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Research Paper

Effectiveness of Interactive Instructional Media on Electrical Circuits

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Abstract

Based on observation toward students of Electrification Engineering, the result explained limitation of interactive instructional media so that teacher had not found the good way to teach the lesson who could not teach with conventional method. These phenomena could bring negative effects for students, so that the students might reply the lesson, and could make time fly. This study aimed to know about effectiveness of interactive instructional media on Electrical Circuits. This research uses Research and Development (R&D) method and development model in this research was 4D (four-D), there were four steps in this model –define, design, develop, and disseminate–. The result that is obtained from this research was follow: The effectiveness of interactive instructional media was expressed effective for improving the students' outcomes because with 90.6% of students had reached Minimum Mastery Criteria. Based on the results of this research could be conclude that interactive learning media for Electrical Circuits was effective to be used as a learning media.

Keywords: *Interactive Instructional Media, Electrical Circuits, Research and Development*

1. Introduction

Information and Computer Technology (ICT) at the present time has grown rapidly [1]–[10]. The development of this technology can help people in various aspects of life and work. Education is one of the areas that utilize ICT as a medium of learning to help teaching and learning activities[11]–[15]. Materials and tools that we know as software and hardware are none other than instructional media. The importance of media that help learning has begun to be felt by teachers and students so that the management of learning aids is needed.

Based on the renewal in the field of information technology, one way is through improving the quality of learning that is by updating the approach or increasing the relevance of teaching methods. Selection of methods and the right instructional media can support well conveyed material to learners. The importance of media that helps learning has begun to be felt by teachers and learners. The management of teaching aids is much needed. One of the good instructional media that used is interactive media. Instructional media can be presented in textual, animations, videos, and picture. The combination of presentation is expected to learners more motivated and feel not quickly bored.

Media is to anything that carries information between a source and a receiver. Everything that conveys information from information sources to those who receive information is called the media [16]. Instructional media is a messenger technology that can be used for learning purposes, instructional media is a physical means to deliver learning materials, instructional media means communication in the form of print and view by including hardware technology [17]. Instructional media is any form of learning means that can be used in a learning process that aims to enhance effectiveness and efficiency in achieving a learning objective [18].

Based on the observations done in Vocational High School in Agam District, the phenomenon found in the learning process, among others; limitations in the procurement of instructional media so that teachers have not found the right way in the presentation of material that can't be presented with lecture and record methods. This phenomenon has a negative impact on students, so students have to repeat the material, also spend the time that should be used for the discussion of the next material that can increase students' knowledge, and cause the students not active in learning because more activities to hear it.

The aim of this research is to see the effectiveness of interactive learning media in Electric Circuit subjects. Instructional media can assist students in understanding and applying the concept of learning, so that the learning objectives can be achieved by students [19][20] and instructional media has a greater opportunity to close the learning achievement gap by instructional media compared with students not learning by using instructional media [21][22]. Instructional media that utilize vision and hearing is a good way to help the learning process for students [23], and instructional media can increase students' phonological awareness in learning [24]–[27].

Based on these problems, researchers feel the need to do this research to find out whether the interactive instructional media developed is effectively used in improving students' learning outcomes in Electric Circuit subjects. Electric circuits are subjects whose material is abstract in nature, so teachers need interactive instructional media to concrete abstract material. Teachers need a way of how they can effectively integrate instructional media into the learning process in the classroom [28].

2. Method

This research is a Research and Development, this can be seen based on the formulation of the problems revealed earlier. In this research, the product that is produced is instructional media using Lectora Inspire software. Research development is the research used to produce a specific product and test the effectiveness of the product [29].
Interactive learning media development procedure is using 4-D (four-D) development model. The development process consists of 4 stages: (1) define (determination of material); design (design); (3) develop (development); (4) disseminate.

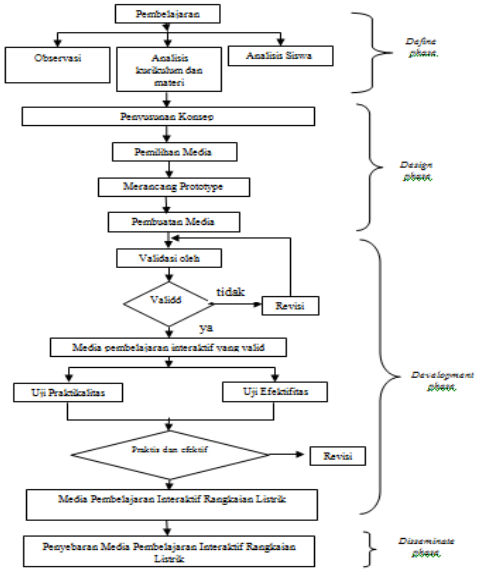

Fig.1: Research Development Procedure

The effectiveness test is in the third stage of the 4D model, the development stage. The effectiveness of instructional media is done with the aim to assess whether the developed instructional media can be used in accordance with expectations to improve student activity and learning outcomes. Aspects of activities observed in the learning process using interactive instructional media of the Electric Circuit.
This instrument is used to obtain data about the effectiveness level of instructional media that is developed, are follows: valid test result of learning and reliable. The test of learning result is used to get the data needed to determine the percentage of student's success after following the learning by using interactive instructional media in circuit subjects. This test is given before (pretest) and after (posttest) learning.
Effectiveness of instructional media is determined by looking at the achievement of the students' learning outcomes by using interactive instructional media used during the research. Student learning outcomes are calculated on the basis of individual completeness obtained by the students. The effectiveness of interactive instructional media is determined by looking at the achievement of student learning outcomes before and after using interactive instructional media. Effectiveness test is done by comparing the learning result before and after using interactive instructional media. This effectiveness test is calculated using the independent sample t-test formula.

