ISSN: 2063-5346
Section A-Research paper

Evaluation of the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply

RAYMUND G. VELASCO1 and FREDERICK P. DELA CRUZ2
raymundvelasco127@yahoo.com and frederick.p.delacruz@isu.edu.ph,
Isabela State University San Mateo Campus
San Mateo, Isabela, Philippines

Abstract— Success of instruction in all schools is dependent upon the accessibility of instructional materials where the skills and technical activity performance of the students can be developed.
The Development of AC/DC Motor Control Trainer with Uninterruptible Power Supply an Instructional Device which is help students to operate, install, design, and troubleshoot electric motor control circuits for various applications. The main goal of this project is to evaluate the performance, of the Developed of AC/DC Motor Control Trainer with Uninterruptible Power Supply at Isabela State University San Mateo Campus. A descriptive-evaluative research design will apply to test its performance. There were Seventy-four (74) respondents, composing of 14 electricity and electronics instructors, 60 electricity students, the five-point Likert's Scale and WAM will be applied to interpret the equivalent meanings of the data gathered and if there is a significant difference between the evaluations of the two groups of respondents on the AC/DC Motor Control Trainer with Uninterruptible Power Supply in terms of its components. using a 25-item questionnaire with five items for each component. The collected data were treated using mean, Z-test for independent samples, and analysis of variance. The AC/DC Motor Control Trainer with Uninterruptible Power Supply were highly rated Much Acceptable in terms of design and durability, construction, functionality, and safety is made of cheaper and locally available materials. Furthermore, it is easy to use and maintain.

Index Terms— Multi-purpose Trainer, AC Motor, DC Motor, Motor Control Circuits and Uninterruptible power supply

Introduction

The success of training and instruction in all schools depends on access to teaching materials where students' technical skills and performance can be developed.

Many teachers have been motivated to fabricate gadgets, devices, machines and equipment that serve various purposes.

Furthermore, to prevent high costs of supplies and materials needed for construction, local but available materials should be utilized

Apparently it has been proven that Electrical Technology curriculum is confronted with the problem of inadequate technology equipment and supplies, thus hampering the delivery of effective instruction and also frequent power interruption due to transmission maintenance and other circumstances that will burden to teaching learning process specially during electric circuit activity performances because we cannot check and energized the output electric circuit of the students to go on with the learning process.

Many schools, colleges and universities offering technology courses face problems like lack of tools, equipment and other facilities required in the teaching learning process. As such, it is difficult to both students and instructors to develop the desired attitude and skills.

It is along this line, that the researcher is motivated to evaluate the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply as an instructional device which will be utilized to reinforce laboratory shop setting specially in motor controls.

The motor control trainer is uninterruptable because it has a backup power utilizing solar energy and an improvised automatic transfer switch that automatically switch the power source from Grid to Solar energy when there is power interruption.

3. Objectives:

Generally, the study aims to promote and strengthen the quality of technical education and skills development program of the university to attain regional, national and international competitiveness.

Specifically, this study aims to attain the following:

Specifically, this study aims to attain the following:

1. To determine the acceptability of the develop AC/DC Motor Control Trainer in Terms of:
   2.1. design and durability;
   2.2. construction;
   2.3. functionality; and
   2.4. safety
2. To determine if there is significant difference between the evaluations of the two sets of respondents.

Conceptual Model

This conceptual model guides the researchers in the conduct of this study is shown in *Figure 1*. which is focused on the evaluation of the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply AC/DC Motor Control Trainer with Uninterruptible Power Supply. The input consists of the two groups of respondents, namely, the electrical and electronics teachers and students in the three campuses of the Isabela State University who offered electrical and electronic courses. The process is concerned with determining the evaluation of the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply. in terms of its design and structure, construction, functionality and efficiency, safety and durability. The output is the evaluated multi-purpose photovoltaic powered device.

The input of this study includes the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply multi-purpose photovoltaic powered device, the two sets of respondents composed of 14 instructors and 60 students in electricity and electrical technology, and the questionnaire. The throughput focused on the administering of the questionnaire to the groups of respondents and analyzing the gathered data through

ISSN: 2063-5346
Section A-Research paper

statistical tools. The output is the evaluation of multi-purpose photovoltaic powered device in terms of the design, construction, functionality, durability and safety.

