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Effects of Learning Aid (KIT) on Student Performance for Electric Circuits Topics

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Abstract

This study aimed to identify the effectiveness of learning aid for the Electric Circuit topics. The learning aid was developed using ADDIE model because it was designed to create lesson plans and learning materials so that the delivery of the lesson will be more effective and efficient. This model was included the phases of analysis, design, development, implementation and evaluation. A set of questionnaire was used in this research. Students were divided into two groups, conventional groups and learning aid group (intervention). The study involves a set of questionnaire was distributed to 48 of form 1 students in Sekolah Menengah Kebangsaan Agama Falahiah, Pasir Pekan, Kelantan. The findings showed that Learning Aid for Serial and Parallel Circuit topics (Electrical Circuit) can effect of the student performance. It is suggested this learning aid can be used as a kit to replace a conventional method to improve the student performance.

Keywords: Learning AID, ADDIE Model, Electric, Interest, Motivation, Effect, Teaching And Learning

Introduction

The Malaysian education system has undergone changes starting from the educational system before independence until the present education system. National Education Philosophy which became public knowledge in 1988, has become the core and backbone of our education system. Ninth Malaysia Plan (RMK9) also stressed the importance of education related to increased capacity for knowledge and innovation and nurture 'first class mentality'. One of them is carrying out comprehensive improvement of the system of education and training delivery. Mustapa and Miskon (2014), said education is not only aimed to enhanced good attitudes but also involves the process of changing attitudes and behaviors of one person or group of people in the quest for human beings not only through the teaching process but also through exercises.

One of the goals contained in the National Education Philosophy is to produce a knowledgeable society. Knowledge and skills are important to ensure the effectiveness of learning

process in the classroom. Knowledge and skills are important to ensure the effectiveness of teaching a teacher in the classroom. This is due to the dominance of teachers in terms of their drive to implement an effective duty (Mustapa & Miskon, 2014). This explains that the teacher is an important asset in teaching and learning methods (PDP). According to Nawawi (2011), especially in the beginning of a learning process needs help and guidance of a teacher or educator.

According to Nachiappan *et al.* (2012), an effective teaching and learning process includes approaches, strategies, methods, styles, models and teaching techniques appropriate in accordance with the learning content, even according to most researchers studying the brain and human thought says that 99 percent of what we learn is coming from senses, through the senses of sight, hearing, smell, taste and touch. It is supported by Othman (2013) stated learning makes students feel tired and bored because there is only one-way communication which means that teachers submit the content and students only as a listener in the classroom.

Electricity is a topic that involves theory and practical even teachers usually used teaching aids (BBM) as the real thing or images that relates for easier teaching and learning in the classroom (Takim, 2014). According to Alias, Azahari & Ismail (2013), the researchers gave the idea to create learning aid, which is capable of affecting the teaching and learning process. The idea was sparked after researchers looked through the teaching and learning process, teacher which are not from the electric field teach students and they found that the attitude of the students who prefer to play at any teaching and learning executed. It is described by the learning aid, it can replace a teacher who has taught the electrical subject who need to work outside the classroom and so on. Teachers of other subjects can replace the classroom while the subject teacher's absence by simply using the learning aid, because the learning aid provided could be touched, can be seen clearly and can be fun for students.

Literature Review

The method often used by some teachers nowadays is the chalk and talk. Conventional teaching methods such as chalk and talk method and read by reading text books, the impact will be minimal and in fact, the situation will not even be able to help improve the skills to think critically and creatively (Takim, 2014). This argument is supported by Ishak, Ariffin, Din and Karim (2002) that states the conventional methods practiced by teachers of learning and will limit the ability of students to get a lot of knowledge. Conventional learning methods should be replaced by a more effective learning and it can improve student understanding. Teaching methods which used chalk and talk just a student-centered only.

