

Development of a Piling Load Test Teaching Kit as a Teaching Aid for Construction Technology Program

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Abstract: The teaching kit of piling load testing is one of the types of tools helping to teach in the teaching and learning process. This study was conducted to identify the need of this teaching kit among lecturers and students in construction technology. Interviews with lecturers in vocational colleges are preliminary studies conducted to identify needs. By identifying the needs of this teaching kit, studies will be conducted with the design of this model until completion. The process of testing the teaching kits is also conducted in this study. This study uses a quantitative design. Data collected by questionnaires and expert assessment forms with high validity and reliability have played an important role in this study. As a result of the distribution of the questionnaires, data collected will be analyzed using the frequency distribution method and percentage to obtain descriptive information. The ADDIE Model is used in designing a kit for teaching this piling load test. Five stages of the model development process, namely, analysis, design, development, implementation, and evaluation. By following the listed stages, the teaching kit for piling loads was designed and developed function as a tool to help teach the construction technology program at the Vocational College.

Keywords: Construction Technology, Teaching Materials Kit, Vocational College

1. Introduction

RMK-11 emphasizes on the continuous development of professionalism based on competency will form a more attractive career progression (Mahmud, 2015). Based on Ahmad, Jalani, & tries where the binary model or flexible dual-way education was adopted According to Jamian, Othman & Hashim (2012), teaching aid is one of the effects of attracting interest and attention to the students and potential to make learning more cheerful and interesting. According to Ilias, Husain, Mohd Noh, Rashed & Abdullah, (2016), the content of the knowledge field is also very important to be dominated by teachers as well as technical preparations such as the use of teaching aid. According to Hanim & Lai (2011), a

teaching kit is also one of the teaching aids where the development of the kit is based on the objective of the topic to be taught. TAM used in teaching can boost students' academic performance (Ibeh et al., 2013). With teaching aid, the task of a teacher becomes easier and more orderly and can give fun to students. Teaching aid is an inverse form that will be used during teaching and learning sessions.

Students have different capabilities to understand the lessons delivered by the lecturers. During the P&P process, there are still teachers who use the methods or techniques of reading the textbooks alone in the teaching and causing pupils to be less interested in active classrooms (Che Mohd Noor & Ahmad, 2015). For students with academic problems, lecturers should diversify their delivery techniques in class to attract students. According to Ahmad Zaki (2004), the reading materials that used paper burden students because there are many writings that need to be read. Then, if the lecturer only delivers only knowledge without the use of TAM, it will result in difficulty in understanding the teaching concept.

Hamdan and Mohd Yasin (2010) noted that centered teacher-centered learning is only in one way that teachers convey their education and students only listen to make passive students passive learners. This will cause students to easily feel bored and will dampen their interest of students to learn. The technical field lecturer faces problems regarding the use of modern technology, which is concerned if there are undesirable things. As a result, the use of technology among the lecturers in technical areas is blocked and limited. In fact, the result of the research on the level of use of TAM among technical instructors is still at the medium level (Hamdan and Mohd Yasin, 2010). Therefore, this traditional strategy needs to be improved to create harmonious teaching and learning among lecturers and students.

Students are easily lost focus while learning in the classroom due to the instructor's approach that provides one-way, excluding students, only based on the black Board only (Mohammad, Hashim, & Yasin, 2011). The learning and teaching process should be more attractive and needs to be used for the 21 Century teaching methods. Students will be more interested and will be more involved if teachers use more effective teaching methods. Teachers need to organize measures to ensure students are more interested in learning. Therefore, efforts should be done to ensure a better teaching practice can be established in the teaching and learning process that occurs in the classroom in school (Samsudin et al., 2013).

Knowledge and skills in the use of TAM are the main barriers that restrict teachers from continuing to use TAM consistently in teaching and learning (PdP) (Llias et al., 2013). The issue of holistic implementation of PdP with TAM in school would have problems if teachers did not dominate the skills and knowledge of using the TAM well. This was further strengthened by the outcome of early research conducted on a lecturer in a vocational college where lecturers lacked knowledge and skills in the use of TAM. The school or other educational institutions should endeavor to enhance the needs of the teachers' knowledge and skills in schools such as creating the latest access to the current books as well as conducting courses and training suitable for teachers to dominate the skills of using TAM that will make PdP more attractive and effective (Yusoff et al., 2016).

