International Journal of Early Childhood Special Education (INT-JECSE)

DOI: 10.9756/INT-JECSE/V14I1.226 ***ISSN:*** *1308-5581 Vol 14, Issue 01 2022 PP:1943-1947*

Developing of Students' Learning Achievement in Electronic and Electrical Circuit Course by Electric Circuit Practice

Received: 11.01.2022 Accepted: 05.03.2022

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ABSTRACT: This research was aimed to develop students' learning achievement in electronic and electrical circuit by doing an electric circuit practicum. There were 10 laboratories for the third-year students, majoring Physics of the The Faculty of the Science and Technology at The Thepsatri Rajabat University, but only 10 laboratories to be practiced by following the real data of electronic and electric circuit and systematically analyzing the data using Proteus 8.0 program. This program was also able to simulate the circuit. The findings are that based on the university's evaluation systems, there were 9 students scored 80 to 100 or A (75%), while 3 students scored 75 to 79.99 or B+ (25%). Furthermore, there was the learning appraisal following the Subject's objectives, which was consisted of 4 topics, i.e. the course syllabus contents, the designed learning, the experiment, and the creating interaction. The appraisal would be on $\bar{X}$ and S.D. in 4 appraisal objectives

KEYWORDS: Learning achievement; electronic and electrical circuits; Electric circuits practice Introduction

1. INTRODUCTION

Nowadays, the evolution of information technology and communication progress speedily, developing learning the information technology and communication of teenagers was important, developing learning the information technology and communication of students would be important of the nation's ready changing by managed education had to hold that the students could learn and improve themselves and the students were the most important, the managed learning process might support the students to develop themselves naturally and potentially. [1]

Electronic and Electrical Circuit course description Rectifier and various filters operating point. Parameter And important values are listed in the diode's manual. And transistors CB CE and CC transistors, transistors, load balancing, different types of applications and applications. Both digital and linear ICIC op amps work on the circuit. Diodes measurement and testing Differential filtering with filters using oscilloscope and multimeter, biasing circuit, transistors, ICs, various circuits, opamp amplifiers, frequency generators and amplifier circuits.

The electronic and electrical circuit course had both of theory and laboratory. Learning method in the previous using a conventional form, which was only basic interactive. Therefore, student did not understand how to do the interactive process. Moreover, students could not analyze the electronic and electrical circuit. And it impacted the students' grade which categorized as in the middle.

The research was developed by the lecturer by using the simulated circuit as the exercises for the students to develop and improve their learning, and how to build the electronic and electrical circuit. The Proteus 8.0 program was valuable to simulate the designed exercises to the students. By changing the circuits model, this study aims to know the achievement and understanding of students on the simulated understanding, such as the electric resistance changing to make the electric lamp changed to the different ways, and the display of oscilloscope of DC to AC differently. To check those understandings, the was a final appraisal. [9]

To know the basic elements of the electrical circuits.To know the various types of electrical signals.To know and understand various laws of electrical circuits. To apply various theorems to solve the problems of electrical circuits and to interpretthe resultsTo find the various parameters from electrical circuitsTo determine the transient response in electrical circuitsTo analyze the magnetic circuits To sketch various types of electrical and magnetic circuits by Proteus 8.0 program

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For the students who were not able to analyze the circuit, we used the Proteus 8.0 program to create and design the electric circuits in the simulated working circuit. Those students would learn the circuit functions and components, and they were expected to explain all the functions and the inner components safely.

2. METHOD

This research was used the project-based learning in which learning management and project-based activities were student-centered pedagogy. It was involved dynamic classroom approach to possibly bring students acquired the deeper knowledge through an active exploration of real-world challenges. The students would learn by the group working process to bring about to the new learning results by following the project process, i.e. writing the project and its conclusions in the abstract. [2] [8]

The population of this research was the students of Physics Department, The Faculty of Science at Thepsatri Rajabhat University, who attended the electronic and electrical circuit course. The samples were purposively selected from the students that showed the low performing grade. There were 11 students was chosen as the samples of the research, consisted of 3 boys, and 8 girls aged ranged 20-21 years old. The tools created was the circuit designing simulation in Proteus 8.0 program which will be printed out on the papers, and used as the materials in the electronic and electrical circuit course. There were 15 laboratories and, only 10 laboratories matched with electronic and electrical circuit course.

TABLE* 1. *The criteria of the study are shown

Score	Grade	Symbol
80-100	4	A
75-79	3.5	B+
70-74	3	B
65-69	2.5	C+
60-64	2	C
55-59	1.5	D+
50-54	1	D
>50	0	F

The analysis of the statistics information of the assessment was analyzed as followed. [5]

1. **Mean ($\bar{\bar{X}}$)**

$$\bar{\bar{X}} = \frac{\sum x}{n} \qquad (1)$$

When $\bar{\bar{X}}$ was Mean of the point.

$\sum x$ was the all conclusion of point.

n was the size of samples.

