

Development of Motor Control Circuit using Demonstration through Simurelay Program for Developing Practical Skill on Control Motor Circuit

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Abstract: Development of Motor Control Circuit using Demonstration through Simurelay Program for Developing Practical Skill on Control Motor Circuit Connecting with Hands in Electric Motor Control Subject. The purpose for 1) Develop a worksheet on motor control 2) To assess the quality of the demonstration learning management through the Simurelay program to develop practical skills on motor control 3) To assess the operability of the manual motor control. The statistics for the quality analysis of the tools are: Accuracy and the statistics for data analysis are mean, standard deviation, and percentage. The results showed that 1) Development of a worksheet on motor control with a score of accuracy or reliability (IOC) of the motor control sheet that passed the criteria, the average IOC will be 0.67-1.00 2) Demonstration learning management through the program to develop the motor control wiring skills. 3) The overall quality of the activities was at a good level (mean = 4.48, S.D. = 0.91). Considering each aspect, it was found that the level was very good. The aspect with the highest mean was "The learning media (mean = 4.78, S.D. = 0.383) 4) The students had skills in operating circuits to control electric motors by hands on skills, which passed the criteria, accounting for 84.69%. have qualified 100%

Keywords — Demonstration learning, Practical skill, Manual motor control circuit

I. INTRODUCTION

The direction of the country's development in the National Strategy (2018-2037) has set important development goals to develop people in all dimensions and at all ages to be good, competent, and qualified people. Thai people are ready in physically, mentally, and intellectually with good development all around also have responsibility to society and others, have discipline, maintain morality and be a good citizen of the nation, have the right principles and gain the skills needed in the 21st century, such as the ability to act, the ability to solve problems, adapt, communicate, and work with others more effectively, have a habit of continually learning throughout life. The National Strategy (2018), the National Education Plan (2017-2036), has set out on human resource development as a crucial mechanism for bringing the country into a global society in the 21st century and the key

issue has been set out in the National Strategy and Thailand 4.0 strategy. The preparation of manpower in terms of knowledge and skills essential competencies such as analytical thinking Ability to solve problems, communicate and work as a team, etc., in order to stay up to date with the changing trends of the dynamic world. The National Education Plan (2017) Characteristics or indicators of learners' ability to practice self-confidence [6] Prapatsara Kotakun (2012) the learners gain knowledge and understanding from direct experience, making it clear from the learning experience, bring coping skills, solve problems skills and make decisions to be useful in their application in life. [4] Thissana Khaemane (2007) practical ability is an important skill that should be developed for learners along with learning outcomes in various subjects.

The skilled work in which learners lack practical ability will lead to occupational hazards (Amnat Chonpitak, interviewee, June 14, 2021). Teaching in practical subjects is an instruction that develops learners to have potential in thinking, problem solving, and applying knowledge in theoretical learning. The practicing course is a course that allows learners and teachers to participate and interact in learning, discussing, and exchanging ideas, and also trains students to work in groups and to share duties if the

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learners are absent. The ability to practice students will lack discipline in work. When problems at work may not be resolved as well as they should, social skills will also decline (Prapisri Laorsi, interviewee, 17 June 2021). And the science in the technician will focus a lot on practice. The ability to practice will allow students to apply the knowledge of theory subjects to real practice. Including real work situations and awareness of safety at work, this skill is considered a very necessary skill in this field of technicians, which if the learner lacks the ability to practice, it will not be able to do it. Learned or may practice without expertise/prudence will create a risk for both learners and users. It also prevents students from solving specific problems that may arise on the job site (Virapong Udomphon, interviewee, 17 June 2021). It also corresponds to the issue of learning development, reform of learning processes that respond to changes in the 21st century by developing learning processes at all levels, from early childhood to higher education that use knowledge-based and interdisciplinary thinking systems for development process learning of learners at all levels of education, including activities to enhance skills and develop an integrated learning system that emphasizes action. The National Strategy Board (2019) can therefore conclude that practical ability is a skill that learners should learn. And it is also a problem that should be improved.

