Journal of Informatics and Vocational Education (JOIVE)
Vol.2, Issue.3, October 2019, pp. 117~121
ISSN:

BASIC COMPUTER NETWORKING TRAINER: HOW DOES THE EFFECTIVENESS TOWARDS LEARNING OUTCOMES IMPROVEMENTS?

Khrisna Bagaskara[1], Agus Efendi [2], Puspanda Hatta [3]
[1,2,3] Department of Informatics Education, Sebelas Maret University

Article Info

Article history:

Received Sept 12, 2019
Revised Oct 20, 2019
Accepted Oct 15, 2019

Corresponding Author:

Khrisna Bagaskara,
Departement of Informatics Education,
Sebelas Maret University,
Jl Ahmad Yani, no 200,
Pabelan, Kartasura, Surakarta,
Jawa Tengah, 57169, Indonesia.
Email:
khrisnabagaskara@gmail.com

ABSTRACT

Learning media like simulator application was used in many learning processes at education institutes such as school and university. Based on observation, practicing using real equipment such as trainer media more effective than using the simulator as learning media to improving students comprehension in the learning process. On the previous work, Basic Computer Networking Trainer was developed that aims to improve students learning outcomes. This study aims to find out: The effectiveness of Basic Computer Networking Trainer towards learning outcomes at Computer Networking 1 subjects. This study using the experimental method with Quasi-Experimental Design. This study was done within 2 groups divided into experiment group treated using Basic Computer Networking Trainer and control group treated using Cisco Packet Tracer. Both groups were given by writing test. First was pre-test that given before treatment and post-test given after treatment. The sample of this study was 42 students 2nd grades of Information Technology and Computer Education, Teacher Training and Education Faculty of Sebelas Maret University, Surakarta.

Keywords: effectiveness, basic computer networking trainer, learning outcomes

DOI: https://doi.org/10.20961/joive.v2i3.37976

1. INTRODUCTION

Learning Media such as simulator application has been used in many learning processes either in school or university. In his research Prabhandita (2012) conclude that vocational study which has practice subject in the majority, learning media has a significant influence towards students to understanding the learning subjects. Using simulator application, students can be helped to understand about basic computer networking. However, using simulator application was less effective if applied in university stages, because students in the university should have the ability to operating real equipment in order to be competent in work stages. Widiarningsih (2014) argues that the trainer media has a huge influence on learning media for creating an effective learning process. Saputro (2012) also argues that experience in using real equipment for practice increasing student comprehension in the learning process.

This study aims to measure effectiveness between basic computer networking trainer and simulator application (Cisco Packet Tracer) as learning media in Data Communication and Computer networking 1.

The purpose of this research is to find out (1) The difference in learning outcomes between Basic Computer Networking Trainer and Cisco Packet Tracer as learning media. (2) The effectiveness of Basic Computer Networking Trainer towards learning outcomes at Data Communication and Computer Networking 1 subjects.

In this article will be discussing the literature review, research methods, results, and conclusions. The outcomes of this research are to answer the research question, **"Is there any difference in learning outcomes between using Cisco Packet Tracer and basic computer networking trainer?" and "How does the effectiveness of**

using basic computer networking trainer towards learning outcomes in Data Communication and Computer Networking 1 subjects?"

2. RESEARCH METHOD

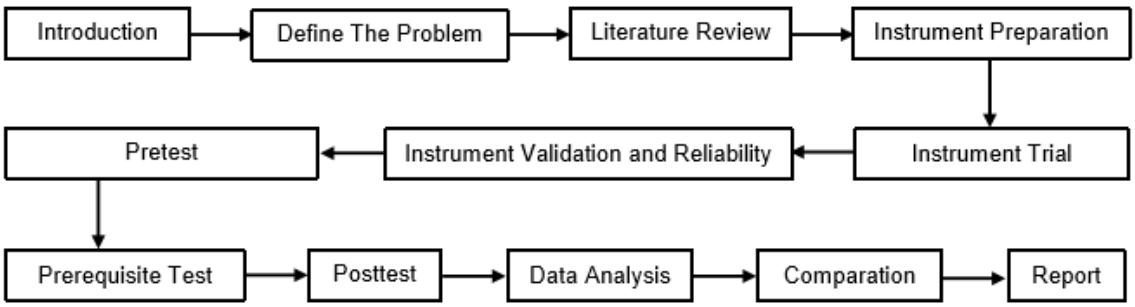

Figure 1.Research Process

This study contains several phases, that was: a) preliminary study; b) Problem Identification; c) Literature Review; d) Instrument Preparation; e) Instrument Trial; f) Instrument Validation and Reliability; g) Pretest, given before treatment to both groups; h) Prerequisite Test (Normality Test, Homogeneity Test, and Stability Test); i) Posttest, given after treatment to both groups; j) Data Analysis, including hypothesis test at significance level 0.05 and gain index analysis; k) Comparison, comparing the result between experiment group and control group; l) Report.

