

Super Structural Teaching Kits as Teaching Aid Materials for Construction Technology Students

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Abstract: Teaching Aids Materials (TAM) is an important thing in a teaching and learning session as it can stimulate student's interest in learning because TAM is either in electronic or non-electronic form is an important support tool to increase the understanding of students and their interest in learning. This study discusses the use of teaching kits as TAM to assist teachers in implementing better and more effective teaching and learning sessions in the superstructure topic. The use of TAM is very necessary nowadays because it is a one-century learning method that can attract students during teaching and learning sessions. This study aims to know the suitability of teaching kit design, suitability of using the kit material, and functional applicability of teaching kits as TAM. The research design used in this study is in the form of product development and quantitative approach which uses the questionnaire form as a research instrument for data collection. The sample for the study was 20 lecturers from the Tanah Merah Vocational College and Kuala Krai Vocational College. The findings of the study showed that the use of the superstructural teaching kits could improve the quality and be suitable to be used in the teaching and learning session of the superstructure topic in a vocational college.

Keywords: Teaching Kits, Teaching Aid Material, Suitability Of Kit Design, 21st-Century Learning, Super Structure, Vocational College

1. Introduction

The Transformation of Vocational Education (TPV) aimed at strengthening the national vocational education system to produce skilled and trained manpower. The academic composition will be reduced and increased in industrial practice or technical practical to the student will be done (Ismail, 2011). The students of vocational college will be more vulnerable to skills than theoretical knowledge. It is very good to improve the psychomotor skills of vocational college students to become highly skilled manpower. Hence, the teaching and learning session should be improved to produce excellent students in theoretical knowledge and practical skills. As such, the use of media such as teaching aids materials

(TAM) is important when the teaching and learning (T&L) session is conducted. The appropriate use of TAM can produce students who dominate and understand what the teacher was delivered. According to (Azman, Azli, Mustapha & Mohd Isa, 2014) with the relevant TAM, it would help the teachers explain a concept more clearly than with verbal explanation. TAM is an important thing in the teaching and learning session as it can stimulate students' interest in learning because TAM either in electronic or non-electronic form is an important support tool to increase the understanding of students while retaining the interest of learning. In addition, TAM also explains messages that wish to be conveyed. Azman, Azli, Mustapha, & Mohd Isa (2014) noted that teaching is effectively enhanced when it is assisted by the media that allows in-memory experience in addition to the involvement through experience. The scope of this study focuses on the needs and requirements of the research objectives that are focused on the development of teaching kits, suitability in terms of design, suitability in terms of the use of teaching kit and teaching kit materials. The scope of this study is to focus on lecturers who teach in construction technology in the field of vocational college.

To produce students with technical and vocational skills, it should start at the vocational college. Usually, teachers still teach with writing on the whiteboard (Reighluth, 2012). Therefore, students are not easy to understand the subjects clearly because students are easily bored with the teaching and learning method which is often used by most teachers. The use of TAM, such as teaching kits, are less used in vocational college, resulted in a difficult student to pay attention and difficult to understand the lessons that been delivered. Teachers did not use the teaching kits in teaching and learning sessions and they still use modules (Abdullah, Zainal Abidin & Mohamad, 2012). Most teachers still use a complete book or module to convey educational content (Bunyamin, 2015). This causes student failure in receiving and understanding the lesson with a clear picture.

The failure of the lecturers in delivering educational content, will cause students to be easily bored, less enthusiastic, and consider the subject as difficult (Hassan & Mohd, 2007). Therefore, students do not pay attention during the teaching and learning session. Students are more excited about having fun and active atmosphere during the teaching and learning session. The teaching and learning process for technical areas is more focused on two parts, namely theoretical and practical. Both parts play an important role to the students to ensure they truly understand with what teachers have taught.

A traditional teaching and learning system that only favors the use of one-way communication and textbooks does not guarantee the effectiveness of the teaching and learning session with the students. This is because, it does not enhance the thinking capabilities of the students' and their imagination skills (Ismail, 2017).

Students do not know how to solve problems because the applied teaching and learning does not allow the student to think critically, and their psychomotor skills cannot be applied optimally. By the early surveys, which was done at the Tanah Merah Vocational College on 10 lecturers of construction technology, the lacking in the use of TAM such as teaching kits during the teaching and learning session was found. Lecturers only use one method in teaching and learning without including student activities in class. This causes students easily get bored and lack of attention during the teaching and learning session. The use of modules throughout the teaching and learning session also affects the understanding of students as it does not show the actual concept or process of the matter.