From the importance of the ability to operate the electric motor control circuit by hand. The course of electric motor control and problem solving by teaching the above demonstration. Therefore, the researcher is interested in researching the development of motor control circuits by using a development of Motor Control Circuit using Demonstration through Simurelay Program for Developing Practical Skill on Control Motor Circuit Connecting with Hands in Electric Motor Control Subject in the subject of electric motor control. The target group is undergraduate students. It is expected that after learning is managed, students will have the learning behaviors as intended and apply it to life in the future

II. METHODOLOGY

In the research the Demonstration learning through the Simurelay Program to develop Practical Skills in Motor Control Circuit by Hand in Electric Motor Control Course is an experimental type of research. By using the preliminary experimental research model, the one-group experiment, measuring the results only after the experiment (The One-Shot Case Study Design, posttest-design) according to the concept of [6] Pariwat Khueankaew (2008) with the following steps:

A. Populations and samples

The populations and samples are 20 students from the 2nd year bachelor's degree students, Bachelor of Technology program electrical technology major: Faculty

of Industrial Education Technology, King Mongkut's University of Technology Thonburi in 2/2021 academic year by specific random sampling

B. Research instruments

Methods for creating and qualifying tools with a specific purpose/topic of the experimental worksheet and consists of a total of 5 worksheets, studying theories, concepts, documents and research papers in order to understand the principles of creating experimental worksheets to create a motor control experiment worksheet. From the desired indicator according to the objective which from the principle of choosing to develop learner indicators and present the experimental worksheets created to the experts. The Content Conformity Assessment (IOC) for experts to determine the validity of the content or to consider the consistency between the question and the object (Item-Objective Congruence: IOC).

- Motor control worksheet for developing practical skills in electric motor control circuits by hand

- Quality assessment form of demonstration learning activities for developing practical skills on manual motor control circuits' 5-sided electric motor control

- A practical ability measure by using the Motor Control Experiment Worksheet to develop the practical skills in the manual motor control electric circuit by using the Manual Motor Starting Experiment Worksheet. All 5 worksheets have 3 side indicators.

C. Data Collection Methods

Development of Motor Control Circuit using Demonstration through Simurelay Program for Developing Practical Skill on Control Motor Circuit Connecting with Hands in Electric Motor Control Subject. The researcher conducted the experiment with a random sample of 20 people using the research model. The One-Shot Case Study Design, posttest-design based on the concept of [6] Pariwat Khueankaew (2008) is as shown in Fig. 1.

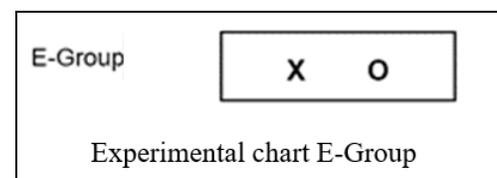


Fig. 1 Experimental scheme.

In the experimental flowchart, various symbols were used to convey the following meanings.

E-Group = an experimental group of 20 people

X = experimental variable: Demonstration learning management

O = dependent variable: the motor control electric circuit operation skills

D. Research tools

Conducting the experiment set Task Analysis

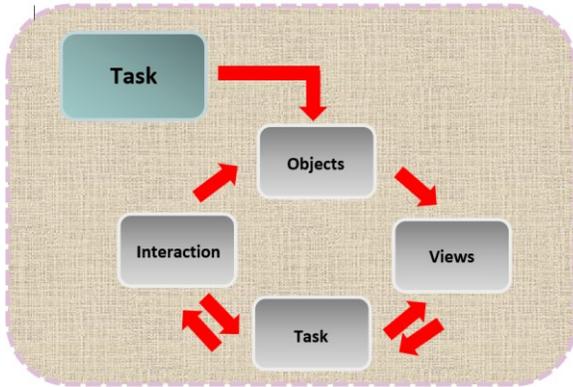


Fig. 2. Show the experimental scheme.

Job analysis is a teaching method that is suitable for students with special needs, in which teachers have a good teaching plan, with goals and activities or tasks divided into sub-steps task analysis format as shown in Fig. 2.

From the first step to the final step and taught in sequence step by step until the child is successful. Therefore, job analysis is therefore one of the teaching techniques that teachers must use to make teaching more effective.

Job analysis refers to a process that is used to continuously separate the work into sub-steps, with the sequence of sub-steps and describing all important steps of the job.

III. OBJECTIVES

1. To assess the quality of the demonstration learning management through the Simurelay program to develop practical skills on the manual motor control circuit in electric motor control
2. To compare the operate ability the electric motor control circuit by hand in the subject of electric motor control with criteria 80%.

