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Compact Disc Interactive Design Tutorial and Effect on the Improvement of Learning Network Computer Lessons

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Abstract

This study aims to design an interactive CD wake up in order to improve student learning outcomes in subjects Computer Network. The design of an interactive CD begins with a needs analysis, interactive CD design, followed by testing before being implemented. When finished designed and built, then the interactive CD learning is implemented in Computer Networking. This type of research is classified as a Research and Development as well as descriptive correlation. From the research, it can be concluded: 1). The results of the pretest subjects Computer Networking Students of SMK Muhammadiyah Padang showed by 31.82% to exceed the criterion of completeness Minimum value. 2). Results posttest subjects Computer Networking Students of SMK Muhammadiyah Padang after using Interactive CD by 59.09% over the KKM. 3). There are significant differences between the learning-based Media Interactive CD Tutorial Computer Networking (Class Experiment) by Learning using conventional methods. 4). There is a significant and positive effect between the perceptions of students about Learning Media Design Interactive CD Tutorial Computer Networking on Student Results Subjects Computer Networks of 42.4 %. In other words, the use of an interactive tutorial CD learning in class XI (TKJ 1) Department of Computer Networks SMK Muhammadiyah Padang can improve learning outcomes Computer Network.

Keywords: *interactive CD, tutorial, chart and diagrams, computer networks, achievement*

1. Introduction

Learning is the process of obtaining mastery, knowledge, habits obtained from the learning process [1]. The low learning outcomes are caused by two factors, namely: (1) factors from outside the student [2], consisting of social and non-social factors [3], such as teacher qualifications, methods, media, equipment and evaluation; (2) factors from within students (internal) consist of physiological and psychological factors, such as intelligence, interests, talents, motivations, perceptions and ways of learning [4]. The use of media in the learning process is an effort of interaction between lecturers/teachers and students. Learning media is anything that can communicate learning material to students in order to provide stimulation to the mind, attention, interest in order to occur the learning process [5], [6].

Learning media used can be well perceived by students. A person's perception of something is influenced by its relevance to needs, where someone will give a positive reaction if it is a necessity for him. In the process of functional literacy learning will get a positive response from learners if the learning provided is relevant to their lives, such as debriefing skills that they can apply can even be a source of income. According to Khalil learning outcomes are something that is acquired, mastered or is the result of the learning process [7]. Measurement of learning outcomes will show the achievement of something. In this case, what is measured is something that already exists in students. In [8] also argues that the definition of learning outcomes is mastery of knowledge or skills developed by subjects, which is indicated by the value of the test or the score given by the lecturer. In Indonesia, a learning achievement evaluation measure is called the Learning Outcomes Test (THB).

This test is used to measure the level of success of a teaching program and to find out student to extent participants have utilized their cognitive abilities. Learning is an activity that produces changes in behavior in the individual, both actual and potential acquired in the learning process. In the teaching and learning process, it influences a number of factors, namely internal and external. Internal factors consist of: 1) physiological conditions in the form of general physiological conditions and the five senses, 2) psychological conditions including interest, intelligence, talent, motivation, and cognitive abilities. External factors consist of: 1) natural environmental factors, social and cultural environment and [9], 2) instrumental factors in the form of curriculum, [10] programs, facilities, and infrastructure and teaching staff.

Media that can meet the criteria that are expected by users to be obtained through available media packages and design based on user needs. Given the difficulty in obtaining a commercially available media packages to meet the learning needs Network SMK Muhammadiyah computer in Padang, the researchers tried to meet that demand through the design of an interactive CD for the purposes of teaching in SMK Muhammadiyah Padang. Furthermore, this Interactive CD is implemented in computer networking subjects and then seen its influence in improving learning outcomes with the formulation of the problem as follows: "Is there an influence on the design of Interactive CD Tutorial on improving learning outcomes in Computer Networking Subjects of Muhammadiyah Vocational School Students in Padang?."

The objectives that the author wants to achieve in this study are as follows: 1) To design and build an Interactive CD Tutorial on Computer Network Subjects according to the demands of the existing curriculum. 2) To get data or information about the stages of designing learning media for Computer Networks. 3) To get data or information about student learning outcomes on Computer Network subjects. 4) To find out how much influence the Design of Learning Media Computer Network Tutorial CD on the learning outcomes of students of Muhammadiyah Vocational School Padang.