2. **Standard Deviation**

$$\text{S.D.} = \frac{nEx^2 - (\sum x)^2}{n(n-1)} \qquad (2)$$

When S.D. was Standard Deviation of the point.

n was the number of student in the samples.

$\sum x^2$ was the point conclusion in double of each students.

$(\sum x)^2$ was the double point conclusion each of students.

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3. PRACTICE AND EXPERIMENTS

The conduction of the research was aimed at develop students' learning achievement in electronic and electrical circuit, by using Proteus 8.0 program [4]. The simulated program assembled the electronic and electric circuit course, there were 10 laboratories, so the laboratories would match to the electronic and electric circuit course as follows. [6] [7] [10]

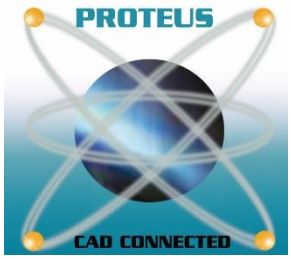

FIGURE 1. ***Proteus 8.0 Program***

Proteus is a single integrated application with ISIS, ARES and 3D Viewer modules appearing as tabbed modules. The program enables changes on the schematic to be reflected across PCB, BOM and Design Explorer in real time. Proteus stores the design (DSN), layout (LYT) and common database in a single project file (PDSPRJ).

TABLE 2. Practice training in Proteus 8.0

1.	Flashing circuit
2.	220 Volt AC Adapter for 12 Volt DC Power
3.	Transformer Power Supply
4.	PIC 16F627A
5.	5-volt power supply circuit
6.	Transistor circuit
7.	Closed Circuit Television
8.	Emitter Circuit
9.	Base Circuit
10	Darlington circuit

Therefore, the simulated test in the Proteus 8.0 program (FIGURE 2. and FIGURE 3) for answering the exercises and to create the questionnaire matching with the exercises with four objectives. There were also four topics, the course syllabus contents, the designed learning, the experiment and the creating interaction as the instruments of the study.

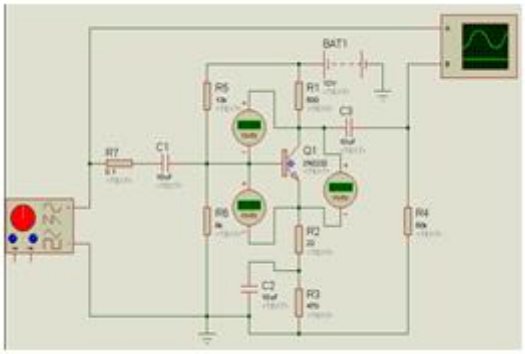

FIGURE 2. Emitter Circuit in program Proteus 8.0

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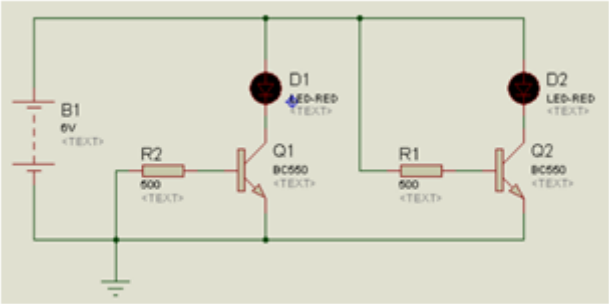

FIGURE 3. Transistor circuit in program Proteus 8.0

4. RESEARCH RESULT

The appraisal result of students in the learning achievement development of the electronic and electric circuit by analyzing practice, using by Thepsatri Rajahbat University, district Lopburi, Lopburi ranking of samples followed the TABLE 3.

TABLE 3. Result

Grade	Score	Number of Student	%
A	80=>>	9	75
B+	75-79.99	3	25
B	70-74.99	0	0
C+	65-69.99	0	0
C	60-64.99	0	0
D+	55-59.99	0	0
D	50-54.99	0	0
F	0-49.99	0	0

Therefore, doing the appraisals collectedly to the created assignments by the 4 objectives, there were 4 topics, the course syllabus contents, the designed learning, the experiment and the creating interaction. Following the TABLE 4.

TABLE 4. Evaluation result of the questionnaire

Grade	Score	Number of Student	%
A	80=>>	9	75
B+	75-79.99	3	25
B	70-74.99	0	0
C+	65-69.99	0	0
C	60-64.99	0	0
D+	55-59.99	0	0
D	50-54.99	0	0
E	0-49.99	0	0

5. CONCLUSION

Following by the university's ranking of electronic and electric circuit by circuit analyzing, the electronic and electric circuit course, there were 11 students majoring Physics. The students evaluated before learning made more

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understanding of the topic of this course and the theory. They can do the final test and midterm successfully to made the learning achievement, the sample of the students passed the appraisal standard 100 % of Thepsatri Rajahbat University appraisal system and the created test could decrease time in more interactive, and the appraisal was followed by the 4 learning objectives in the very well level both of medians and standard deviation.

ACKNOWLEDGEMENT

This exercise can be combined with a variety of other programs and can be an introductory course for interested students.

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