Therefore, students' examination results turned out not to be not good especially the one that involve theories such as practical tests. In the super structure topic, there are many building structures which are beams, column, walls, roofs, and many others. Students are not able to clearly understand the position of each structure if there is no actual picture of the structure. As a result of the problem, researchers intend to develop a super structure teaching kit as TAM that helps teachers and students to launch the teaching and learning process. Hopefully with the availability of this super structure teaching kit, helping teachers and students in giving a clear picture of building construction concepts.

The study was to identify suitability TAM in the process of teaching and learning. The TAM was developed to attract students and facilitate the students to understand as the kits that were developed are similar with the real site. In addition, this dispensing kit not only attracts interest but also able to make continuous thinking, to help understand and be able to identify the issue or matter through the enhancement of reading activities and providing new experiences to the students for more open mind. The related groups are lecturers, vocational college, and students.

The result of discussions from the problem background, researchers found that there is issue in teaching method of the lecturers. They are still using a traditional teaching and learning method such as writing an education on the whiteboard. Students are easily bored and do not give attention when the teaching and learning session take place because it does not catch their attention. It is contradicting with when they learn using teaching kits. The lack of use of TAM at the Education Centre also became one of the problems that drove the graduates of the College of Vocational. No TAM provided by the vocational college and the lecturers have to develop TAM using their own money. This will be a burden to the lecturers. Apart from that, the level of domination of lecturers on TAM is weak and poses a negative attitude against the use of TAM. The string of the above problem, motivation and spirit of lecturers will be affected. Lecturers have limited knowledge and skills in the use of TAM. When the teacher is not motivated to teach TAM, it will affect the teaching and learning session conducted by the lecturer. Teaching makes students bored and bored to learn. A more exhausted teaching and learning session will lead to lose control and students will face many problems. At the same time, learning session becomes ineffective. Finally, the difficulty of students in mastering this super structure topic can be seen from getting low marks in their examination. Therefore, this study focuses on the development of the super structural teaching kits in terms of design suitability, suitability of material uses and functional applicability of the kit. This is to improve the quality and effectiveness of the teaching and learning session at the vocational college which will produce outstanding students. The objectives of this study are:

- a) Developing a super structure teaching kit as a teaching aids material (TAM) for construction technology students.
- b) Identify the suitability in terms of design and use of the super structure teaching kit material as a teaching aids material (TAM) for construction technology students.
- c) Testing the functional reliability of the super structure teaching kit as a teaching aids material (TAM) for construction technology students.

1.1 Conceptual Framework

There are many steps done by the researcher to come into the end product which is the teaching kit. It is built in hoping that it can be the best solutions to the issues happening among the construction technology students from vocational college of Malaysia in their super structure subtopic. In the preliminary studies, the researcher will collect all the data needed. Then, the data will be analyzed. Researcher designed the teaching kit right after the analysis process completed. When the design is ready, the teaching kit will be build/develop into a real product. The development of teaching kit is based on the construction syllabus. As usual, a new product will go into testing and evaluation process before it is used widely by the targeted users. The teaching kit is tested and evaluated in terms of its design and functional reliability. Any lacking will be overcome during the improve and redesign phase afterwards. Researcher will consider the teaching kit is ready to be used by super structure subtopic students in vocational college when it has passed all the phases stated as in Figure 1.