2. Methodology

In accordance with the early problems and research objectives, then this study belongs to the type of Research and Development as well as descriptive correlational. The R & D in question is the design of CDs based on Learning Videos on Computer Network Subjects, while research correlational aimed to see the influence of independent variables with the dependent variable. This research testing the effect of several independent variables on the dependent variable. The variables are: 1) Independent variable: Student Perception about Designing

Computer Network Learning Media CD, 2) Dependent variable: Student Learning Outcomes of Computer Network Subjects at Muhammadiyah Vocational School Padang.

3. Results and Discussion

3.1. Distribution of Data on Student Learning Outcomes (Pretest)

Learning Outcomes (pretest) data obtained the lowest score range of 35 to 80 and the highest average value of 55.68 and a standard deviation of 13.913. The clearer the data is presented in the following table.

Table 1. Learning Outcomes Data Distribution (pretest)

No.	Interval Class	Absolute Frequency	Relative Frequency (%)
1.	35-<43	4	18.18
2.	44-<52	6	27.27
3.	53-<61	5	22.73
4.	62-<70	4	18.18
5.	71-<80	3	13.64
	Total	22	100,00

The calculations listed in table above 22.73% of the number of respondents collated the average score, there were 45.45% of respondents who obtained a score the following, and 31.82% of informant obtained a score in above the average group. Histogram group scores Student Learning Results can be seen in Figure 1.

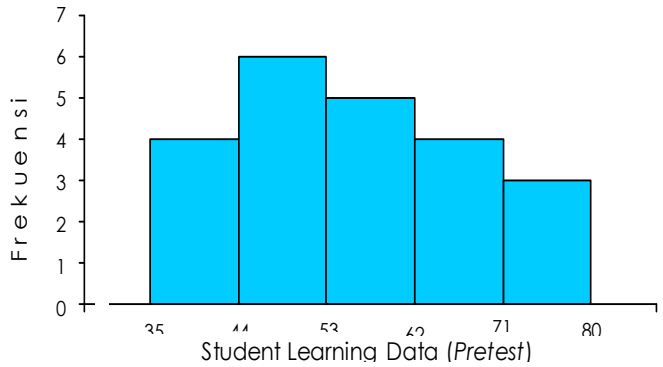

Figure 1. Histogram Distribution of Student Learning Outcomes (Pretest)

3.2. Distribution of Student Learning Data (Posttest)

Data obtained in the field of Learning Outcomes (posttest) obtained the lowest score range of 58 to 88 and the highest average value of 68.64 and a standard deviation of 8.867.

Table 2. Learning Outcomes Data Distribution (posttest)

No.	Interval Class	Absolute Frequency	Relative Frequency (%)
1.	58 -< 63	8	36.36
2.	64 -< 69	5	22.73
3.	70 -< 75	5	22.73
4.	76 -< 81	2	9.09
5.	82 -< 88	2	9.09
	Total	22	100,00

The calculation in table above 22.73% of the number of respondents collected the data from student Learning Outcomes, there were 36,36% with the score below average and there were 40,91% obtained the score above average. The histogram can be seen in the Figure 2.

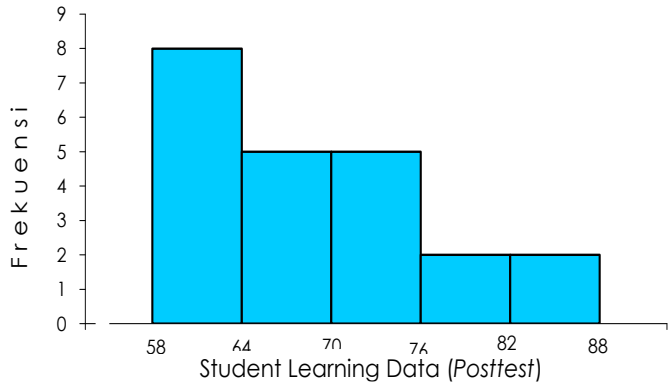

Figure 2. Histogram Distribution of Student Learning Outcomes (Posttest)

3.3 Distribution of Computer Network Learning Outcomes Data Using Conventional Methods

Data obtained in the field of Student Results obtained using conventional methods range highest lowest score of 35 to 70 and the average value of 54.32 and a standard deviation of 9.423.