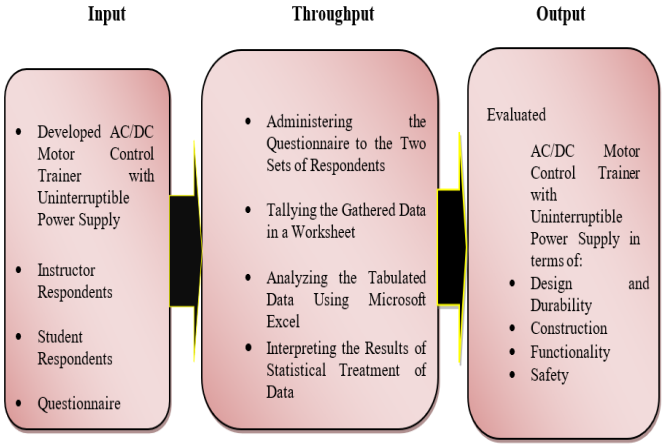

Figure 2.

Figure 1. *Conceptual Framework Showing the Evaluation of the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply*

Methodology

A descriptive-evaluative research design where applied to test its performance. There were Seventy-Four (74) respondents, composing of 14 electricity and electronics instructors, 60 electricity students, the five-point Likert's Scale and WAM will be applied to interpret the equivalent meanings of the data gathered and if there is a significant difference between the evaluations of the two groups of respondents on the AC/DC Motor Control Trainer with Uninterruptible Power Supply in terms of its components. using a 25-item questionnaire with five items for each component. The collected data were treated using mean, Z-test for independent samples, and analysis of variance.

According to Gay, as cited by Cabato (2012), descriptive research involves the collection of data in order to test hypothesis or answer questions concerning the current status of the participants in the study.

Descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation. The methods involved range from the survey which describes the status quo, the correlation study which investigates the relationship between variables, to developmental studies which seek to determine changes over time (http://www.okstate.edu/ag).

Table 1. The collected data were tallied and analyzed using the scale below:

Rating Scale	Descriptive Rating	Level of Acceptability
5 4.20-5.00	Strongly Agree	Very Much Acceptable
4 3.40-4.19	Moderately Agree	Much Acceptable
3 2.60-3.39	Agree Moderately	Acceptable
2 1.80-2.59	Disagree	Not So Much Acceptable
1 1.00-1.79	Strongly Disagree	Not Acceptable at All

Figure 3. *shows the actual picture of the Developed AC/DC Motor Control Trainer with Uninterruptible Power*

RESULTS AND DISCUSSION

Table 2. *Summary of Respondents' Evaluations of the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply*

Criteria	Instructors		Students	
	WAM	DR	WAM	DR
A. Design and Durability	4.85	SA	4.85	SA
B. Construction	4.68	SA	4.81	SA
C. Functionality	4.85	SA	4.81	SA
D. Safety	4.83	SA	4.82	SA
Grand Weighted Mean	**4.80**	**SA**	**4.82**	**SA**

Table 2 presents the summary of respondents' evaluation along the selected variables. It can be seen that the respondents have "*strongly agreed*" that the standards of design and durability, construction, functionality and safety of the AC/DC Motor Control Trainer with Uninterruptible Power Supply had been met.

Significant Difference in the Evaluation of the Two Groups of Respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply

Table 3. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply in Terms of Design and Durability, Using *z*-Test

Respondents	WAM	s	Computed z Value	Critical z Value (α=5%)	Decision	Interpretation
Instructors	4.85	0.27	0.00	1.96	Fail to Reject the Ho	Not Significant
Students	4.85	0.19				

Note: s – Standard Deviation α – Level of Significance
Ho – Null Hypothesis

As presented in Table 3, the critical z value is 0.00 and the computed *z* value is 1,96. Since the computed *z* value is less than the

ISSN: 2063-5346
Section A-Research paper

critical *z* value, at 5% level of significance, the statistical decision is not to reject the null hypothesis. Thus, there is no significant difference between the evaluations of the two groups of respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply as regards design and durability. This means that the perceptions of the respondents are the same.

Table 4. Test of Difference in the Evaluation of Groups of Respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply of Construction using *z*-Test

Respondents	WAM	S	Computed *z* Value	Critical *z* Value (α=5%)	Decision	Interpretation
Instructors	4.81	0.38	1.73	1.96	Fail to Reject the Ho	Not Significant
Students	4.68	0.29				

Table 4 revealed that the computed *z* value of 1.73 is lower than the critical *z* value of 1.96, at the 5% level of significance; the statistical decision is not to reject the null hypothesis. Hence, there is no significant difference between the evaluations of the two groups of respondents on the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply as regards Construction. This concludes to accept the null hypothesis of the study.