3. Results and Discussion

A. Pretest Data
Pretest data is obtained after the test to students, this pretest is done before the learning begins by using interactive instructional media. Data pretest in if using SPSS 16. The results of data analysis pretest can be seen in the table below.

Table.1: Normality of Pretest Data

		Control Class	Exp. Class
N		33	32
Normal Parameters[a]	Mean	62.8788	64.8148
	Std. Deviation	12.93193	7.70030
Most Extreme Differences	Absolute	.200	.314
	Positive	.103	.314
	Negative	-.200	-.235
Kolmogorov-Smirnov Z		1.148	1.775
Asymp. Sig. (2-tailed)		.143	.064

Table.2: Homogeneous of Pretest Data

Levene Statistic	df1	df2	Sig.
7.358	1	63	.079

Based on Table 1 it can be seen that the significance value of the normality test is 0.143 and 0.064 > 0.05, thus it can be concluded that the control class data and the experimental class are normally distributed. In Table 2 it is known that the significance value of homogeneity test is 0.079 > 0.05, thus it can be concluded that the control class data and experimental class are homogeneous. The pretest data of the control class and the normal and homogeneous distributed experimental class were then analyzed using independent sample t-test. The result of pretest analysis is presented in Table 3.

Table.3: T-test of Pretest

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Value	Equal variances assumed	7.358	.009	.730	63	.468	1.93603	2.65038	-3.36034	7.23239
	Equal variances not assumed			.736	52.442	.465	1.93603	2.63072	-3.34184	7.21389

Based on Table 3 it can be seen that the value of sig. (2-tailed)> 0.05 is follow 0.468> 0.05 it can be concluded that there is no significant difference between learning result of pretest of control class and experiment class.

B. Posttest Data
Posttest data obtained after the test to students, posttest is done at the end of learning, after the students finished learning by using interactive instructional media. Posttest data is processed by using SPSS 16. The result of posttest data analysis can be seen in table below.

Table.4: Normality of Posttest Data

		Control Class	Exp. Class
N		33	32
Normal Parameters[a]	Mean	80.1515	83.6806
	Std. Deviation	6.78749	8.76756
Most Extreme Differences	Absolute	.176	.256
	Positive	.176	.123
	Negative	-.163	-.256
Kolmogorov-Smirnov Z		1.009	1.446

Asymp. Sig. (2-tailed)	.261	.061

Table.5: Homogeneous of Posttest Data

Levene Statistic	df1	df2	Sig.
3.319	1	63	.083

Based on Table 4 it can be seen that the significance value of the normality test is 0.261 and 0.061 > 0.05, thus it can be concluded that the control class data and the experimental class are normally distributed. In Table 5 it is known that the significance value of the homogeneity test is 0.083 > 0.05, thus it can be concluded that the control class data and the experimental class are homogeneous. The control-class posttest data and the normal and homogeneous distributed experimental class were then analyzed using posttest paired t-test data analyzers. The result of pretest analysis is presented in Table 6.

Table.6: T-test of Posttest

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
value	Equal variances assumed	3.319	.073	1.818	63	.005	3.52904	1.94129	-.35033	7.40841
	Equal variances not assumed			1.811	58.396	.005	3.52904	1.94891	-.37157	7.42965

Based on Table 6 it can be seen that the sig value. (2-tailed) < 0.05 is 0.005 < 0.05 it can be concluded that there is a significant difference between the learning outcomes of posttest control class and experiment class, the result of posttest learning is better than the pretest result.

Based on the results of posttest and pretest assessment it can be concluded that there is a difference between posttest and pretest assessment results. If the percentages of students' completeness classical subjects test larger or equal to 85% then this interactive instructional media can be said to be effective. Based on the data analysis that has been done on the subject of the experiment, it was found that from 32 students who were subjected to experimental experiment class, 29 students (90.6%) obtained the minimum of mastery criteria, this means that the students' large from 85%, so it can be concluded that interactive instructional media is effectively used as a medium of instruction in the subjects of the Electric Circuit.

4. Conclusion

In this development research produce an effective interactive instructional media, in circuit subjects, this is proven because this interactive instructional media has experienced effectiveness test conducted on the students. Interactive instructional media is declared effective to improve student learning outcomes, so it can be concluded that this interactive instructional media can be utilized in the learning series of electricity.

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