Table 3. Distribution of Computer Network Learning Outcomes Data Using Conventional Methods

No.	Interval Class	Absolute Frequency	Relative Frequency (%)
1.	35 -< 41	2	9.09
2.	42 -< 48	4	18.18
3.	49 -< 55	6	27.27
4.	56 -< 62	5	22.73
5.	63 -< 70	5	22.73
	Total	22	100,00

The calculations listed in table above 27.27% of the number of respondents obtained an average group score from the scores of Student Learning Outcomes using conventional methods, there were 27.27% respondents with the score below average, and there were 45,45% of respondents with the score above average. Histogram of Student Learning Outcomes using conventional methods can be seen in Figure 3.

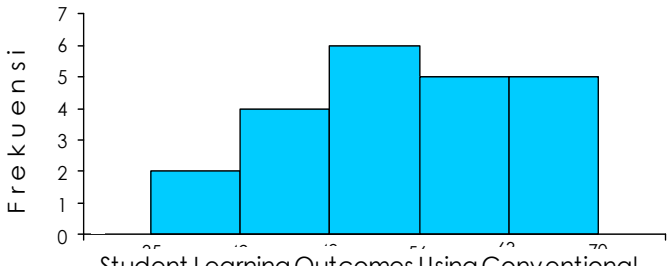

Figure 3. Histogram of Distribution of Learning Outcomes of Computer Networks with Conventional Methods

3.4 Student Perception Data Distribution About Learning Media Interactive CD Computer Network Tutorial

Data obtained in the field of Perception students about Learning Media Interactive Tutorial CD Computer Network obtained the lowest scores range 127 to 171 and the highest average value of 148 and a standard deviation of 11.687.

Table 4. Perception students about Learning Media Interactive

No.	Interval Class	Absolute Frequency	Relative Frequency (%)
1.	127-135	3	13.64
2.	136-144	3	13.64
3.	145-153	11	50.00
4.	154-162	2	9.09
5.	163-171	3	13.64
	Total	22	100,00

The calculations listed in table above 50.00% of the number of respondents obtained an average group score from the students' perceptual scores on the Computer Network Interactive Learning CD. Based on the results, there were 27.27% of with the score below the average price, and 22,73% of with the score above the average. Histogram group perception score of students about Computer Network Interactive Learning CD can be seen in Figure 4.

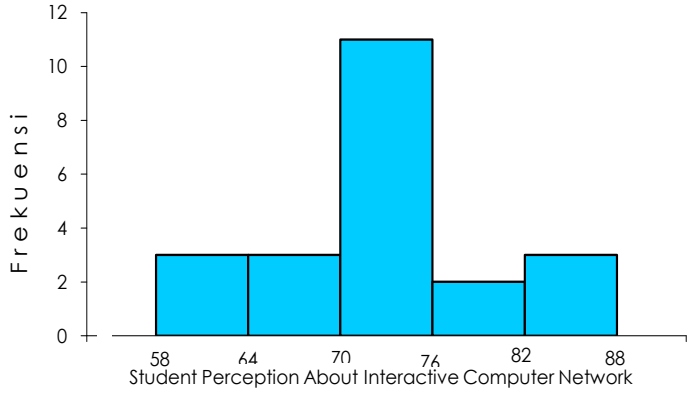

Figure 4. Histogram of Student Perception Distribution About Learning Media Interactive CD Computer Network Tutorial

If the statistical numbers of the two variables are presented as a whole, then the recapitulation table is obtained as in the table below.

Table 5. Recapitulation of Pretest, Posttest, Learning Outcomes, Methods and Student Perceptions

No.	Variable	Score Range	Average	Standard Deviation
1	Student Learning Results (Pretest)	35 – 80	55,68	13,913
2	Student Learning Outcomes (Posttest)	58 – 88	68,64	8,867
3	Learning Outcomes of Computer Networks using Conventional Methods	35 – 70	54,32	9,423
4	Student Perception About Learning Media Interactive CD Computer Network Tutorial	127 – 171	148,73	11,687

Table 5 shows that the pretest obtained in the range of 35-80, an average of 55.68 and with the standard deviation of 13,913. For data of student learning outcomes based on the Posttest tests obtained a range of scores of 58-88, an average of 68.64 and standard deviation of 8.867. For student learning outcomes data using the conventional method obtained a range of scores of 35-70, the average score of 54.32 and the standard deviation of 9.423. For data on Student Perception of Interactive Computer Learning CD CDs obtained a range of scores of 127-171, the average of 148.73 and a standard deviation of 11,687.

3.5. Data Normality Test

Based on the Kolmogrov-Smirnov normality test, obtained data distribution normality figures as shown in Table 6.

