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Adventure Based Learning Module: Content Validity and Reliability Process

Mohd Afifi Bahurudin Setambah[1] Nor'ain Mohd Tajudin[2]
Mazlini Adnan[3] Muhamad Ikhwan Mat Saad[4]

[1]Institut Pendidikan Guru Kampus Temenggong Ibrahim, Johor Bahru, Malaysia
[1,2,3,4] Universiti Pendidikan Sultan Idris, Tg Malim Perak, Malaysia

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Abstract

This study aims to examine the validity and reliability of Adventure Based Learning module on Basics Statistics for Institute of Teachers Education students using the Content Validity Index (CVI) and Percentage Calculation Method (PCM). The assessment was conducted through the evaluation by 7 experts and 17 students selected via purposive sampling. Three instruments were used for assessment are expert opinion instruments, content validity instruments and reliability module instrument. The result of analysis, CVI and PCM is 0.98 and 83.4%. This module also have 0.71and 0.73 of reliability value. The results of the study prove that the instrument has high validity and good reliability. Therefore, this module has a great potential as a good module. This module is recommended to be used and tested for its effectiveness. The module is also a form of alternative teaching methods to guide lecturer or teacher to add value to students in terms of critical thinking and leadership skills.

Keyword: Development, Validity, Reliability, Modules, Adventure Based Learning

1.0 Introduction

The current trend shows, the transformation of teaching and learning of mathematics should be done. This has become a major focus in producing 21st century skilled of human capital. Developing human capital is no longer focused only on academic achievement but also focuses on outcomes rather than inputs. This was clear when the findings indicate that achieving excellent graduates alone is no longer guaranteed to get a job but they requires with other soft skills (Ismail, 2011; Ismail, 2012).

This transformation is also as the duty for the teachers when Malaysians' students achievement in two international assessment test (TIMSS and PISA) is at an alarming (Samsudin & Musa, 2016). This problem is associated with the practice of teaching and learning of Malaysian mathematics and science teachers who are less competent (Mariani & Ismail, 2013). Teaching and learning practices in question is the process or method of teaching by teachers or lecturers while imparting knowledge (Ngasiman, 2014).

There are several methods of teaching that is often practiced by teachers in order to foster the practice of teaching and learning. Among them is the lecture method (oral teaching

and presentation materials), discussion, inquiry learning, discovery methods, cooperative learning, and project based learning (Mok, 1993; Idris, 2005). However, teachers still maintain the practice of teaching methods such as responses revision exercises, lectures and individual training when operating math class. This is because they are more focused on improving the academic achievement (Mariani & Ismail, 2013; Koh, Choy, Lai, Khaw, & Seah, 2008). A study conducted by Yeo and Zhu (2005) found that teachers only use 3 per cent discussion method and demonstration or presentation method at the primary level in their class. While at the secondary school level, only 8 per cent of the discussion method and 1 per cent demonstration or presentation methods. They usually begin teaching and learning session with lecture and presentation followed by doing exercises and review the answers.

After a long time the findings above remains unchanged where the findings are also consistent with the findings of Ministry of Education (MOE) in year 2000. Math teacher spent a lot of teaching time with the activities such as drills and guidance (27 percent), lectures (19 per cent), and check out the homework (17 percent). This also happens at the international level where the activity of teachers drills and guidance (22 percent) and doing exercises and giving lecture (13 per cent) (Ministry of Education, 2000).

There are seven teachers of mathematics teaching practices that are often used. Two of the seven practice is often used by many teachers, namely the emphasis on the concept understanding and use of Polya model in teaching and learning. In addition, teachers also often giving an appropriate example during discharge of a mathematical topics. They use mathematical terms that are easily understood and also concrete materials in a practice. There are teachers who use mind maps as i-Think and heuristic model of teaching and learning during the sessions. Among of them take into account the ability of the students when planning their teaching and learning (Tajudin, Puteh, Adnan, Abdullah, & Ibrahim, 2015).

In conclusion, the researchers would like to emphasize that the proposed teaching practice is based on a study conducted by researchers in particular the practice of teaching and learning mathematics. Therefore, teachers are expected to transform and reform in order to practice the teaching and learning practices that foster skills and increase the added value of human capital. 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 carry out the transformation (Mariani & Ismail, 2013; Samsudin & 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 (Saad, Saad, & Dollah, 2012).

An alternative method of teaching which is adventure base learning methods can be seen as a reference for teachers to develop human capital. This method has been proven to have benefit from various aspects of the development of individual skills, especially for 21st century (Setambah, Tajudin, & Adnan, 2016). Therefore, the need to develop adventure based learning methods module is desirable. So this study puts two objectives, namely to assess the validity and reliability of the module.

2.0 Literature Review

2.1 Content Validity Index (Cvi)

CVI is a method of proving empirically to determine the validity of the instruments used by the collected data. This method is easily to administered, save costs and time, and easy to implement (Matore & Khairani, 2015). Therefore, many researchers in and outside the

country are use this method to validate their contents of instrument. Two methods are often practiced by researcher based on two main characters, namely Lawshe and Lynn. Comparison of procedures for the two methods is illustrated by Table 1 below.