Some of the instructors have limited knowledge of the active teaching method which is teaching involving both parties between students and instructors such as interacting with one another in the standard Nasab et al. (2015). This may happen to the motivation of lecturers and the negative attitude of TAM as well as some TAM who do not have complete information on how to use the TAM. According to Chung et al. (2010). A negative and moderate attitude of teachers especially inexperienced teachers and the chance of attending the related course had influenced their motivation and readiness to use the TAM on an optimum basis during the teaching and learning process in the classroom.

The current education is experiencing a very significant change with the new curriculum and subjects introduced by the Ministry of Education. This includes the existence of vocational college

institutions that are managing the technical field and technology. As a result of the highlights of the past study, the problems that arose were related to TAM and the subject of construction technology. Among the problems were the lecturers' facing problems regarding the reduction of teaching methods using TAM during the teaching and learning process. The main factor that contributed to this problem is that the institution does not provide fittings or material to the lecturer.

In addition, teacher-centered learning only in a one-way form where teachers convey their education and students only hear has made passive students. This will cause students to feel bored and a little more will dampen their interest of the students to learn. Next, knowledge and skills in the use of TAM are the main barriers that restrict teachers from continuing to use TAM consistently in PdP. The string of the above problems, teacher' motivation and the spirit of the teacher will also be affected. When a teacher or lecturer is lacking in handling TAM it will negatively affect the instructor's PdP. In addition, teachers were less knowledgeable about the use of teaching aid due to a lack of exposure from the institutions on trainers.

The study was about students at Vocational College who attended construction technology courses. The construction of this scalable teaching kit is in a real structure but the size of scaled down so that it is easy to carry and save placeholders in classes and labs. Respondents were taken from Tanah Merah and Kuala Krai Vocational College. Lecturers who are chosen for expert assessment are lecturers in the field of construction technology in the vocational college. In this study, the priority of this study was to identify the suitability of teaching aid in the teaching and learning process. It was developed to attract students' interest as well as facilitate the students to understand in a more profound basis based on the kit that was developed with the real in the construction site. In addition, this teaching kit not only attracts interest but can make continuous thinking, helping to understand and be able to peel out an issue or matter through increased reading activities and giving new experiences to students. The objectives of this study are:

- a) Developing a test to develop a pile of piling tests as teaching aid for the student technology
- b) Identify the suitability of teaching kits in terms of design and use of materials for construction technology students.
- c) Testing the functional adaptability kit for the piling load test as a teaching aid for construction technology students.

1.1 Conceptual Framework

In doing a study on the development of teaching aid products, identify the need of teaching aid and the appropriate teaching aid design for piling testing topics in the Construction technology program. Hence, the development of teaching aid is carried out according to the standard and syllabus. While the main focus for the development of teaching aid is on the students and directions in the vocational college. As a result of this study, it is hoped to work well as teaching aid at the Vocational College.