Table 6. Normality Result Test Data

Variable	Kolmogorov-Smirnov		
	Statistics	**Sig.**	**Information**
Student Learning Results (*Pretest*)	0,668	0,764	Normal
Student Learning Outcomes (*Posttest*)	0,640	0,807	Normal
Learning Outcomes of Computer Networks using Conventional Methods	0,850	0,465	Normal
Student Perception About Learning Media Interactive CD Computer Network Tutorial	0,704	0,704	Normal

Table 6 shows that the significant value of student learning outcomes (pretest) was obtained for 0.764>0.05, it means that the distribution data frequency of student learning (pretest) is normal. For student learning outcomes data (posttest), it was collected significance number of 0.807>0.05, it means that the data on student learning outcomes (Posttest) is normal. For computer network learning outcomes data using conventional methods obtained a significance number of 0.465> 0.05 means that data on student learning outcomes using conventional methods is normal. For Student Perception data about Interactive CD learning media Computer Network tutorials obtained a significance number of 0.704> 0.05 means that Student Perception data on Interactive CD learning media Computer Network tutorials are normal.

All data collected on the research variables are normally distributed, h al this means that the distribution of respondents had been normal so that it can be used in subsequent testing.

3.6. Hypothesis Testing

3.6.1. Differences in learning outcomes before and after experimenting using the correlated sample T-test (Paired t-test)

The conditions after treatment can be seen that the data has a normal distribution. To find out the significance of the increase in learning outcomes, testing was done through a sample difference test that was correlated or paired the test. This test is conducted to specify the distinction before and after the implementation. Increased learning outcomes of Computer Network subjects in Class XI Computer and Network Engineering Department of Muhammadiyah Vocational School Padang through the application of the Media Interactive CD Tutorial can be described by the following table:

Table 7. Average distribution Student Results pretest and posttest Subjects Computer Networks

Variable	Mean	SD	SE
Computer Network Learning Outcomes			
- Pretest	55,68	13,913	0,476
- Posttest	68,64	8,867	0,503

The average student learning outcomes (pretest) obtained a value of 55.68 with the standard deviation of 13.913. The posttest score obtained a value of 68.64 with a standard deviation of 8.867. For details, see the following paired samples test:

Table 8. Paired Samples Test Results

Variable	Mean	SD	t	df	P
Paired Samples Test Results					
Posttest - Pretest	12,955	6,601	9,205	21	0,000

Result the test calculation above shows that the value of t count = 9,205> t table = 1.72 at a significant level α = 0,000 it means that there are differences of before and after the implementation of interactive learning CD tutorials in Computer Network subjects in-class students XI (TKJ_1) Computer Engineering Department of Muhammadiyah Vocational School Padang. It is showed by a significant level of 0,000 <0,05, it means that the results show a significant difference between the pretest and posttest of the application of interactive learning CD tutorials in Computer Network subjects in class XI (TKJ_1) Department of Computer Engineering Network of SMK Muhammadiyah Padang.

3.6.2. Differences in learning outcomes using interactive learning CD computer network tutorial (experiments) with conventional learning computer network subjects

The conditions after the experiment can be seen that the data has a normal distribution. To find out the significance of the increase in learning outcomes, testing was done through a sample difference test that was correlated or paired the test. This test was conducted to determine the differences between students that used learning outcomes and interactive CD learning media with conventional learning. Increased learning outcomes of Computer Network subjects in TKJ XI 1 and TKJ XI Class 2 Department of Computer and Network Engineering of SMK Muhammadiyah Padang through the application of Media Interactive CD Tutorials are illustrated in the following table.

Table 9. Distribution of Average Learning Outcomes of Students in Experimental Classes and Conventional Classes for Computer Networking Subjects

Variable	Mean	SD	SE
Computer Network Learning Outcomes			
- Experiments	68,64	8,867	0,503
- conventional	54,32	9,423	2,009

The average learning outcomes of Experimental Class students obtained a value of 68.64 with a standard deviation of 8.867. The average learning outcomes of Conventional Class students obtained a value of 54.32 with a standard deviation of 9.423. For more details, please see the following paired samples test.

