

The Instructional Packages of Op Amps and Linear IC for Vocational Education Students

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Abstract

In this research, a design of instructional packages of Op Amps and Linear IC is proposed for Vocational Education in Diploma Program. For the data sampling in our experiment, twenty nine students of Diploma Program in Chonburi Technical College are in our case study. The tools for experiment also include the instructional packages, the pretests, the midtests, the posttests, and the statistical tools. The statistics used for data analysis are E1/E2, mean (M), and standard deviation (SD). After the experiment, the results showed that the average scores of Diploma students in midtest, posttest (E2), and pretest (E1) were 216.61, 117.16, and 39.98, respectively.

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Keywords: Instructional Packages, Op Amps and Linear IC, Diploma Program, Vocational Education.

1. Introduction

OFFICE of the Vocational Education Commission in Thailand was responsible for production and development. The middle class and technologists are reforming the whole concept. Structure and methodology for quality production. In addition to the above, During the 12th National Economic and Social Development Plan (BE 2560-2564) and the National Education Plan (2560-2579) to enable the plan to move effectively. A study of the context that affects the development of education in the country. The progress of digital leap that affects the social and economic systems of countries, regions and the world. The skills of the 21st century population all over the world face the challenge and the development of the country into the economic and social development of Thailand 4.0 [1].

Nowadays teaching and learning management according to the 2003 Diploma of Vocational Education Program. The course fo-

cuses on and aims to develop learners with skills and competencies in career level specialized professional fields. There are full knowledge, practical landscape, understand life, morals, ethics, and focus on practicing in the workplace. Supporting students work in the workplace and self-employed including studying at the degree level in technology. The Op Amp and Linear IC courses is a course in the certificate program in High Vocational, 2003, Industrial Engineering Electronics field. The content of the topic about the History and General features of op amps, Features and functions of op amps, Voltage comparator and phase signal comparator, Level detector and voltage follower, Inverting Amplifier and non-Inverting Amplifier, Summing voltage and Difference voltage, Signal converter circuit, Frequency filters, Signal generator, Gate circuit, Using op amps, and Voltage Control and Electrical Measurement [2].

The teaching conditions of the op amp and linear IC. In both state and private industrial technicians, there is a similar problem; the problem of shortage of materials to be used as teaching materials in learning of students are not as good as they should. In teaching and learning using good materials teaching, it is an important thing to do. The learner be interested to get knowledge

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Table 1. The Efficiency of the Instructional Packages of Op Amp Liner IC for Curriculum Diploma of Vocaitonal Education Students.

unit list	Percentage of average score from the activity during (E1)			Percentage of average scores from the post-test (E2)			The result of efficiency
	Full score	Score during the study	Percentage	Full score	Score post-test	Percentage	
Unit 1 History and General features of op amps	23	20.30	88.26	10	8.10	81.00	pass
Unit 2 Features and functions of op amps	25	21.60	86.40	15	13.50	90.00	pass
Unit 3 Voltage comparator and phase signal comparator	12	9.60	80.00	10	8.15	81.50	pass
Unit 4 Level detector and voltage follower	8	6.80	85.00	10	8.10	81.00	pass
Unit 5 Inverting Amplifier and non Inverting Amplifier	20	18	90.00	15	13.50	90.00	pass
Unit 6 Summing voltage and Difference voltage	10	9	90.00	10	8.35	83.50	pass
Unit 7 Signal converter circuit	20	16.90	84.50	15	13.15	87.67	pass
Unit 8 Frequency filters	20	16.90	84.50	15	13.20	88.00	pass
Unit 9 Signal generator	30	25.90	86.33	15	12.90	86.00	pass
Unit 10 Gate circuit	40	37.15	92.88	15	13.50	90.00	pass
Unit 11 Using op amps	40	35.60	89.00	15	12.55	83.67	pass
Unit 12 Voltage Control and Electrical Measurement	25	21.25	85.00	10	8.20	82.00	pass
total	273	238.75	87.45	155	133.20	85.94	pass

Table 2. The Progress of Students Learning the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students in Chonburi Technical College.