According to Nawawi (2011), associated with conventional methods of teacher-based teaching is no longer the best way to prepare students with a variety of skills. This illustrates that the conventional methods are no longer suitable for use today. Yunoh & Yaacob (2013) found that the cause of students lack of interest in the topic of electricity because the students can not undertake "hands on" as the topic of electricity is a major topic of the respondents supposed to see how the circuit is constructed and build your own circuit. Azman, Azli, Mustapha, Balakrishnan and Isa (2014)

argues that the use of learning aid can help technical teachers explain things and conceptual learning contents more accurately than a verbal description. However, level of used of learning aid among technical teachers was at a moderate level (Yasin, 2010).

According to Khamis and Awang (2014), stated in their study found that students do not understand the lesson is trying to convey in the classroom where students are unable to draw back on the circuit diagram, can't distinguish the order of serial and parallel and are not able to build a real circuit. Hamid (2013) students seem confused to distinguish the characteristics of series and parallel circuits. They can't distinguish between series and parallel circuits. Similarly, Ismail and Dahlan (2015) in their research explained that the students did not answer properly and failed to understand the concept because they are confused with the circuit arrangement in parallel and serial arrangement. This is evidenced by Khamis and Awang (2014) found that students are unable to identify the symbols of electrical components. Yunoh and Yaacob (2013) found that there have been misconceptions among students about the symbols and wires for electrical circuits in parallel and series electrical circuit. It is supported by Ing (2012) in his study found the students had trouble understanding the concepts in topics serial and parallel circuits. The results Yunoh and Yaacob (2013) and Ing (2012) prove that students have difficulties in understanding the concepts of series and parallel circuit topic.

However, according to Salsidu, Azman and Abdullah (2017) in his study of the learning trends using interactive multimedia in the field of technical education: a literature highlight found that subjects were more interesting and effective, even using pictures, graphics, videos and voices can help students understand and remember what they are learning well. This is supported Beedle and Wright (2007) in their study of perspectives from multiplayer video gamers. This research specifically sought to verify whether multiplayer video games perceived that higher-order thinking skills such as motivation, communication, problem solving, and creativity were increased by playing multiplayer video games. A study conducted by Kirriemuir and McFarlane (2003) also found that teachers provided motivation through use of computer games. This shows that the use of learning aids in the field of electricity can increase achievement, interest and motivation. Teaching and learning who use technical learning aids in replacing the demonstration method are indispensable in line with the development of technology and science.

Through the use of learning aid, students achievement increased. A research conducted by Yunoh and Yaacob (2013) to 26 students from 5 years at Sekolah Kebangsaan Darat Datu Rakit has shown that the use of learning aid named Kit Elektrik Ringkas (KERIS), he has proved that misconceptions prevailing among respondents in successfully corrected. They are supported by Ing (2012) in his research found the students had facing problem to understand the concepts in topics serial and parallel circuits. After analysis, on average of 56.8 per cent of pupils, almost 3/5 of five Zhong have less understanding on the difference between parallel and serial circuit. According Ismail and Dahlan (2015), students do not respond properly and failed to understand the concept because they confused with the circuit arrangement in parallel and serial arrangement. However, after undergoing intervention tests, marks obtained from students worksheet increased. Similarly, finding

by Hassan (2011) proves that student achievement increases when using learning aid in teaching and learning process.

There are a variety of internal and external factors that are often associated with student achievement such as personality, gender, socio-economic, interests, attitudes, motivation, learning styles and teaching methods (Ahmad, Ghani, Zainal & Ismail, 2012). This argument is supported by Ting Suh Ping (2012), the result of a number of pupils in a primary school in Kuching, he found that the use of teaching aid stimulate students' interest. According to Jasmi and Tamuri (2007), the use of teaching aid (BBM) technology-based education can be practiced to increase the effectiveness of the teaching and learning, in addition to the interest and attention of students can be pulled through the use of rigorous planning.

In fact, the use of the learning aid is expected to impact interest, fun and enthusiastic including improving student achievement in academics (Hassan, 2011). Used of the learning aid in the learning aid process not only attracts students but it can also improve students understanding. It is also supported by Hanif, Azman, Pratama and Ma'arof (2016) in his research found learning aid whether in electronic or non-electronic form is an important to increase students understanding while maintaining student interest. Therefore, these problems need to be overcome to produce students who excel in academic achievement. One way is to use the learning aid for Serial and Parallel Circuit topic because the topic involves technical skills.