Table 10. Paired Samples Test Results

Variable	Mean	SD	t	df	p
Computer Network Learning Experiment Class– Conventional Class	14,318	11,141	6,028	21	0,000

The t-test results show that the value of $t_{count} = 6.028 > t_{table} = 1.72$ at a significant level $\alpha = 0{,}000$ it means that there is the difference of student learning that used learning media interactive CD Computer Network tutorials and the that used outcomes using conventional methods in Computer Network subjects in class XI (TKJ_1 and $TKJ_{2)}$ j affairs SMK Muhammadiyah Computer Network Padang. It is showed by a significant level of 0,000 <0,05 that means that the results show that there are significant differences between learning outcomes using Interactive Learning CD Computer Network Tutorials (Experiments) with Conventional Learning Computer Network Subjects in class XI (TKJ_1 andTKJ_2) Computer Engineering Department of Muhammadiyah Vocational School Padang.

3.6.3. Effect of student perception on designing learning media interactive CD computer network tutorial on student learning outcomes in computer network subjects

The working hypothesis proposed is the Effect of Design effectiveness on Interactive CD Learning Media Tutorial on Student Learning Outcomes in Computer Network Subjects. From the results of simple linear regression to the research data, the results of the analysis Effect of Design Effectiveness Learning Media Interactive CD Tutorial on Student Learning Outcomes in Computer Network Subjects obtained results as the following table.

Table 11. The Results of Simple Regression Analysis Between Student Perceptions of Designing Learning Media Interactive CD Computer Network Tutorial on Student Learning Outcomes in Computer Network Subjects

Variable	Regression Coefficient	Standard Error	T		
			Count	Table	
				α=0,05	α=0,01
X	0,494	0,129	3,841	1,72	2,51
Constanta	= 4,879				
Standard Error of Est	= 19,198				
r Squared	= 0,424				
r	= 0,652				

A simple regression analysis of the research data obtained regression coefficient of 0.494 and constant 4.879,consequently the form of the relationship between the two variables is presented in the regression equation $\hat{Y} = 4.659 + 0.494\ X_{1\ the}$ results of testing through t test obtained t_{count} of 3.841 while the T_{table} at the level of confidence $\alpha = 0.01$ of 2.51 the strength of the relationship of 0.424 between the variables of Student Perception of the Design of Learning Media Interactive CD Computer Network Tutorial on Student Learning Outcomes in Computer Network Subjects. The influence shows that the level of student perceptions about the design of Learning Media Interactive CD Computer Network Tutorials contributed 42.4%. Thus, it is proven that the correlation coefficient means that the proposed hypothesis is accepted. Then, tested using the **F** test as for the results can be seen in the following table:

Table 12. Analysis of Variance

Source	Sum of Square	DF	Mean Square	Fo	F_{table}	
					α = 0,05	α = 0,01
Regression	700.821	1	700.821	14.750	4,35	8,10
Residual	950.270	20	47.514			
Total	1651.091	21				

From the table above, it is known that the results of the significance test of the regression method obtained F count of 14,750 this price is greater than the F numerator 1 table and the denominator 20 at the level of confidence **α** = 0.05 of 4.35 and **α** = 0.01 of 8, 10 by comparing the price of F_{count} with F_{table} it is known that regression coefficient is very significant because F_{count} is greater than F_{table}.

Table 13. Analysis of the significance of rxy correlation coefficients

r_{xy}	r_{Table} at Significant	
	α = 0,05	α = 0,01
0,652	0,423	0,549

The results of the calculation of the correlation coefficient between variables Student perceptions of the Designing of Learning Media Interactive CD Computer Network Tutorials on Learning Outcomes of Computer Network Subjects Studentsr_{xy}0.652.The test results show there is a significant and positive influence between student perceptions of the design of learning media Interactive CD Computer Network Tutorials on Student Learning Outcomes of Computer Network Subjects through a regression model $\hat{Y}$ = 4.879 + 0.494X.

3.7. Discussion

The results of research that have been proven through data descriptions and hypothesis testing will be discussed with the relevant theories and research results.Based on the calculation of the results of the initial condition values (*pretest*) obtained 22.73% of the number of respondents obtained an average group score from the score of Student Learning Outcomes, 45.45% of respondents who scored below the average group price, and 31.82 % of respondents get a score above the average group price.Calculations after the posttest were obtained 22.73% of the number of informant acquired the average group score of the students ' learning results score, 36.36% of the informant score below the group average price, and 40.91% of respondents received a score above the average group price.