Sample

The sampling technique that used in this study was total sampling because of the amount of population less than 100 so that entire population becomes research sample (Sugiyono, 2007). Sugiyono (2007), total sampling was a sampling technique that amount of sample equal to the amount of population.

Total sampling was used to entire 2nd grades of Information Technology and Computer Education that divided within 2 class, that was Class A amounted to 31 students and Class B amounted to 30 students.

Method of Collecting Data

Observation

Observation aims to collect observation results data that used to find out students activeness of learning. Observation equipped with observation sheets that contain students activeness indicator list divided into affective assessment and psychomotor assessment. On each assessment includes several indicators that showed in Table 1.

Table 1Observation Indicator List

Num.	Assesment	Indicator
1.	Affective	a. Acceptance b. Reaction c. Organization d. Appraisal e. Internalisation
2.	Psychomotoric	a. Skills b. Perspective ability c. Exactness d. Expressive, Reflex, Interpretation

Calculation for Activeness Percentage (PK) of students learning using formula below:

$$PK = \frac{passed\ indicators}{entire\ indicators}\ x\ 100\%$$

(Purwanto, 2013: 102)

Index of learning activeness percentage based on (Purwanto, 2013: 103) showed in Table 2.

Table 2.Learning Activeness Index

Percentage (%)	Index
86 - 100	Very Good
76 - 85	Good
60 - 75	Fair
55 - 59	Bad
<= 54	Very Bad

Writing Test

Writing test aims to measure basic computer networking trainer effectiveness towards cognitive assessment on Computer Networking 1 subjects.

The instrument that used in this study was Pretest and Posttest in multiple choice question about Computer Networking 1. The pre-test was done before learning without treatment started, while post-test was done after learning with treatment ends.

The question of Pretest and Posttest was created based on Computer Networking 1 Learning Plans. In every skill, stages contain main subjects and indicator that divided into questions as showed in table 3.

Table 3.Writing Test Preparation

Num.	Main Subjects	Indicators
1.	Data Communication Introduction	Students understood and able to explain data communication concept
2.	Transmission media in Data Communication	Students understood and able to explain transmission media that was used in data communication
3.	Data Communication and Computer Networking Standardization	Students able to explain OSI and TCP IP protocol
4.	Computer Networking Equipment	Students able to identify and operate Computer Networking equipment that working on layer 1,2, and 3
5.	IP addressing in Computer Networking	Students understood the concept and how to IP addressing in Computer Networking
6.	*Subnetting*	Students able to calculate and sharing computer networking requirements based on network subnet
7.	Static Routing	Students able to explain and adjust static routing in computer networking
8.	Dynamic Routing (RIP)	Students able to explain and adjust dynamic routing in computer networking

Research Design

This research was a quantitative research with experiment method. This research was done by dividing 2 groups. The first group was experiment group which given by treatment using basic computer networking trainer. The second group was control group which given by treatment using Cisco Packet Tracer. Both groups are given by writing a test that was pre-test before treatment and post-test after treatment. Pre-test given before learning activity started and post-test given after learning activity with treatment over.

Data Analysis

Data Analysis in this study was used descriptive statistics, hypothesis test at significance level 0.05 and gain index analysis.

3. RESULT AND ANALYSIS

3.1. RESULT

Descriptive Statistics

Table 4. Experiment and Control Group Test Score

Class	Pretest			Posttest		
	Max. Score	Min. Score	Average	Max. Score	Min. Score	Average
Experiment	100	20	60.04	93	66	79.71
Control	93	13	61.57	86	40	72.09

Table 5Pretest and Posttest Score Graphic (Experiment and Control Group)

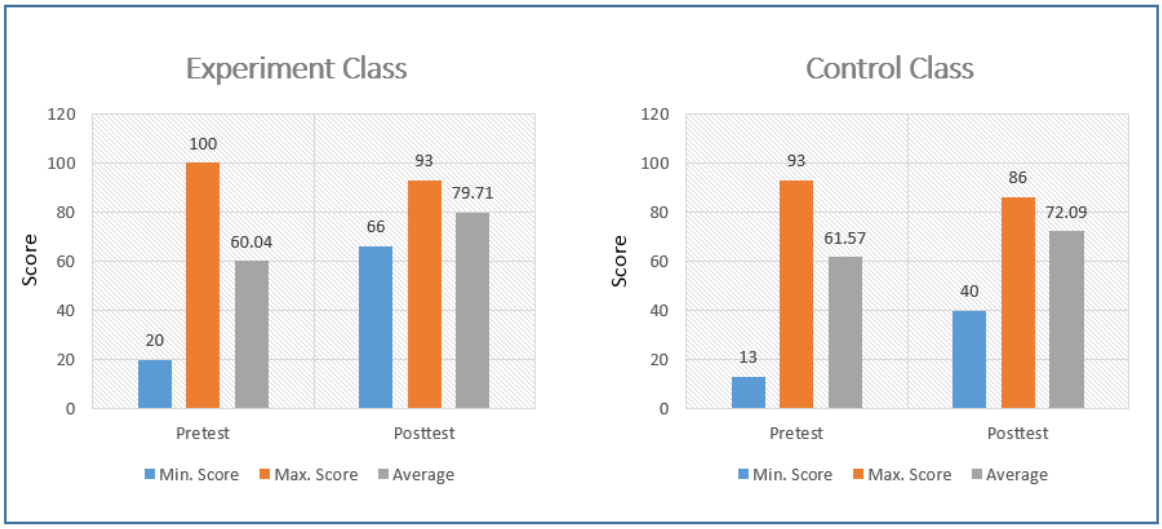

Table 6Example of Format for Tables (Source)