Methodology

Design Review

Figure shows a flow chart for a graphical representation of the construction of a project representing the work planned by the appropriate working order. Learning Kit serial and parallel circuits built using ADDIE model includes the phases of analysis, design, development, implementation and evaluation.

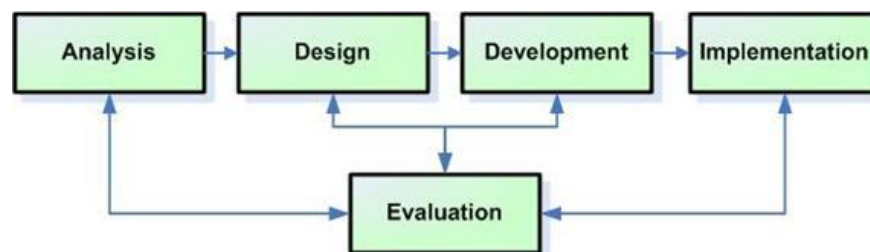


Figure : ADDIE Framework (Dick and Carey, 1996)

a) *Analysis*

The analysis was made based on the study of the problems for which there are problems of teaching and learning for Electrical Circuit topic's, especially for subtopic Serial and Parallel Circuit. Based on previous studies, students do not understand the concept and the difference between serial and parallel circuits and does not recognize electronic components and symbols. It is also supported by interview analysis with spontaneous teacher students without video recording and only for research records. The results of the interview were found to be difficult for students to understand this topic.

b) *Design*

Development learning aid for Serial and Parallel Circuit based on learning theories such as Edgar Dale Theory (1969), Theory of Behaviorism (1913) and Cognitive Theory that characterizes human memory is higher at 90% if they make their own study as well as behavioral learning will change when there is stimulation.

c) *Development*

Serial and Parallel Circuit Learning Kit design are divided into 3 parts, namely the learning aid box, wiring circuits and modules (including Compact Disk of learning and teaching process). Learning aid box is built using wood as the main raw material. The components are stacked on top of the circuit board (Perspex sheets). The characteristic of perspex sheets are formed and punched is an option to use as a learning aid's circuit board. Electronic components are arranged and connected with a terminal hole (banana socket) as appropriate. Electronic components used include the types of components and symbols to be learned by form 1 students such as buzzer, resistors, bulbs, switches and so on.

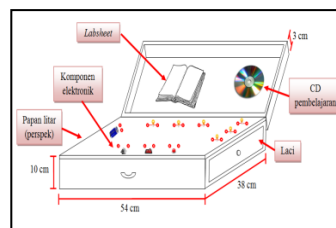


Figure : Sketch of Learning Aid Serial and Parallel Circuit



Figure : Learning Aid's Components



Figure : Series and Parallel Circuit's Learning Aid

d) *Implementation*

This study was conducted to form 1 students in Sekolah Menengah Agama Falahiah, Pasir Pekan, Kelantan. The number of respondents taken to be sample in this study was 48 people. Students were divided into two groups, conventional and learning aid group.

e) *Evaluation*

Students are assessed using questionnaire. After a study of electrical circuit topic, both groups of students were given a questionnaire to find out the effect of the learning aid.

Population and Sample Review

A school in the state of Kelantan was chosen by random which is, Sekolah Menengah Agama Falahiah, Pasir Pekan, Kelantan are selected. A total of 48 students were randomly selected from 90 students of form 1. The questionnaire was distributed to students who conducted teaching and learning using the learning aids to identify the effectiveness of the students after using the Circuit and Parallel Circuit Learning Aids.

Research Instrument

Researchers used self-developed questionnaires as research instruments. Before answering the questionnaire, the two groups undergo teaching and learning using conventional methods and the other using learning aids. After that, the students are required to answer the questionnaire to find out the effect of learning aid. The researchers created their own instruments to suit the respondent based on the issues and objectives to be achieved.