The results of the t test calculation above shows that the value of t_{count} = 9,205> t_{table} = 1.72 at a significant level α = 0,000 it means that there are differences in student learning outcomes before and after the application of interactive learning CD tutorials in Computer Network subjects for students class XI (TKJ_1) Department of Computer Engineering Network Muhammadiyah Vocational School Padang .This is also indicated by a significant level of 0,000 <0,05, which means that the results show that there are significant differences between before (*pretest*) and after (*posttest*) the application of interactive learning CD tutorials in Computer Network subjects in class XI students (TKJ_1) Computer Engineering Department of Muhammadiyah Vocational School Padang.Learning outcomes achieved by students are very closely related to the instructional objectives planned by the lecturer. Instructional objectives are generally grouped into three categories, namely: 1) cognitive domain consists of memory, understanding,[11] application, analysis, synthesis and evaluation, 2) effective domain consists of acceptance, response, assessment, organization and characterization, and 3) the psychomotor domain consists of imitation, manipulation, accuracy, articulation, and

experience[12].From the calculation of the comparison of test results for the experimental class and conventional class, it was found that the value of t_{count} = 6.028> t_{table} = 1.72 at a significant level α = 0,000 it means that there are differences in student learning outcomes using CD learning media Interactive Computer Network tutorials with student learning outcomes using conventional methods in Computer Network subjects in class XI students (TKJ_1 and TKJ_2) Computer Engineering Department of Muhammadiyah Vocational School Padang .This is also indicated by a significant level of 0,000 <0,05, which means that the results show that there are significant differences between learning outcomes using Interactive Learning CD Computer Network Tutorials (Experiments) with Conventional Learning Computer Network Subjects in class XI (TKJ_1 and TKJ_2) Computer Engineering Department of Muhammadiyah Vocational School Padang.

The use of media in the learning process is very necessary, efforts to increase interaction between lecturers and students. Learning media is anything that can communicate learning material to students in order to provide stimulation to the mind, attention, interest in the learning process to occur[13]. Learning media are useful for: 1) arousing passion for learning[14], 2) equating experience[15], 3) enhancing experience[16], 4) giving rise to the same perception[17].The media can be grouped into four, namely: 1) Visual media, 2) Media that is only heard, 3) Media that can be heard and can be seen and 4) Media dramatization[18].The results of simple linear regression analysis from the research data obtained regression coefficient of 0.494 and constant 4.879 thus the form of the relationship between the two variables can be presented in the regression equation $\hat{Y} = 4.659 + 0.494\ X_{1\ the}$ results of testing through t test obtained t_{count} of 3.841 while T_{table} at the level trust = 0.01 of 2.51 the strength of the relationship of 0.424 between the variables of Student Perception of the Design of Learning Media Interactive CD Computer Network Tutorial on Student Learning Outcomes in Computer Network Subjects. The strength of the relationship shows that the level of student perceptions about the design of Learning Media Interactive CD Computer Network Tutorials contributed 42.4%. Thus, it is proven that the correlation coefficient means that the proposed hypothesis is accepted.

Learning media used should be well perceived by students. Perception is a cognitive process experienced by someone in understanding the message/information from the environment through the senses of sight, hearing, touch, feeling and smell[19]. A person's perception of something is influenced by his relaxation with needs, meaning that someone will give a positive reaction, if it is a necessity for him.

Positive perceptions or views of citizens learning about learning media, are expected to support supporting the process of teaching and learning activities and improving learning outcomes. Learning is inseparable from the process of presenting material. Tutors must be able to present good material. Attractive, clear and encompassing all material makes a presentation well received. If that is the opposite, adult students will quickly get bored and reduce their motivation to learn. For example, presentations are presented with letters that are too small so that it is difficult to read, the colors displayed do not show clear gradations, or the presenter only uses the lecture method, and others.

4. Conclusion

Based on the analysis and design of the interactive CD learning carried out, then continued with experimental research from the Interactive CD on the learning outcomes of Computer Networks at the Muhammadiyah Vocational School in Padang can be summarized as follows: 1) The results of the *pretest* of Computer Network subjects of the Muhammadiyah Padang Vocational School students showed 31.82% which could exceed the minimum completeness criterion. 2) *Posttest* results of Computer Network subjects Students of the Muhammadiyah Padang Vocational School after using the Interactive CD

amounted to 59.09% exceeding the KKM value. 3) There is a significant difference between Media-based learning Interactive CD Computer Network Tutorials (Experimental Classes) with Learning using conventional methods. 4) Gained a significant and positive influence between students perceptions of designing interactive Learning Media CD computer network tutorials on student learning outcomes in computer network subjects by 42.4%.

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