Table 5. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply in Terms of Functionality using *z*-Test

Respondents	WAM	S	Computed *z* Value	Critical *z* Value (α=5%)	Decision	Interpretation
Instructors	4.81	0.26	0.85	1.96	Fail to Reject the Ho	Not Significant
Students	4.85	0.16				

Based on Table 5, the computed *z* value of 0.85 is below the critical *z* value of 1.96, and then the statistical decision is not to reject the null hypothesis. At the 5% level of significance, it shows that there is no significant difference between the evaluations of the two groups of respondents on the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply as regards functionality. This implies that the respondents have the same perceptions on the mobility of the project.

Table 6. Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply in Terms of Safety Using *z*-Test

Respondents	WAM	S	Computed *z* Value	Critical *z* Value (α=5%)	Decision	Interpretation
Instructors	4.82	0.27	0.14	1.96	Fail to Reject the Ho	Not Significant
Students	4.83	0.18				

As shown in Table 6, the computed *z* value of 0.14 is less than the critical *z* value of 1.96, so the statistical decision is not to reject the null hypothesis. It means that there is no significant difference between the evaluations of the two groups of respondents on the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply as regards safety. Hence, accept the null hypothesis of the study.

Table 7. Summary of Test of Difference in the Evaluation of the Two Groups of Respondents on the Developed AC/DC Motor Control Trainer Using *z*-Test

Criteria	Computed *z* Value	Critical *z* Value	Decision	Interpretation
Design and Durability	0.00	1.96	Fail to Reject the Ho	Not Significant
Construction	1.73	1.96	Fail to Reject the Ho	Not Significant
Functionality	0.85	1.96	Fail to Reject the Ho	Not Significant
Safety	0.14	1.96	Fail to Reject the Ho	Not Significant

As displayed in Table 7, the computed *z*-values of design and durability, construction, functionality and safety are lower than the critical *z*-value, and then the statistical decision is not to reject the null hypothesis. It concludes that there is no significant difference between the evaluations of the two groups of respondents on the developed AC/DC Motor Control Trainer with Uninterruptible Power Supply.

This implies that the evaluations of the respondents as to the four criteria of evaluation used are the same. So, accept the null hypothesis of the study.

Conclusions

Based from the findings it is concluded that the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply is highly acceptable in terms of design and durability, Construction, functionality and safety. Furthermore, the evaluation of the two groups of respondents on the developed and evaluated project do not differ significantly. Finally, the project is appropriately designed, durable, functional and safe to use.

Recommendations

Premised on the significant findings and conclusions of the study, the following recommendations are offered:

1. Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply may be replicated for instructional purposes in electrical technology classes to enhance academic performance of students and help address the problem on inadequate tools, gadgets, trainers and multi-purpose machines.
2. To further establish the acceptability of the device, an experimental study can be conducted to determine its effectiveness in enhancing the psychomotor performance of students in electrical and electronics technology.
3. Patenting (UM.) the Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply highly encouraged.
4. Further studies could be conducted to come up with more effective device with improved design and durability, construction, functionality and safety features.
5. The Developed AC/DC Motor Control Trainer with Uninterruptible Power Supply must have at least one transparent side to show visibility of internal components.

BIBLIOGRAPHY

Bola, I R. (2004) Portable Analog and Digital Trainer. (Unpublished Master'sThesis. Camarines Sur Polytechnic Colleges–Naga Campus, Naga City)

ISSN: 2063-5346
Section A-Research paper

Bonaobra, A B. (2006) Instructional Materials in Teaching Physical Education in the Intermediate Grade. (Unpublished Master's Thesis. Bicol University, Legazpi City

Djuric. (2012) Training Systems for Electrical Wiring Installation <http:/www.lucas-nuelle.com> December 18, 2012.

Linzo, J B. (2012) Traditional and Integrated Learning Discovery Approaches and their Effects on Student's Learning Outcomes. (Unpublished Master's Thesis. Bicol University, Legazpi City)

Mendoza, C A E. (2011) Development and Evaluation of Digital Video Disc Circuit Trainer. (Unpublished Master's Thesis. Bicol University, Legazpi City)

Ramos, Ronald S. Technological Research Inventions and Innovations. Research and Development Journal, Benguet State University, La Trinidad, Benguet, 2008

Ruma, Manuel E. "Effectiveness of the Multi-Purpose Machine at Isabela State University". Unpublished Master's Thesis. Nueva Vizcaya State University, Bambang, 2014

Seguban, Romeo G. A Multi-Purpose Overhauling and Lifting Apparatus: A School Based Research, Research and Development Department, Isabela State University, Ilagan, Isabela, 2010

Dela Cruz, M M. (2007) An Instructional Tri-Axial Robotic Trainer (Unpublished Master's Thesis. Camarines Sur Polytechnic Colleges–Naga Campus, Naga City)