Table 1
CVI Information

No.	Matter	Lawshe (1975)		Lynn (1986)	
1	Scale	Nominal		Ordinal	
2	Formula	CVR = $\frac{n-\frac{N}{2}}{\frac{N}{2}}$ n – numbers of evaluator agreed N – Sum of evaluator CVI is mean of the CVR		CVI = $\frac{n}{N}$ Divide the ordinal scale into two groups for example scale 1,2,3,4. So that 1 and 2 not agreed and vice versa. n – numbers of evaluator agreed N – Sum of evaluator Mean CVI is a mean of all CVI each item.	
3	Range accepted	N	Value	N	Value
		5-7	0.99	2-4	1.00
		8	0.75	5	> 0.83
		9	0.78	6	> 0.86
		10	0.62	7-10	> 0.78

Thus, performing this analysis is important for researchers who want to determine the validity of the instrument in their study. This will ensure content validity of the instrument can be measured using methods or procedures are accurate and correct.

2.2 Percentage Calculation Method (Pcm)

A module that has been assessed by an expert should be calculated the percentage value. This was evaluated using the following formula:

$$\frac{\text{Total Expert Score (x)}}{\text{Toatal Maximum Score (25)}} \times 100 = \text{Content Validity Level}$$

Total expert score is the score who assess the form of Likert scale questionnaire to be calculated. The total expert score is then divided by the total maximum score. For example, If you use a five point Likert scale is used, then the maximum score of each item is 5. If using a Likert scale of seven, the maximum score of each item is 7. Total maximum score is calculated based on the product of the number of items with maximum score. Then the value will be time with 100. So, that value are call Content Validity Level. The 70 per cent is considered to have a high content validity. Conversely, if the value obtained is less than 70 percent (Noh & Ahmad, 2005).

2.3 Module Reliability

Reliability refers to the consistency of measurement (Darussalam & Hussin, 2016). One way to test the reliability of the module is based on statistics by calculating Cronbach's alpha coefficient. Interpretation reliability is dependent on the value of Cronbach alpha coefficient. According to Jackson (2009), the reliability of 0.70 to 1.00 is a powerful, medium 0.30 to 0.69 and 0.29 to the poor. Thus, determination of the level of reliability of the module can be calculated.

3.0 Research Question

i. Determine the content validity of adventure based learning modules (Basics Statistics).
ii. Determine the reliability of adventure based learning modules (Basics Statistics).

4.0 Research Methodology

The study was conducted using a quantitative approach by correlation study. This approach was chosen based on an analysis of all the data in a quantitative form in which data can be measured. So, choosing the right form of study. The instrument also been initiated to test the validity and reliability. In summary, this study procedures described in Figure 1.

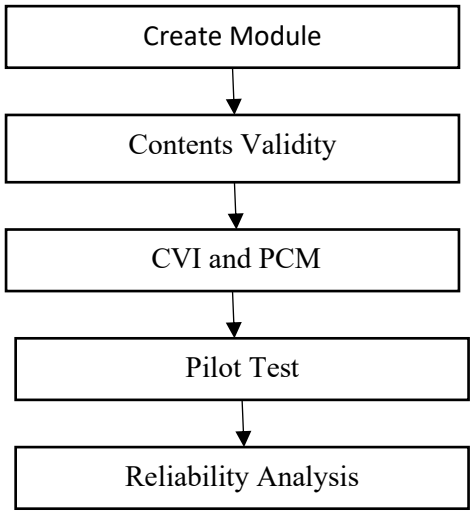

Figure 1 Research Procedure

Validity and reliability test process consisting of three instruments, namely:

i. Content validity instrument adaptation of Jamaludin Ahmad (2015) instrument.
ii. Expert opinion questionnaire
iii. Sample reliability questionnaire.

According Fraenkal, Wallen, and Hyun (2012), a questionnaire is often used by researchers because of the characteristics of the questionnaire. Questionnaire were able to answer many questions, was able to collect data on a large scale and have the power of generalization. Thus, the questionnaire instrument is suitable used to determine the validity and reliability of the module.

5.0 Research Finding

Validity and reliability are important in quantitative research to determine the suitability of an instrument. According to Ghani & Aris (2012), the validity of the module is determined based on the views of experts. Experts appointed shall have the qualifications and expertise

in the fields of language, education and modules. Rubio, Berg-Weger, Tebb, Lee, and Rauch (2003) suggests that the validity process need to appoint at least three reviewers as an expert. So in the context of the study, researchers had appointed seven appraisers in the field of mathematics education, pedagogy of mathematics, language and modules.

Arising from that, the response of an expert assessment has been collected through content validity instruments and expert opinion questionnaire to give their opinions related to the adventure based learning modules were analyzed. Data analysis aimed at proving the validity and reliability of the module in a systematic and scientific. To determine the validity of the content of a module, there are two methods of analysis assessment made by researchers. This methods of analysis for determining the legality of such content is the PCM and CVI.