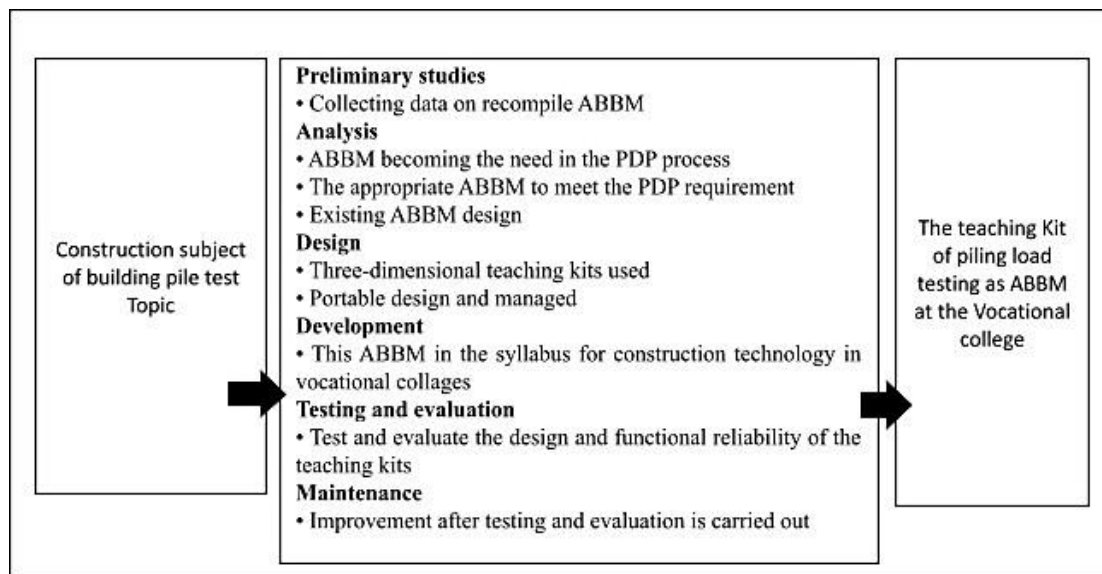


Figure 1: Conceptual framework

2. Methodology

The methodology section describes all the necessary information that is required to obtain the results of the study. It consists of Research Design, Research Procedure and Research Instrument or other important information related to methodology.

2.1 Population and Sample

The population used by the researchers in this study is among the lecturers of the construction technology course at Vocational College. Researchers use the population from this circle to achieve the objectives that have been stated. Meanwhile, for a sample the study, a total of 20 people among the lecturers from the construction technology course were randomly selected from the population derived from the Tanah Merah Vocational College and Kuala Krai.

2.2 Instrument of Study

In this study, researchers will use the questionnaire as an instrument to be given to respondents consisting of the lecturers of the construction technology course in vocational college, a question made by using questionnaires to obtain information and data to answer the second and the third question which are, does the test teaching kit is suitable as teaching aid for construction technology students? And does the use of test teaching kit materials suitable as a teaching aid for construction technology students?

There are various ways to measure human behavior. One of them is to use a research instrument (Mohammad & Subramaniam, 2014). The use of this questionnaire is to assist researchers in collecting data information correctly and accurately and in accordance with the requirements of the study. The items contained in the questionnaire should be in accordance with the objective of the study submitted so that the information obtained can help in designing the teaching kits as well as determine the functional reliability of the learning kits developed. A questionnaire to be given to students and lecturers is cited by Kong (2016). In part A, the respondent is required to mark (√) on each question submitted. Part B, C, and D the respondent is required to indicate (√) on each question by following the scale of the schedule provided. In part E, the respondent should give a brief suggestion and comment.

Table 1: Scoring of likert scale items (Sugiyono, 2012)

Rating	Scale
Strongly Disagree (SD)	1
Disagree (D)	2
Agree (A)	3
Strongly agree (SA)	4

2.3 Data Analysis

In this study, researchers use Microsoft Excel 2016 software to analyze raw data derived from the feedback form in the form of a checklist that will be distributed to the respondent for review. The raw Data is analyzed by descriptive using the method of calculation of percentages and is presented in frequency and percentage shapes. According to Aziz (2009), the percentage calculation method is the number of samples that make the choice divided by the total samples of the entire study then multiplied by a hundred percent. As a result of data retrieval that has been processed, data is presented in the form of a schedule for improvement for elements that are less agreed upon by the respondent.

Table 2: Summary of valuation by Najib's level of agreement (2003)

Agreement level	Category	Measurement
SA A	Agree	High
SD D	Disagree	Low

3. Results and Discussion

The following is a result of the study from research questions. The data analysis adopted in this study is a descriptive analysis.

3.1 Demographic Analysis

Table 3: Demographic analysis

Demographic information		Frequency(<i>f</i>)	Percentage(%)
Gender	Male	11	55
	Female	9	45
Age	20-30 years	0	0
	31-40 years	2	10
	41-50 years	4	20
	51-60 years	14	70
Place of Service	Kuala Krai Vocational College	10	50
	Tanah Merah Vocational College	10	50
Teaching experience	1-5 years	0	0
	6-10 years	0	0
	11-15 years	3	15
	16-30 years	17	85

The demographic analysis of respondents containing gender, age, and service years placement are shown in Table 4.1. Gender analysis shows that the majority of the respondents are men of 11 (55%) and 9 (45%) is the female respondent. Meanwhile, for the duration of the teaching experience, the majority comprised 16-30 years (85%).