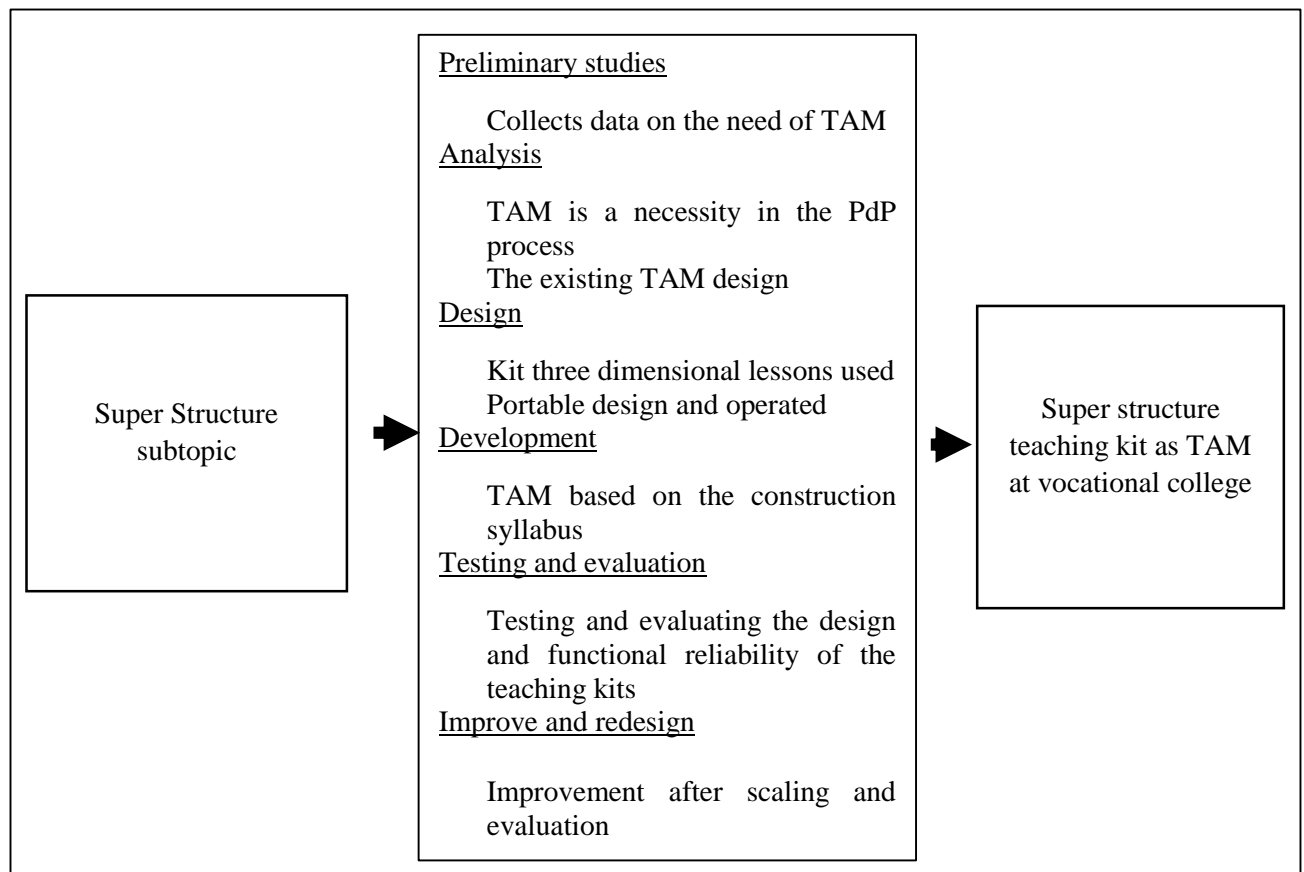


Figure 1: Conceptual framework

2. Methodology

This study is the production of a product which will involve the development process and design of teaching kits by modifying the ADDIE model. This model usually becomes the basis and reference in designing products because it is suited to be used for learning model that emphasis on product design. There are 5 phases in ADDIE model. Firstly, analysis. This phase is used by the researchers when doing the collection of information to fulfil the research objectives. Secondly, design. Researchers will design the product that aligned with the research objectives. In this study, researchers will build a super structural teaching kit as a teaching material. Thirdly, development. The product development phase has two methods which are through questionnaires and analysis. Next, implementation. In this phase, researchers will test the teaching kit to discover any error during product development. Lastly, evaluation. There are two phases of evaluation which are, formative evaluation to ensure the effectiveness of the product and summative evaluation to know the feedback and willingness of the targeted users which are in this case, the lecturers and students of vocational college.

2.1 Population and sample

The population used by the researchers in this study is a group of lecturers from construction technology course at a vocational college. Researchers use this population to ensure that the objectives that have been stated will be achieved. As for the sample, researchers selected a total of 20 people among the lecturers in the population to be used in this study. According to ADDIE model, this population selection and sampling process falls under the phase of evaluation.

2.2 Instrument of study

For the research instrument, researchers use the questionnaire as an instrument of information collection and the questionnaires were adapted from previous review containing 18 items which consists of three elements, namely attitude, knowledge, and skills. In addition, the researcher also made a validity comprising of the lecturers from polytechnic and vocational college in respect of the questionnaires. Through the questionnaire, it will be analyzed by using a scale of Likert (Table 1) to gauge the extent of the objectives of this study. The scale of Likert is an instrument used to gauge the attitude, opinion and perception of a person or group of people on social phenomena (Sugiyono, 2012). According to ADDIE model, this population selection and sampling falls under the phase of evaluation.

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

Data that has been obtained from respondents will be processed, analyzed and evaluated through descriptive statistical studies using frequency and percentage methods. The questionnaires were analyzed according to the question of quantitative measure where each item answered each research question specifically. The results of data analysis for the readiness of the lecturer college either high, medium, or low are determined through Table 2.