The results of analysis of expert opinion on the modules by PCM is 83.4%. The detail of data analysis process have been described previously. This proves that this module has high content validity. In addition, the researchers also analyzed the content validity based on CVI calculation. This is in line with the opinions and recommendations made by Rubio et al., (2003) and Lynn (1986). There are one way to calculate the validity of the content is to get the CVI. This is calculated based on the total number of specialists who have agreed divided by the number of appointed experts. CVI value of 0.80 or above is considered to have excellent content validity (Rubio et al., 2003). This is interpreted by numbers of panel who were appointed (Lynn, 1986) and illustrated by Table 1. Overall, the average for the CVI is 0.96. Then the module has excellent validity. Results from both the content analysis found that these modules have very good content validity.

From the aspect of module reliability, analysis Cronbach alpha coefficient was calculated. With the help of SPSS software, the reliability of this module is 0.71. This coincides with the opinion of Ahmad (2015), in which the SPSS software is able to reduce the calculation error when measuring the Cronbach alpha coefficient. Based on the reliability, the module is considered good and acceptable. (Chua, 2006; Jackson, 2009; Fraenkal et al., 2012). This value is calculated based on the views of experts. In addition, the reliability analysis module to the sample also performed. Jamaludin Ahmad (2015), pointed out that the process of securing the reliability of module sample should follow the steps as outlined in Figure 2.

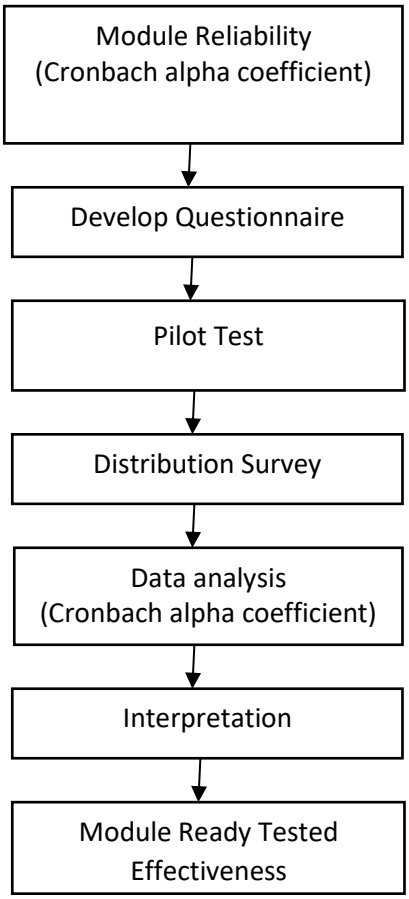

Figure 2 Reliability module process

0.73 value derived from alpha Cronbach coefficient analysis. This analysis has shown that the adventure based learning module were ready to test their effectiveness against the Basic Statistics achievement, critical thinking and leadership skills element. In conclusion, the data shows that this module has high validity and its reliability is good. The module is expected to provide a positive impact on the dependent variable, namely the achievement of Basic Statistics, critical thinking and leadership skills. A pilot study was undertaken to test the usability of the module and provides researchers feel the process of pre experiment before implementing the actual experiment.

6.0 Discussion

This article discusses issues related to the validity and reliability of the module. There are several things that must be considered by every researcher during the validity and reliability process. This must be done so that the module is constructed performed what should be performed during the study was conducted. Among the procedures that should be implemented by the researchers is to determine the validity by CVI and PCM. In addition, researchers also suggest that the appointment of at least five assessors need to be made. Based on the experience of researchers in the course of the evaluation process, the use of three assessors is quite difficult to qualify Lynn and Lawshe (DeVon et al., 2007). So, this is the reason why researchers have selected seven people to judge the validity of the module. If researchers still want to use three evaluators, the Fuzzy Delphi method are encouraged to build the module that really have content validity. For the aspects of reliability, the pilot study should be conducted and the test reliability through Cronbach's alpha coefficient statistics

need to be calculated. Overall, this module has a very good validity and strong reliability. Therefore, the researchers recommend this module is used by faculty members of the institute, college or university that has a particular subject Basic statistics relevant to the topic so that they can create a sense of fun learning to students.

7.0 Summary

This research report analyses the validity and reliability process of the adventure based learning modules are built for teaching courses Basic Statistics. It was specially developed to provide guidance to educators to implement teaching and learning practices that have student-centred principles, encourage innovation and creativity, build and enhance higher-order thinking, commendable character build, improve and develop leadership skills and lifelong learning. In addition, the module is also able to highlight the potential of an institution in order to provide a superior education in the implementation of teaching and learning, especially in niche of mathematics education in particular subjects (Statistics). Therefore, a study of the effectiveness of this module needs to be done to prove its impact on the development of excellence and glory human capital. As a result, the module can be used as a guide for other researchers to develop the potential of this adventure based learning methods. It is hoped that this method could be an alternative teaching methods for educators to use to develop a balanced human.

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Corresponding Author

Mohd Afifi Bahurudin Setambah
Mathematics Department
Institut Pendidikan Guru Kampus Temenggong Ibrahim, Johor
Kementerian Pendidikan Malaysia
mohdafifi.jpkk@gmail.com

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