Based on table and figure above, in pretest experiment class got 20 in the minimum score and 100 in the maximum score, while control class got 13 in the minimum score and 93 in the maximum score. Then, experiment class obtains 60.04 for pretest and 79.71 for post-test while control class obtains 61.57 for pretest and 72.09 for post-test. It showed that there is the difference in result test of both groups based on the average score in the post-test. Experiment class got a higher score than control class so that basic computer networking has more influence than Cisco packet tracer to improving students learning outcomes.

Hypothesis

Research Hypothesis:

H_o : There was no difference in learning outcomes between students that using Basic Computer Networking Trainer with students that using Cisco Packet Tracer in Basic Computer Subjects.

H_a : There was a difference in learning outcomes between students that using Basic Computer Networking Trainer with students that using Cisco Packet Tracer in Basic Computer Subjects

Table 7Result of Post-test Hypothesis Test

Data	df	Sig.	Significance Level	t-count	t-table	Index

Posttest Experiment and Control	41	0.040	0.05	2.128	1.683	H_a Accepted

Based on table 5 Significance level was 0.040 indicated that it was < 0.05 and $t_{count} > t_{table}$, then H_a that was the hypothesis of this research was accepted. It showed that Basic Computer Networking Trainer was able to improve students learning outcomes in Basic Networking Subjects.

3.2. Gain Index Analysis

Gain Analysis was a difference between Post-test and Pre-test average score of both groups (Hake, 1999). Hake also argues there were formulas to counting Gain Score, that was:

$$g = \frac{(posttest\ average\ score) - (pretest\ average\ score)}{100 - (pretest\ average\ score\ )}$$

Table 8. Result of Gain Score Index

Class	Pretest	Posttest	Gain(g)	Index
Control	61.95	72.09	0.26	Low
Experiment	60.04	79.71	0.49	Fair

In table 5. gain index score of the control group was 0.26 and gain index score of experiment group was 0.49. This score was interpreted into Index Gain. According to gain index, control group included into low index and experiment group included into the fair index.

4. CONCLUSION

According to research result supported by data analysis in this study, using basic computer networking trainer in Data Communication and Computer Networking 1 subjects have to be optimized in the case to increasing students comprehension towards learning subjects so as increased students learning outcomes. However, other factors such as space availability to basic computer networking trainer take place also lecturer knowledge about operating the trainer was an important thing for support basic computer networking trainer utilization as learning media in Computer Networking 1 subjects.

REFERENCES

[1] Hake, R. R. (1999). *Analyzing Change/Gain Scores.* Diperoleh pada 13 Juni 2017, www.physics.indiana.edu
[2] Hashimi, S. M., & Gunes, A. (2017). Performance Evaluation of a Network Using Simulation Tools or Packet Tracer. Journal of Computer Engineering, 19 (1), PP 01-05.
[3] Irnawati. (2012). Pengaruh Penggunaan Alat Peraga Terhadap Prestasi Belajar Siswa Pada Materi Pokok Geometri di Kelas 8 SMPN 1 Tamiang Hulu.
[4] Nazumudeen, N., & Mahendran, C. (2014). Performance Analysis of Dynamic Routing Protocols Using Packet Tracer. International Journal of Innovative Research in Science, Engineering and Technology, 3 (1).
[5] Purwanto, M. N. (2013). Prinsip-Prinsip dan Teknik Evaluasi Pengajaran. Bandung: Remaja Rosdakarya
[6] Saputro, D. B. (2012). Trainer Mikrokontroller ATmega16 Sebagai Media Pembelajaran Di SMKN 2 Pengasih.
[7] Siregar, S. (2013). Metode Penelitian Kuantitatif: Dilengkapi perbandingan perhitungan manual & SPSS. Jakarta: Kencana.
[8] Sugiyono. (2007). Metode Penelitian Kuantitatif, Kualitatif & RND. Bandung: Alfabeta.
[9] Prabhandita, A. (2012). Pengembangan dan Implementasi Media Pembelajaran Trainer Kit Sensor Ultrasonik pada Mata Diklat Praktik Sensor dan Transduser di SMK N 2 Depok Sleman.
[10] Widiarningsih. (2014). Efektivitas Penggunaan Alat Peraga Terhadap Prestasi Belajar Matematika Materi Garis Bilangan Pada Siswa kelas 3 MIN Ringinanom Temanggung.
[11] Yusdi, A. (2013). Pembuatan Televisi Trainer sebagai Media Pembelajaran Troubleshooting Televisi Warna pada Siswa SMK Negeri 3 Tegal.