs to be collected. Next, they need to present the assignment results and reflect on the learning.

This study also uses three instruments: basic statistical achievement test, a critical thinking skills test, and the leadership skills questionnaire. All three instruments are developed and have good validity and reliability. Basic statistical achievement instruments include data handling, Numerical Measurement, and Correlation Analysis. The test has two parts, namely seven questions in part A, and three questions in part B. The overall score for this test is 100. The critical thinking skills test is developed based on two elements of critical thinking skills: interpretation and evaluation. The leadership skills questionnaire involves 25 items that include communication skills and group work elements.

Data were analyzed using Inference Statistics with the help of SPSS software. To determine the suitability of the test, data are tested in terms of normality, linearity, the similarity of variance, and the existence of outliers (Pallant,2010). These results determine the use of inferential statistical tests. After reviewing based on the Shapiro-Wilk test, the findings showed insignificant results, i.e., the analysis's value exceeded the significance level of 0.05. Thus, the data is normal. Data review from the aspect of variance equality was also conducted through the Levene test. Findings also show insignificance of $p > 0.05$. This means, both groups are the same. Outlier data is seen through the box plot test. However, no outlier was issued when the Trimmed mean values of the two tests did not differ from the original mean. Therefore, the MANOVA Test is used to achieve the purpose of the study.

FINDINGS

Table 1 shows the results of the Box's Test of equality of Covariance Matrices. Box test results show insignificant data $p > 0.05$ i.e., p value = 0.60. This indicates that the data do not deviate from one of the covariance equality conditions. Then the MANOVA test can be continued.

The Pillai's Trace test results show no significant group effect (independent variables) on the achievement of Basic Statistics, critical thinking skills and leadership skills at the beginning of the study. This is further reinforced by the findings shown in Table 2. This table shows the results of MANOVA test analysis on the mean differences of pre-achievement of Basic Statistics, critical thinking skills and leadership skills between treatment group and control group. The results of the MANOVA test analysis showed that there was no significant difference in the mean of pre-test between groups for the achievement of Basic Statistics [$F(1,28) = 3.88$, $p > 0.05$], critical thinking skills [$F(1,28) = 1.49$, $p > 0.05$] and leadership skills [$F(1,28) = 2.89$, $p > 0.05$]. This means that the respondents did not have any differences from the three aspects before the treatment was performed.

TABLE 1
BOX'S TEST OF EQUALITY OF COVARIANCE MATRICES RESULTS

Box-test Analysis	
Box's M	5.145
F	.757
df1	6
df2	5680.302
Sig.	.604

* Significant level p<0.05

TABLE 2
ANALYSIS OF MANOVA TEST MEAN PRE-TEST BETWEEN TREATMENT GROUP AND CONTROL GROUP

Effect Test Between Subject Source	Dependent variable	Degree of Square	Df	Mean Square	F	Sig.
Model Corrected	Pre-test Basic Statistics	128.133[a]	1	128.133	3.88	.059
	Pre-test Leadership Skills	126.485[b]	1	126.485	2.89	.100
	Pre-test Critical Thinking Skills	99.615[c]	1	99.615	1.49	.233
intercept	Pre-test Basic Statistics	10678.533	1	10678.533	323.13	.000
	Pre-test Leadership Skills	167133.888	1	167133.888	3815.01	.000
	Pre-test Critical Thinking Skills	115402.681	1	115402.681	1719.85	.000
Group	Pre-test Basic Statistics	128.133	1	128.133	3.88	.059
	Pre-test Leadership Skills	126.485	1	126.485	2.89	.100
	Pre-test Critical Thinking Skills	99.615	1	99.615	1.49	.233
Error	Pre-test Basic Statistics	925.333	28	33.048		
	Pre-test Leadership Skills	1226.667	28	43.810		
	Pretestr Critical Thinking Skills	1878.815	28	67.101		
Sum	Pre-test Basic Statistics	11732.000	30			
	Pre-test Leadership Skills	168487.040	30			
	Pre-test Critical Thinking Skills	117381.111	30			
Sum Corrected	Pre-test Basic Statistics	1053.467	29			
	Pre-test Leadership Skills	1353.152	29			
	Pre Critical Thinking Skills	1978.430	29			