IV. RESEARCH HYPOTHESIS

1. The accuracy or reliability of the motor control experimental worksheet to develop practical skills on electric motor control circuits passed the criteria (score 0.50 or higher).
2. Demonstration learning management to develop practical skills on electric motor control circuits by electric motor control course by applying the concept of demonstration learning management based on the concept of [5] Thisana Khaemenee (2008), with the following steps: 1) creating interest in learners 2) educating learners 3) training readiness in practice 4) practice ability to practice 5) lesson summary and 6) measure practical ability
3. After learning with demonstration learning activities through Simurelay program to develop skills in working on motor control circuits by hand, not less than 80% have

skills in operating electric motor control circuits by hand that pass the criteria (Score 50% or more)

Work is mean a behavior or a group of behaviors that an individual must perform to show that they have the skills or knowledge that can be divided into 2 tasks as follows

1. Target task
2. Subtask

There are 3 tools used in this research which are experimental kits, worksheets, and achievement forms. each has no operation process.as shown in Fig.3.

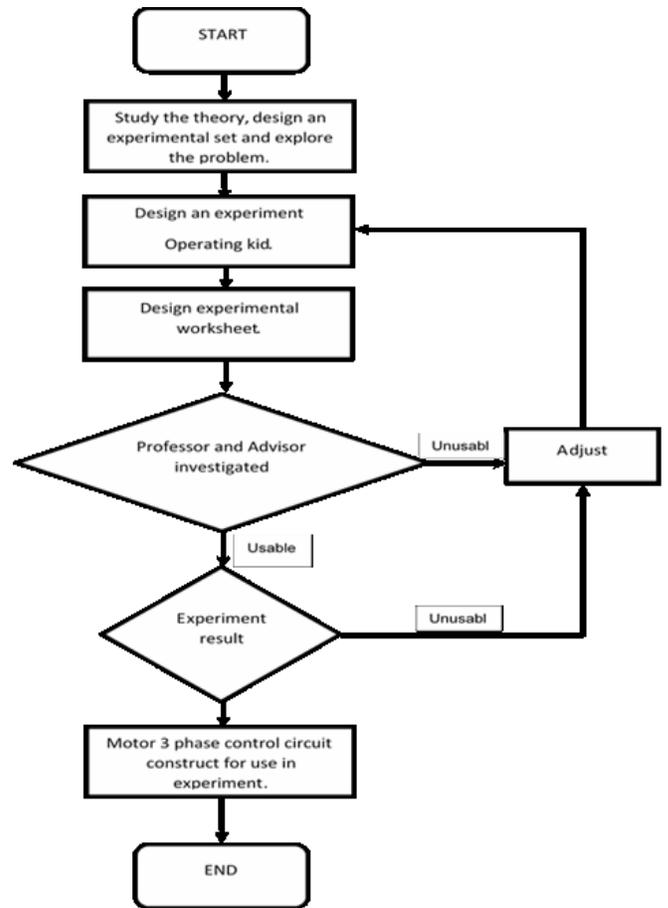


Fig. 3 Operation process.

V. DATA ANALYSIS

A. Quality analysis of research tools

Analyze the validity or accuracy by calculating the correspondence between the question and the object (Item Objective Congruence (IOC)). A validity assessment form for all 5 experimental worksheets from content experts by having quality assessment experts calculate IOC values.

B. Objective Data Analysis and experimenting with hypotheses

Analyze the quality of the demonstration learning management activities to develop practical skills on manual motor control circuits in order to examine the stated research hypotheses “The quality of the activities is better level” and analyze the quality of activities obtained from the assessment of experts by calculating the mean and the standard deviation then compare the mean with the mean range to indicate the quality level, the acceptable values are level up The average range of 3.50 - 4.49 is of good quality.

Analyze the scores of the experimental worksheet to develop practical skills in electric motor control circuits in the subject of electric motor control to verify the research hypothesis that said “After learning with demonstration learning activities through Simurelay program, to develop practical skills on manual motor control circuits in the subject of electric motor control are not less than 70 percent with a better skill in operating electric motor control circuits by hand”, which is a group score with a passing criterion more than 50 percent

C. Statistics used in data analysis

The accuracy by using the formula for finding the consistency IOC (Index of Item Objective Congruence), Mean, Standard Deviation: SD, Percentage

VI. SUMMARY OF RESEARCH RESULTS

The development of motor control worksheets to develop practical skills in electric motor control circuits by hand The generated worksheets have a validity score (IOC) of all 5 qualifying motor control worksheets, with an average IOC of 0.67-1.00, which is considered consistent with the established hypothesis.