Number of students (29)	Pre – Test (155)	Test during the study (273)	Post –test (155)
average	39.98	216.61	117.16

and understanding and remembering more easily at present. The new technology used in teaching and learning to develop teaching and learning management. The maximum efficiency for learners including learners with better academic achievement by using the Computer Assisted Instruction or Computer Teaching Lesson. The use Computer technology used to enhance teaching and learning while teaching in the classroom or enhance learning. Teaching outside the classroom increase teaching efficiency that can teach new knowledge and additions.

The problems arising from the teaching and learning process of electronic subjects. Especially in the Optics and Linear IC; from the above reason, the researcher recognizes the importance of problems. Therefore, developed a higher potential student need to provide students with the ability to cultivate, Psychomotor Domain. The ability to develop themselves. The teacher teaches the

process of teaching the students to achieve the efficiency and effectiveness of learning. The designed and development of teaching by using the Instructional Packages of Op Amps and Linear IC was to provide students with cognitive ability, Psychomotor Domain. The results of the teaching and learning process are presented using the instructional package in the course. This is a benefit for our students and developed education in Chonburi technical college in Thailand.

2. Objective

- 1) To develop and test efficiency of the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students.
- 2) To compare the students' achievement before and after using the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students.

3. Conceptual Frameworks

3.1. Instructional Packages

Chaiyong Brahmawong [3] stated was the instructional package is the type of communication. There are specific aims to teach

even the instructional package. Thai educators have long been teaching the concept of teaching, even without the word "teaching set". The media has produced the production system and the teaching materials that correspond to the subjects, subjects and objectives to change the behavior of the students.

In this research, I divided the development of Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students into 12 unit as follows:

- Unit 1:** History and General features of op amps
- Unit 2:** Features and functions of op amps
- Unit 3:** Voltage comparator and phase signal comparator
- Unit 4:** Level detector and voltage follower
- Unit 5:** Inverting Amplifier and non-Inverting Amplifier
- Unit 6:** Summing voltage and Difference voltage
- Unit 7:** Signal converter circuit
- Unit 8:** Frequency filters
- Unit 9:** Signal generator
- Unit 10:** Gate circuit
- Unit 11:** Using op amps
- Unit 12:** Voltage Control and Electrical Measurement

3.2. Developmental Testing (DT)

The researcher studied the concept of the Developmental Testing (DT of Chaiyong Brahmawong [3]. The ideal were follow;

E1 is the efficiency of the process measured by the instruction. Using the instruction set. Percentage of average score from the activity during the teaching and learning.

E2 is the performance of the result. Percentage of average scores from the post-test test.

$\sum X$ is the total score of the learner from the activity during each unit's instructional activity.

$\sum F$ is the total score of the student. After the test.

A is the full score for each activity of each unit.

B is the full score of the post-test

N is the total number of students

The efficiency of the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students, it is based on 80/80 performance. The first 80 means the average score of the activity during the instructional period of each teaching unit. Percentage is 80 or above. And 80 score mean 80% of the average score from the unit test after each unit of instruction is correct.

3.3. Analysis of learning achievement

The mean and standard deviation from the pre-test and post-test learning with the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students [3].

$$\bar{X}_1 = \frac{\sum X_1}{N} \quad (1)$$

$$\bar{X}_2 = \frac{\sum X_2}{N} \quad (2)$$

When

\bar{X}_1 is the average of the pre-test

\bar{X}_2 is the average of the post-test

$\sum X_1$ is the sum of the pre-test

$\sum X_2$ is the sum of the post-test

N is the number of students

Standard Deviation (SD)

$$SD_1 = \sqrt{\frac{N \sum X_1^2 - (\sum X_1)^2}{N(N-1)}} \quad (3)$$

$$SD_2 = \sqrt{\frac{N \sum X_2^2 - (\sum X_2)^2}{N(N-1)}} \quad (4)$$

4. Methodology

- 1) The sample was 29 students in Curriculum Diploma of Vocational Education in Chonburi Technical College, Thailand. Semester 2, Academic year 2017 by used Simple Random Sampling technique.
- 2) The research content used in the development the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students. There are 12 unit as follow;

Unit 1: History and General features of op amps

Unit 2: Features and functions of op amps

Unit 3: Voltage comparator and phase signal comparator

Unit 4: Level detector and voltage follower

Unit 5: Inverting Amplifier and non-Inverting Amplifier

Unit 6: Summing voltage and Difference voltage

Unit 7: Signal converter circuit

Unit 8: Frequency filters

Unit 9: Signal generator

Unit 10: Gate circuit

Unit 11: Using op amps

Unit 12: Voltage Control and Electrical Measurement

5. Data Analysis

- 1) Analysis of the efficiency of the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students in accordance with the 80/80 criterion set out in E1 / E2 formula.
- 2) Analyzing the student achievement by comparing differences of scores obtained from the pre-test and post-learning achievement test with the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students.