* Significant level p<0.05

Multivariate Test analysis based on Pillai's Trace found the existence of a significant effect of independent (group) variables [F (3,26) = 3.86, p <0.05)] on the post-Basic Statistics test, critical thinking skills, and overall leadership skills. Pillai's Trace was chosen because of its suitability to measure the effect when the sample size is small compared to other tests (Tabachnick & Fidell, 2013). From the results of the previous Pillai's Trace analysis, it is possible to identify the main effects for each variable through the effect test between subjects. Table 3 shows the analysis of the MANOVA test of the mean difference of the post-test of Basic Statistics achievement, critical thinking skills and leadership skills between the treatment and control groups. The results of the MANOVA test analysis showed that there was a significant difference in the mean post-test between groups for the achievement of Basic Statistics [F (1,28) = 4.61, p <0.05] and leadership skills [F (1,28) = 10.46, p <0.05]. At the same time, test analysis showed insignificant results for critical thinking skills [F (1,28) = 0.41, p> 0.05]. Thus, there was no significant difference in the mean post-test of critical thinking skills between the treatment group and the control group. In other words, the treatment given has an effect on two of the three dependent variables. However, the findings show that treatment does not affect the aspect of critical thinking skills. This is also reinforced by the findings of the Box's Test of equality of Covariace Matrices. The results show insignificant data p> 0.05 i.e., p value = 0.54.

The R square value indicates that treatment has contributed 14.1 percent change in the achievement of Basic Statistics and 27.2 percent in leadership skills. The results of this study suggest that future studies should be done because almost 30 percent of the treatment effect on dependent variables is characterized by human capital, which is the aspect of leadership skills. This shows that the treatment has good potential to be highlighted. This can be proven based on the mean value of the experimental group better than the control group (leadership skills of the experimental group = 83.93, control group = 77.13), and (achievement of Basic Statistics of the experimental group = 78.4, control group = 74.2).

TABLE 3
ANALYSIS OF MANOVA TEST MEAN POST-TEST BETWEEN TREATMENT GROUP AND CONTROL GROUP

Effect Test Between Subject Source	Dependent variable	Degree of Square	Df	Mean Square	F	Sig.
Model Corrected	Posttest Basic Statistics	132.300[a]	1	132.300	4.607	.041
	Post-test Leadership Skills	346.800[b]	1	346.800	10.456	.003
	Post-test Critical Thinking Skills	36.300[c]	1	36.300	.414	.525
intercept	Posttest Basic Statistics	174650.700	1	174650.700	6082.363	.000
	Post-test Leadership Skills	194568.533	1	194568.533	5866.388	.000
	Post-test Critical Thinking Skills	178640.833	1	178640.833	2038.392	.000
Group	Post Basic Statistics	132.300	1	132.300	4.607	.041
	Post-test Leadership Skills	346.800	1	346.800	10.456	.003
	Post-test Critical Thinking Skills	36.300	1	36.300	.414	.525

Effect Test Between Subject						
Source	Dependent variable	Degree of Square	Df	Mean Square	F	Sig.
Error	Posttest Basic Statistics	804.000	28	28.714		
	Post-test Leadership Skills	928.667	28	33.167		
	Post-test Critical Thinking Skills	2453.867	28	87.638		
Sum	Posttest Basic Statistics	175587.000	30			
	Post-test Leadership Skills	195844.000	30			
	Post-test Critical Thinking Skills	181131.000	30			
Sum Corrected	Posttest Basic Statistics	936.300	29			
	Post-test Leadership Skills	1275.467	29			
	Post-test Critical Thinking Skills	2490.167	29			

* Significant level $p<0.05$

Overall, the results of the Pillai's Trace multivariate test showed that there was a group effect on the combination of the three-second post-tests in terms of Basic Statistics, critical thinking skills and leadership skills [$F(3,26) = 4.05$, $p < 0.05$)]. Based on the results of this analysis, the researchers rejected the null hypothesis and proved that the treatment as a whole had an impact on all three aspects. The results of the analysis of MANOVA test Table 4 show that there is a significant difference in the mean of second post test between groups for the achievement of Basic Statistics [$F(1,28) = 5.57$, $p < 0.05$] and critical thinking skills [$F(1,28) = 5.30$, $p < 0.05$]. At the same time, test analysis showed insignificant results for leadership skills [$F(1,28) = 1.08$, $p > 0.05$]. Thus, the time between post test and second post test affects critical and leadership skills. This is seen when the results of the analysis of the two variables differ between the post-test and the second post-test.