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

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

3. Results and Discussion

The following is a result of the study from research questions. Data analysis adopted in this study is a descriptive statistical analysis. This descriptive statistical method is used to analyze data in percentage and frequency. As for the analysis of the study, it comprises of respondents' demographics which combined with the research questions that includes the 3 conjunctions, the suitability of design, suitability of materials used, and the functional applicability of the teaching kits.

According to Rashid and Azman (2005), for a TAM to be use in a classroom, it must be physically safe to use, accessible and easy to be keep, durable, and always updated. Discussion of this study shows positive results. There are few characteristics to be considered by the lecturers to choose their learning medium that suited with the students (Hassan, 2004). In the field of skills, a majority of the lecturers from college vocational had rejected the fact that due to their low skills, they were unable to perform teaching activities that included skills when using TAM. This shows that the majority of their lecturers have high skills and have no problems in implementing teaching activities using their existing skills. Through research conducted on the lecturers, the vocational college shows a high level of perception of their willingness.

3.1 Demographic analysis

For the demographic analysis of respondents containing gender, age, serving and teaching experience are shown in Table 3. Gender analysis shows that the majority of the respondents are women: 3 (15%) and 17 (85%) are the respondent of men. While for teaching period, the majority consisted of more than 16 years (95%).

Table 3: Demographic analysis

Demographic information		Frequency (<i>f</i>)	Percentage (%)
Gender	Male	17	85
	Female	3	15
Age	20-30 years	0	0
	31-40 years	1	5
	41-50 years	3	15
	51-60 years	16	80
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	1	5
	16-30 years	19	95

3.2 Suitability of design

The findings show that all respondents (100%) agreed on the suitability of teaching kit design. All the respondents agreed that the design of teaching kit is suitable for teaching and learning. 85% of the lecturers also agreed that the teaching kit gives similar views with the real super structure design and the size of teaching kit is suitable for teaching and learning purpose. Table 4 shows the analysis of the suitability of teaching kit design.

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	0	0	20	100
2.	The design of a super-structure teaching kit gives similar views with the real super structure design.	0	0	0	0	3	15	17	85
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	5	25	15	75
5.	Each teaching kit component can be installed and removed	0	0	0	0	8	40	12	60
6.	The size of the teaching kit is suitable for teaching and learning.	0	0	0	0	3	15	17	85
7.	Design of teaching kits that can attract students.	0	0	0	0	4	20	16	80
Total Frequency		0	0	0	0	4.14	20.72	15.86	79.28
		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

teaching kit is inspired by the real super structure taskforce in the industry. The characteristics of a good TAM are, it is easy to be used and stored, and it does not need additional equipment and specific storage place.

3.3 Suitability of materials usage

The findings show that majority of the respondents (95%) agreed on the suitability of material usage. Most of the respondents agreed that the material used provides a similar picture to the actual material. 80% of the lecturers also agreed that the selection of material on each component of super structure is suitable and it can provide a variety of activities to teachers in delivering teaching content.

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	1	5	19	95
2.	The selection of material on each component of super structure is suitable.	0	0	0	0	4	20	16	80
3.	Materials used are safe.	0	0	0	0	5	25	15	75
4.	Materials used to be durable.	0	0	0	0	7	35	13	65
5.	Materials are easily used to be maintained.	0	0	0	0	5	25	15	75
6.	Teaching kits can provide a variety of activities to teachers in delivering teaching content.	0	0	0	0	4	20	16	80
Total Frequency		0	0	0	0	4.33	21.67	15.67	78.33
		0 (0%)				20 (100%)			

Based on Table 5 for the suitability of material usage, researcher found that most of the respondents (95%) agreed that the material used provides a similar picture to the actual material. According to Rashid and Azman (2005), for an ABBM to be use in a classroom, it must be physically safe to use, accessible and easy to be keep, durable, and always updated. There are few characteristics to be considered by the lecturers to choose their learning medium that suited with the students (Hassan, 2004). It must be non-hazardous, portable, lightweight, and easy to be replaced. One the component in the teaching kit for super structure course is, the researcher used plywood as the base. Respondents also agreed because, the materials are easy to find and cost-wise. Other than that, most of the components used are the same with the actual one.

3.4 Functional reliability of the teaching kits

The findings show that majority of the respondents (90%) agreed on the functional reliability of the teaching kits. Most of the respondents agreed that the teaching kit can show the processes available in producing a clear super structure. 70% of the lecturers also agreed that the teaching kit can facilitate students to remember the type of components found in super structure and it can attract students to understand the better subtopics of the structure. Table 6 shows the analysis of the functional reliability.