3.2 Suitability of Design

Analysis of the respondent's consent level for each item in the suitability of the design of teaching kits. Based on the analysis that has been carried out in this section, the percentage is highly agreed upon and agreed to indicate a value of 100%. This shows that the respondent agreed with the suitability of the kit design that was used by the researchers in the development of the testing of piling load test is suitable. A highly agreed scale has the highest percentage of 73.57% while the percentage for an agreed scale of 26.43%. The percentage of design items for teaching kits is suitable for teaching and learning to achieve the highest percentage at 95%. The second highest of the most agreed percentage is the item for each teaching kit component can be mounted and removed and the size of the teaching kit is suitable for teaching and learning purposes. That got a percentage of 75%.

Next, the design item of the teaching of the piling load test provides a similar picture of the actual test design and teaching kit design that can attract students with the lowest percentage of 65%. As such, the teaching kit of load tests has been developed with design suitability for the highly-agreed percentage of respondents.

Table 4: Analysis of the suitability of teaching kit design

No.	ITEM	SD		D		A		SA	
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1.	Design of the teaching kit is suitable for teaching and learning.	0	0	0	0	1	5	19	95
2.	The design of a super-structure teaching kit gives similar views with the real super structure design.	0	0	0	0	7	35	13	65
3.	The teaching kit is easy to operate.	0	0	0	0	6	30	14	70
4.	The teaching kit is easy to remove.	0	0	0	0	6	30	14	70
5.	Each teaching kit component can be installed and removed	0	0	0	0	5	25	15	75
6.	The size of the teaching kit is suitable for teaching and learning.	0	0	0	0	5	25	15	75
7.	Design of teaching kits that can attract students.	0	0	0	0	7	35	13	65
Total Frequency		0	0	0	0	5.29	26.43	14.71	73.57
		0 (0%)				20 (100%)			

Based on the analysis, the teaching kit has a good design because 100% of the respondents agreed that the design of the teaching kit is suitable for teaching and learning. This is because the design of the teaching kit is inspired by the real superstructure taskforce in the industry. The characteristics of a good teaching aid are, it is easy to be used and stored, and it does not need additional equipment and specific storage place.

3.3 Suitability of Material Usage

Analysis of the respondent's consent level for each item in the suitability of the use of teaching kit materials. Based on the analysis that has been carried out in this section, the percentage is highly agreed upon and agreed to indicate a value of 100%. This shows that the respondent agreed to the suitability of the use of kit materials used by researchers in the development of the testing of the piling load test. a highly agreed scale has the highest percentage of 69.17% while the percentage for an agreed scale of 30.83%. Teaching kits can provide various activities to teachers in presenting the teaching of the highest percentage at 85%. The second largest item is a highly agreed percentage is the item for the used material is secure that gets a percentage of 80%. In turn, the item strictly agreed to the material used for the lowest value of a percentage of 55%. As such, the teaching kit of piling was developed with the suitability of material used as the percentage of the highly agreed respondents was high.

Table 5: Analysis of the suitability of material usage

No.	Item	SD		D		A		SA	
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1.	The material used provides a similar picture to the actual material.	0	0	0	0	8	40	12	60
2.	The selection of material on each component of super structure is suitable.	0	0	0	0	6	30	14	70
3.	Materials used are safe.	0	0	0	0	4	20	16	80
4.	Materials used to be durable.	0	0	0	0	9	45	11	55
5.	Materials are easily used to be maintained.	0	0	0	0	7	35	13	65
6.	Teaching kits can provide a variety of activities to teachers in delivering teaching content.	0	0	0	0	3	15	17	85
Total Frequency		0	0	0	0	6.17	30.83	13.83	69.17
		0 (0%)				20 (100%)			

3.4 Functional Reliability of Teaching Kits

Analysis of the respondent's consent level for each item in the functional reliability of the teaching kit. Based on the analysis that has been carried out in this section, the percentage is highly agreed and agreed to indicate a value of 100%. This shows that the respondent had agreed with the functional adaptability of the kit that was used by the researchers in the development of the teaching kit of the piling load test is suitable. For a highly agreed scale has the highest percentage of 75% while the percentage for the scale agreed by 25%. The percentage of the teaching kit items can facilitate students to remember the types of components found in the piling load test. Earns the highest percentage at 85%. The second highest number of items agreed to be the item for this teaching kit to provide a true view of the construction site and the teaching kit will increase the understanding of the students on piling load testing at 80%. In addition, the items agreed to this lesson kit could show the processes available in producing the test load testing clearly. Get the lowest value percentage of 55%. Therefore, the super-

structure teaching kit that has been developed has functional reliability as the percentage of highly agreed respondents is high.