However, by referring to the mean values for each variable across the treatment group and the control group, it was found that the treatment group showed the achievement of Basic Statistics (treatment = 52.42; control = 43.89), critical thinking skills (treatment = 72.60; control = 66.89) and skills better leadership (treatment = 87.67; control = 85.80). The results of this study suggest that future studies should be conducted to investigate the effects of this ABL treatment because more than 80 percent of the changes in the dependent variables are still unidentifiable through this study.

The R square value also indicates that the period has given a 16.6 percent change in the achievement of Basic Statistics and 15.9 percent of critical thinking skills. Therefore, emphasis should be given so that future studies can be done. This is because the results of the study are seen to have the potential to respond to the mission call and student aspirations set.

TABLE 4
ANALYSIS OF MANOVA TEST MEAN SECOND POST-TEST BETWEEN TREATMENT GROUP AND CONTROL GROUP

Effect Test Between Subject Source	Dependent variable	Degree of Square	Df	Mean Square	F	Sig.
Model Corrected	Second Post-test Basic Statistics	546.133[a]	1	546.133	5.569	.025
	Second Post-test Leadership Skills	26.133[b]	1	26.133	1.077	.308
	Second Post-test Critical Thinking Skills	244.626[c]	1	244.626	5.302	.029
intercept	Second Post-test Basic Statistics	69568.726	1	69568.726	709.418	.000
	Second Post-test Leadership Skills	225680.133	1	225680.133	9296.357	.000
	Second Post Critical Thinking Skills	145928.626	1	145928.626	3162.612	.000
Group	Second Post-test Basic Statistics	546.133	1	546.133	5.569	.025
	Second Post-test Leadership Skills	26.133	1	26.133	1.077	.308
	Second Post-test Critical Thinking Skills	244.626	1	244.626	5.302	.029
Error	Second Post-test Basic Statistics	2745.807	28	98.065		
	Second Post-test Leadership Skills	679.733	28	24.276		
	Second Post-test Critical Thinking Skills	1291.970	28	46.142		
Sum	Second Post Basic Statistics	72860.667	30			
	Second Post Leadership Skills	226386.000	30			
	Second Post Critical Thinking Skills	147465.222	30			
Sum Corrected	Second Post-test Basic Statistics	3291.941	29			
	Second Post-test Leadership Skills	705.867	29			
	Second Post-test Critical Thinking Skills	1536.596	29			

*Significant level $p<0.05$

DISCUSSION

There is no denying that learning methods and strategies are often tested by other researchers, such as inquiry approaches thinking skills and academic achievement (Mohd Afifi et al., 2017) and adventure-based learning on student leadership (Anderson, 2014). This study also supports the study of Carrier et al. (2013). This proves that the ABL is also able to have a positive impact on the academic field. This is because ABL

also has inquiry-based and experience-based learning characteristics (Doering, 2007; Veletsianos & Kleanthous, 2009).

The findings of this study have confirmed the meta-analysis done by Hattie et al. (1997). The meta-analysis findings of him and his colleagues show the impact of ABL on academic achievement and leadership. These findings are also in line with the meta-analysis of Cooley et al. (2015) that ABL can impact leadership skills as well as the study of learning approaches Carrier et al. (2013) on academic achievement.

This study has also implemented another test which is the second post-test. This second post-test is given after eight weeks of post-test. The purpose is to test the extent to which the knowledge and skills applied through this ABL method can be maintained over a long period. This method has been applied by Mohd Taib and Norlena (2010) and Beightol et al. (2012). Yet the period between the post-test and second post-test studies differs where the second post-test Beightol et al. (2012) performed after four months, while Mohd Taib and Norlena (2010) did not state the duration of the interval in their publications.