Result and Discussion

Table 1 shows the effect of learning kit on student performance. It was found that the use of the learning aid of Serial and Parallel Circuit indicates the effectiveness of the Electric Circuit topic. Based on questionnaires that have been carried out, most of the students agreed that this learning aid affects the teaching and learning with a mean value of 4.75. It was revealed that the use of instructional aid provides a beneficial effect on teaching and learning to the topic Serial and Parallel Circuit. This result was in agreement with Kailani and Rohani's research (2011) which is found that teaching becomes more interesting and effective if learning aid is used. This argument is supported by Hassan (2011) from the findings of the study also proved that pupil performance improved when teaching and learning kits were used in the teaching and learning process.

Table : Effects of learning kit on student performance

item	Statement	Sun.
	The use of this learning kit:	
1	help me to focus in class	4.79
2	I'm eagerly look forward to KHB's learning time	4.69
3	makes me feel excited to learn	4.79
4	the topics that being taught are easier to understand	4.71
5	link the theory with an actual situation	4.75
6	provide sufficient time for me to remember and understand each learning	4.67
7	easy for me to remember the lessons being learned	4.75
8	could help me to improve understanding in recognizing learning taught by teachers	4.79
9	sufficient for students to review instructional learning without teachers	4.73
10	allow me to make the differences between series and parallel circuit	4.69
11	managed to turn the learning environment	4.67
12	I prefer to ask if I do not understand	4.73
13	making learning more comprehensive and diverse	4.83
14	I gained an experience that cannot be easily found through ordinary teaching	4.79
15	encouraged me to investigate problems or possibilities arising	4.81
Total Min		4.75

However, there are few questions that students have disagreed which are 1.4 percent only. Probably caused by the distance between students with learning aid during the teaching and learning based on teaching aids and they even had to take turns with a group of friends as only using one unit of learning aid used for this experimental session. It has the support of researchers previously Kailani and Rohani's (2011) also support the fact that the use of suitable teaching kit can make students more likely to generate curiosity and interest as well as adding variety to teaching in the classroom. Overall, it can be concluded that the use learning aid of Serial and Parallel Circuit can have a positive impact on students.

Recommendations and conclusions

This research aimed to identify the effectiveness of Serial and Parallel Circuit learning aid for form 1 student for the topic of Electric Circuit. Based on the results of studies conducted, the questions raised in this study have been answered through questionnaire. Overall, learning aid for Series and parallel circuits can affect the Electric Circuit topics for form 1 students. The findings of the first study found that the use of Series and Parallel Circuit Learning Aids shows the effectiveness of electric circuit topics. Appropriateness of teaching aids in teaching and learning to ensure that the content can be delivered and well-received by students. Therefore, it is expected that the study and construction of the learning aid for Series and Parallel Circuit. This can help administrators and teachers to improve the effectiveness of students for the Electric Circuit topic.

For the purpose of improving researchers can expand the study to other students who are facing the same problem and can be generalized to the whole country. In addition, this learning aid need regular maintenance since it uses 1.5-volt battery and the battery should be replaced only when running out of power. Therefore, this learning aid can be improved by using a power source of the plug (240 V). In fact, researchers can build the learning aid's box with materials from plastic to make learning aid lighter to carry anywhere easily. Researchers also can build learning aid in simulation.

Learning theory is a guide to teachers to help students achieve maximum performance. The theory used is the theory of Edgar (1969). In the Edgar Dale Theory states that humans will achieve 90 percent memory when they make their own things and it can alter the understanding from difficult to being easier. This is the same as the use of this learning aid where students can build their own electrical circuits and the results are more understandable.

Contribution

This study is expected to benefit the parties involved in the electric field. Especially for students to gain more control over Siri and Parallel Circuits. Practical training using this learning aid helps to improve student performance. Learning aid also creates the interest and motivation of students in teaching and learning because it is easy to understand as compared to traditional learning. In addition, effective teaching depends on the way a teacher teaches. Teachers can choose the right method to attract students, such as learning using learning aid. Learning aids can improve the quality of teaching and learning in the classroom as students can learn on hand. Furthermore, providing

appropriate learning aid can help the school in carrying out its activities effectively with learning aid and producing excellent students and raising the image of the school.

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