Demonstration learning through Simurelay program to develop practical skills on manual motor control circuits in electric motor control course shown in the Fig.6. The sequence of steps in the training is as follows: Step 1 Creating Interest Step 2 Educating students in each of the 5 worksheets of the experiment, divided into 1 worksheet per week. Step 3 Practice readiness for practice. Instructors will distribute worksheets for each experiment for learners to study the working principles of different motor connections. Step 4. Practice your ability to practice. The teacher divides the learners into groups of 2-3 people, a total of 7 groups, then let the learners do the experimental worksheets and the instructor demonstrates through the Simurelay program shown in the Fig.7 and allows the learners to compare the results of the hands-on exercises. Step 5 Lesson Summary The teacher summarizes the content by summarizing each worksheet separately and having the learners explain the working principle. Step 6 Measure the practical ability for learners to complete the circuit from the 5 experimental worksheets and experiment with the three-phase motor control circuit operating set as

shown in the Fig.4, practical activities according to the experimental worksheet Fig.5.

The overall quality of learning management activities was at a good level (mean = 4.48, S.D. = 0.91). When considering each aspect, it was found that the level was very good in all aspects. The top 3 aspects with the highest average from highest to lowest were “Learning Media (mean = 4.78, S.D. = 0.38), followed by the learning activities aspect (mean = 4.73, S.D. = 0.46) and the overall structure of the plan (mean = 4.53, S.D. = 0.81) were considered consistent with the stated assumptions.

6.4 Results of a study on the ability to operate the electric motor control circuit by hand show the percentage of operating capability for manual motor control circuits for 7 groups as shown in Table 1.

TABLE I
Percentage of The Ability of Operating Capability in Motor Control Circuits by Hand.

Group	Target score (155)	Result		Percentage
		Pass	Fail	
1	123	√		79.35
2	133	√		85.80
3	123	√		79.35
4	126	√		81.29
5	129	√		83.22
6	140	√		90.32
7	140	√		90.32
Total group pass		7		84.23

Students have practical skills in electric motor control circuits by hand, passing the criteria, accounting for 84.23% and have qualified 100 percent is considered consistent with the assumptions set is “after learning with the Simurelay Demonstration Program Learning Management Activity to develop for developing practical skills on electric motor control circuits by subject electric motor control not less than 80 percent.



Fig 4. Three-phase motor control circuit operating set



Fig 5. Practical activities according to the experimental worksheet

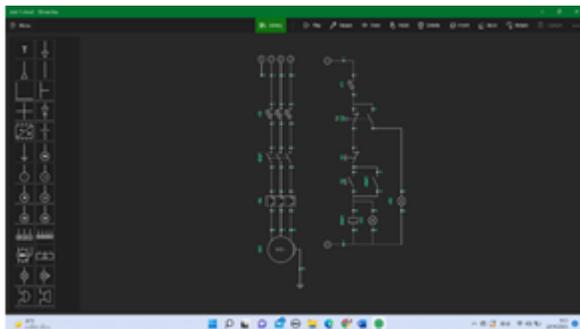


Fig 6. Demonstration learning management through Simulink

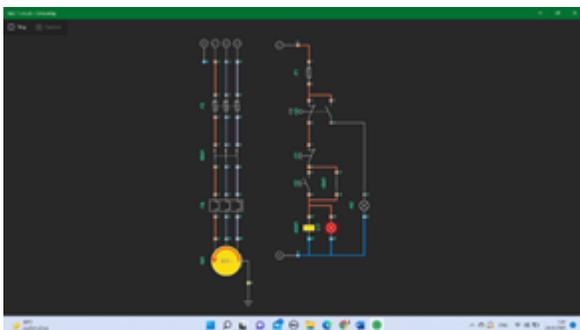


Fig 7. Program to develop hands-on motor control circuitry skills in motor control subject

VII. SUGGESTION

Therefore, there are suggestions for improving research development as follows.

Before practice, teacher should teach the theory of how the devices works because even though there is such information in the experiment sheet some students did not read and understand the information given in the worksheet.

An experimental set to use to develop that learner. There should be enough students. So that students can experiment and learn thoroughly and conduct experiments at the same time.

The researcher needs to take care of the orderliness of the learners while using the experimental kit to prevent

danger during operation and provide advice to learners so that learners can understand the content more.

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