The findings indicate a significant difference in the mean of second post-tests between groups for the achievement of Basic Statistics and critical thinking skills. This difference is seen through the devaluation of the mean elements of Basic Statistics and critical thinking skills. At the same time, leadership skills show a pattern of improvement. However, ABL has a better effect than conventional methods. The findings of this study are intended to support Novak (1998) statement related to meaningful learning. He believes that a learning method is meaningful when knowledge and skills can be maintained within eight weeks and above.

This is because ABL activities provide a meaningful experience compared to conventional methods. ABL is seen to have the potential and support the concept that a person will learn more effectively if they engage in fun learning activities, are interested in what they learn, actively participate, feel calm, can reflect on experiences, and have relationships with daily life. ABL is based on experience-based learning, proving that students can transfer information or knowledge consciously or unconsciously through observations and experiences.

In addition, the concept of the ABL method also has inquiry-based learning features. The learning process also contributes to the retention of information over a long time. Things are seen when the ABL study puts inquiry learning steps as a reference. The ABL learning process begins with studying problems, making predictions or planning, obtaining information, analyzing data and drawing conclusions. Therefore, teachers are advised to change their teaching and learning practices to be more directed to the stated concepts. It is essential that the resulting human capital has comprehensive holistic characteristics.

The importance of placing the teaching and learning agenda as a tool to produce balanced human capital from the aspects demanded by the National Education Philosophy has been realized by the Malaysia Ministry Of Education (MOE) until the MOE (2015) through Malaysia Education Blueprint (Higher Education) recommends 100% of lecturers can conduct student-centered teaching and learning. ABL is an alternative method that is seen to be able to respond to the call of the Mission and National Aspirations, as stated in the Malaysia Education Blueprint. The findings of this study have also confirmed the findings of the improvement of leadership Hattie et al., 1997 and Mohd Afifi et al. (2019) on the improvement of thinking skills. With the improvement of these two skills, students who are educated through ABL are seen to have added value in the world of work. This means these two skills have a relationship, i.e., leadership skills subset to critical thinking skills.

The importance of a leader having critical thinking skills is undeniable. This leader is called an effective leader. Influential leaders also help developing countries. It is also capable of giving success in business. On the other hand, from the aspect of family, an effective leader allows children to grow up healthy and strong and even become productive when they grow up. Therefore, educating students to be effective leaders is significant to help themselves, their families, their communities and their country.

In conclusion, the study's findings indicate that the ABL method is better than the conventional method. This, in turn, recognizes that this alternative method is effective in improving academic achievement, namely Basic Statistics. This ABL method is also seen to positively impact two elements of human capital, namely critical thinking skills and leadership skills. As stated by Karppinen (2012), this approach involving

the five main senses can develop human capital holistically. So it needs to be given serious attention by researchers and educators out there. This is because the ABL method, from the results of this study, contributes towards the development of human capital and responds to the call to realize the mission and aspirations of the country.

CONCLUSION

ABL is seen as a method that is rarely implemented in the teaching and learning of mathematics. Therefore, it is an alternative approach for educators, especially in the field of mathematics education. This ABL approach has been successfully tested. The results of the data analysis found that this teaching approach affects the elements of Basic Statistics achievement, critical thinking skills, and leadership skills. Indirectly, this approach has changed the perception of educators in mathematics. This is because the elements of adventure activities such as cycling, exploring race and flying fox can be applied in Basic Statistics (Mathematics) teaching and learning sessions. Effective teaching and learning can guide and improve knowledge and skills from various physical, emotional, spiritual, intellectual, and personality aspects.

Overall, it is hoped that this research contributes and benefits to MOE, especially Institutes, to produce a balanced human being. This study certainly provides ideas and insights from teaching and learning mathematics that mathematics is not just learned in the classroom. It is also feasible outside the classroom, plus an adventure element. These alternative methods are also seen to impact achievement, thinking skills, and leadership skills not only in short intervals but over longer periods. This at once responds to the call of the country's mission and aspirations to produce excellent, glorious, and distinguished human capital through holistically meaningful teaching methods.

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