Table 6: Analysis of the 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 super structure.	0	0	0	0	3	10	18	90
2.	This teaching kit can give a true picture of the construction site.	0	0	0	0	7	35	13	65
3.	Teaching kits can facilitate students to remember the type of components found in super structure.	0	0	0	0	6	30	14	70
4.	The teaching kits can attract students to understand the better subtopics of the structure.	0	0	0	0	6	30	14	70
5.	This teaching kit can increase the understanding of students on the super structure.	0	0	0	0	8	40	12	60
Total Frequency		0	0	0	0	6	29	14	71
		0 (0%)				20 (100%)			

The results stated that, this kit is as the teaching aids for the construction technology students, managed to save their time and energy throughout the learning process. This teaching kit also manage to capture their attention and interest to fully focus during the learning session. Other than that, by using this teaching kit, the understandings of students on the subject will be better and improve based on the steps and processes that need to be carried out when using the teaching kit. This is because, every component used in this teaching kit resemble the real one that been used in the industry. Overall, the results prove that the teaching kit is functioning well and compliment with the super structure subtopic.

4. Conclusion

On the whole, aspects that wish to be studied such as design suitability, suitability of material use, and functional applicability can be identified. Based on discussions from the findings of the study that have been explained, it can be formulated that this study meets and achieves all three objectives and questions of study. Therefore, researchers can conclude that, this super structure teaching kit can be summed up to be used in the teaching and learning session in the super structure subtopic at vocational college.

Through the development studies between super structure teaching kits, lecturers, and students, these are among the implications of this study. Firstly, the teaching kits of TAM to improve their quality of teaching and learning session with the students. Next, students also get positive impact in their learning session by getting better understanding in their super structure topic of content. The current teaching and learning session are to follow the 21st century learning style, which uses TAM as a media 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.

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References

- Abdullah, Zainal Abidin & Mohamad. (2012). Guru tidak menggunakan kit pengajaran dalam sesi PdP sebaliknya hanya menggunakan modul. *Seminar Kebangsaan Majlis Dekan Pendidikan Universiti Awam* (pp. 1-889). Sabah: Universiti Malaysia Sabah.
- Azman, Azli, Mustapha, & Mohd Isa. (2014, 03 01). *Penggunaan Alat Bantu Mengajar ke Atas Guru Pelatih Bagi Topik KerjaKayu, Paip dan Logam*. Retrieved from Academia: https://www.academia.edu/35677547/Penggunaan_Alatt_Bantu_Mengajar_ke_Atas_Guru_Pelatih_Bagi_Topik_Kerja_Kayu_Paip_dan_Logam
- Bunyamin, M. A. H. (2015). Pendidikan STEM Bersepadu: Perspektif Global, Perkembangan Semasa di Malaysia, dan Langkah Ke Hadapan. *Buletin Persatuan Pendidikan Sains*, 1-6.
- Hassan, A. & Mohd, A. (2007). *Guru Sebagai Pendorong Dalam Darjah*: Kuala Lumpur: PTS Publications & Distributors Sdn. Bhd.
- Hassan, A. (2004). *Kebolehgunaan Kit Pengajaran Dan Pembelajaran Bagi Meningkatkan Prestasi Pelajar*. Johor: Jabatan Pendidikan Teknik Dan Vokasional, Kolej Universiti Teknologi Tun Hussien Onn.
- Hassan, N. (2004). *Hubungan Antara Penggunaan Bahan bantu Mengajar Dengan Minat Pelajar Tahun Lima Sekolah Menengah Kem Pengkalan Chepa*. Kelantan: Universiti Pendidikan Sultan Idris.
- Ismail. (2017). *Cerita Lipur Lara Terpilih Berdasarkan Pendekatan Pengurusan*. Kuala Lumpur: Universiti Malaya.
- Ismail., S. (2011, 10 02). *Program Transformasi Pendidikan Vokasional Bermula Pada 2013,Muhyiddin*. Retrieved from Bernama: <http://web8.bernama.com/bernama/v5/bm/newsindex.php?id=612538>
- Rashid, A., & Azman. (2005). *A Framework for the Assessment of ICT Maturity in Becoming a WCU*. 9(2), 25–33.
- Reigeluth, C. M. (2012). *Instructional theory and technology for a post-industrial world*. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (3rd ed., pp. 75-83). Boston: Pearson Education.
- Sugiyono. (2012). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.