Table 6: Analysis of functional reliability

No.	Item	SD		D		A		SA	
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1.	This teaching kit can show the processes available in producing a clear superstructure.	0	0	0	0	9	45	11	55
2.	This teaching kit can give a true picture of the construction site.	0	0	0	0	4	20	16	80
3.	Teaching kits can facilitate students to remember the type of components found in super structure.	0	0	0	0	3	15	17	85
4.	The teaching kits can attract students to understand the better sub-topics of the structure.	0	0	0	0	5	25	15	75
5.	This teaching kit can increase the understanding of students on the superstructure.	0	0	0	0	4	20	16	80
Total Frequency		0	0	0	0	5	25	15	75
		0 (0%)				20 (100%)			

3.5 Comments and Suggestions

Section E is the comments and suggestions section. This is because it gives an avenue for the respondent to give any suggestions and comments suitable to give ideas to researchers in the improvement of quality teaching kits. Good teaching kits can be improved from time to time.

Table 7: Comments and suggestions given by the respondent

No.	Item	Frequency (<i>f</i>)	Percentage (%)
1.	Teaching kits that can increase students ' understanding	7	35
2.	A good approach to attracting students	5	25
3.	The resulting teaching aid can give a true picture of the load test.	5	25
4.	Improvements in terms of use.	2	10

3.6 Discussions

The discussion is related to the analysis of the findings of the study involving three research questions in chapter 5 of the use of teaching aid, the suitability of the teaching aid design, and teaching Kit functional applicability. As a result of the survey on teaching aid design, the test of the piling was expected to assist and meet the teaching aid requirement available at the Vocational College. Based on

the results of the outcome of the usage, researchers found that the percentage values strongly agreed to items used are safe from respondents at 80%. Abd Rashid in Azman (2005) has emphasized physical characteristics such as safe use, ease to use and stored storage, durability, and always updates that need to be used in classrooms. In terms of the use of this material, researchers have used safe materials and high resilience. So, this lessonkit can be used in a safe condition by the instructor and is used for a long-term period of time. According to Hassan (2004) has given some features of the selection of materials can be taken into consideration by a teacher. Materials used should also be harmless, easy to carry, lightweight, and easy to replaceable, or stored. For components in the teaching kit of piling load testing, researchers use the polystyreneboard as a teaching kit site. The respondent agreed to the use of this material because the material is lightweight and easy to be replaced. In addition, each component used in this lesson kit is similar to the actual material. The material used is easily available and does not complicate the use to maintained.

Based on the analysis made, the overall teaching aid generated has good design suitability as each item under this component has 100% in the agreed and highly agreed section. The design of the teaching kit's load test is inspired by actual piling works and reality at the project site. One of the physical factors of the selection of a good teaching aid is easy to use and stored and does not require equipment and boxes as well as storage (Rahman, 2000). With this, researchers have received a very high agreement in terms of design and the size of the teaching kits that are suitable for teaching and learning. Besides that, this lesson kit is easy to operate as there are user manuals on this teaching kit.

The result of this study has shown that the teaching kits of this piling will help and save the time of trainers in the teaching and learning process. This lesson Kit can also attract students to focus fully on the teaching and learning process. Further, the use of this kit can also increase the understanding of students in terms of measures and processes performed in the piling load test. Each component used in this lesson kit resembles the actual components of the construction site. The findings found that this teaching kit could function properly and in tandem with the topic of a piling test.

Through the development of a piling load test teaching kit, lecturers, and students. Have implications in this study. The implications for the lecturers are the use of teaching kits as teaching aid can improve the quality of teaching and learning. In addition, students also have an impact on learning better and give more understanding. The current teaching and learning session is to follow the 21st-century learning style, which uses teaching aid as a medium to attract students and to provide an understanding of the subjects delivered. Therefore, this study is one of the best initiatives to improve quality in the education sector.

4. Conclusion

Data analysis found that the production of a piling load test for the construction technology program at a vocational college is required. The aim of the researchers was to develop a test for the testing of piling loads as a teaching aid at the Vocational College. When the outcome of the teaching aid was developed, the objective of the study was achieved and all questions were answered. The teaching kit of piling loads can function well for the teaching and learning process. Research objectives have been achieved.

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