6. Results

6.1. Analysis of the efficiency of the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students in accordance with the 80/80 criterion set out in E1 / E2 formula

From Table 1, the efficiency of the instruction package of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students were 88.26/81.00, 86.40/90.00, 80.00/81.50, 85.00/81.00, 90.00/90.00, 90.00/83.50, 84.50/87.67, 84.50/88.00, 86.33/86.00, 92.88/90.00, 89.00/83.67, 85.00/82.00, 82.98/83.57, 84.64/85.71, 83.93/83.21, 81.43/84.29, 81.43/84.64 and 83.57/84.64, respectively, according to the 80/80 which was considered to meet the selected efficient standard criteria of 80/80.

6.2. Analyzing student achievement by comparing differences of scores obtained from the pre-test and post-learning achievement test with the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students by using t-test for dependent samples

Table 2. shows the students' scores on the first exercise. The first lesson had average score (E1) was 39.98, score of the test during the study had average score 216.61, and the average score (E2) was 117.16.

7. Conclusion and Discussion

A. Analysis of the efficiency of the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students in accordance with the 80/80 criterion set out in E1/E2 formula [3]. The results showed that the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students were 88.26/81.00, 86.40/90.00, 80.00/81.50, 85.00/81.00, 90.00/90.00, 90.00/83.50, 84.50/87.67, 84.50/88.00, 86.33/86.00, 92.88/90.00, 89.00/83.67, 85.00/82.00, 82.98/83.57, 84.64/85.71, 83.93/83.21, 81.43/84.29, 81.43/84.64 and 83.57/84.64, respectively, according to the 80/80 which was considered to meet the selected efficient standard criteria of 80/80, consistent with Sataworn Chaichumpa and others [4] stated that

information literacy skill is one of the requirements for lifelong learning. However, this kind of skill is personal. Promoting computer skill with traditional teaching that the same content is provided for different students might not be appropriate. Therefore, there is a need to promote person-alized learning for each student. Also Chalernsak Duangngam and others [5] studied the Development of Electric Automotive System Package of Vocational Certificate Students in Automotive Program. The results showed that The results of the study were as follows, 1) Electric automotive system package had efficiency at 72.22/80.46. According to the set criteria. 2) Students learning with electric automotive system package had post test score higher than those pretest; having the significance level of 0.05.

B. Analyzing the student achievement by comparing differences of scores obtained from the pre-test and post-learning achievement test with the Instructional Packages of Op Amps and Linear IC for Curriculum Diploma of Vocational Education Students found that the students' scores had average score (E1) was 39.98, score of the test during the study had average score 216.61, and the average score (E2) was 117.16 consistent with Abdul Muis Mappalotteng [6] studied about the Developing a Computer-Assisted Instruction Model for Vocational High Schools. The results of data analysis revealed The results of the study are as follows: Systematic steps in developing a CAI model for VHSs began with a preliminary study in the form of a needs analysis for the client, followed by a learning system design and lesson planning, and materials development; Learning aspect, content aspect, display aspect, programming aspect; the integration of learning methods made through the strategies in CAI, namely Tutorial, Drill and Practice, Games, Problem Solving, Simulation, and Testing; Integration of constructivist learning theory in the development of CAI in VHSs models made through the interactivity of the CAI program was developed in the form of Interactive CD; The users' responses to the CAI product were very good; The developed CAI model was valid, practical, and consistency.

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Biography



Abhichat Anukulwech received his Bachelor Degree in Industrial Instrumentation Technology from King Mongkut’s Institute of Technology Ladkrabang (KMILT), Bangkok, Thailand. Then, he has received three Master Degrees and one Doctoral Degree as follows: M.Sc. in Communications Engineering from KMILT, Thailand M.Sc. in Industrial Education from KMILT, Thailand, M.Sc. in Educational Administration From Rajabhat

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