

DEVELOPMENT AND ACCEPTABILITY OF
LOW COST ELECTRO-TECH TRAINER BOARD,
SERIES-E09

Angel R. Tonido

University of Rizal System

Abstract:

The use of instructional materials is important in the teaching-learning process in education and training, specifically in Industrial Motor Control System to ensure the trainees' quality training in an industrial-like environment.

Utilizing developmental and descriptive research methods the Low Cost Electro-Tech Trainer Board, Series -E09 was designed, constructed and evaluated on the following criteria: functionality, usefulness, safety and maintenance by electrical experts and selected students as respondents. The trainer board was developed out of locally available materials that made it cheaper, as compared to the trainer board available in the market today. It attained its usefulness based on its design. After several try-outs and revisions, it was found extremely acceptable as evaluated by the respondents. The study recommends that the trainer board be utilized in teaching-learning activities and be produced for commercialization.

Key words: *trainer board, electric motor control*

Introduction:

The effectiveness of any educational program depends so much on the harmonious integration of theories and practices involving the

various elements of education and the elements of the learners' thinking, feeling and acting. We can teach them all of these in many ways, in the shop certainly, through lectures, demonstration and evaluation. But equally important venues for teaching our students how to learn are the prepared instructional materials, in themselves are partly considered trainers, since they mediate learning. Besides providing up-to-date and accurate information on the subject matter, they encourage deep level of learning and develop critical thinking.

The Low cost ELECTRO-TECH TRAINER BOARD, SERIES-E09 could be a good help to both the trainers and trainees in that it contains the necessary materials and devices to apply theory into practice in order to develop students' knowledge, skills and attitudes through competency based approach of learning.

Theoretical Framework:

Primarily the concept of this study was based on the first and second general Theories of Vocational Education. According to Prosser and Quigley (1949), there are general groups of habits required to achieve efficient vocational education: first, habits giving adaptation to working environment, second, process habits, and the third, the thinking habit.

The first general theory that belongs to the environment states "Vocational Education will be efficient in proportion as the environment in which the learner is trained replicates the ambiance he must subsequently work in." Training on the job ensures the exact environment itself. Training in school before going to work can only at best imitate or approximate it. This should go as far as it possibly can, if

it affects to establish any environment habits as advantageous preparation for entrance to the real job.

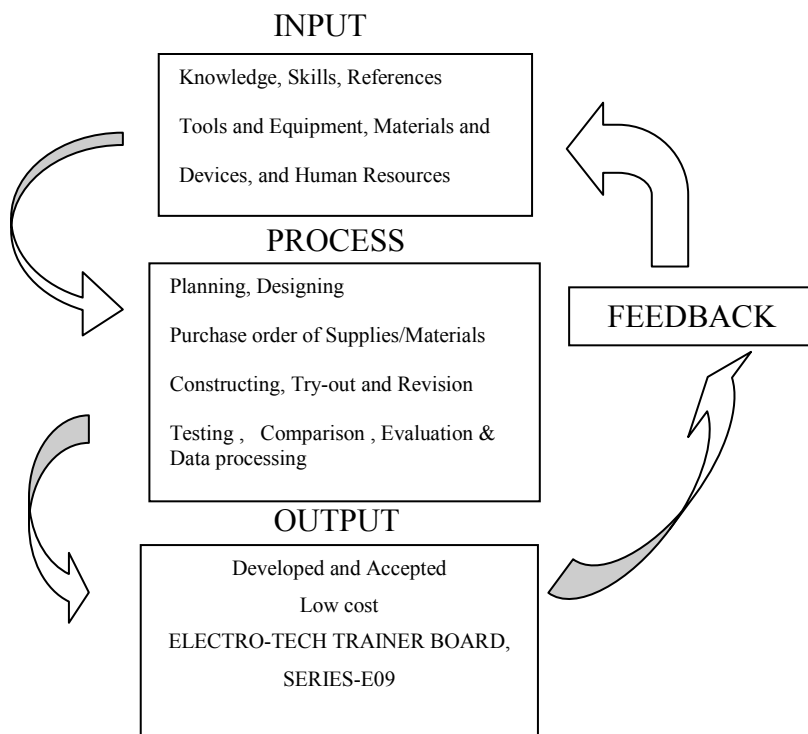
The second general theory that belongs to the process habits states that “Effective training can only be given where the training jobs are carried on the same operations, the same tools and the same machines, as in the occupation itself”. Simply, the statement implies that in order for the student to be effectively trained he must be exposed in an industrial-like environment training facilities.

Conceptual Framework:

Using Comb’s System Approach as basis of the research paradigm, it involves input, process, and output. The input is practically defined as collective terms that refer to some resources that the system obtained from the environment human, facts, material and time. While process refers to the way things are done, the output to the product of accomplishment.

The feedback signifies whether the objectives set in advance were met or not. In case something is missing to the input phase, the arrow that connects the output phase gives change to the process which symbolizes the modification or revision. The feedback, therefore, refers to the impact of input, process and output of the research project, resulting in a better and effective low cost electro-tech trainer board, series-E09 (see conceptual model in Figure I.).

Conceptual Model



Conceptual Paradigm Showing the Development of
Low Cost ELECTRO-TECH TRAINER BOARD SERIES-E09

Objectives of the study:

This study aims to develop low cost ELECTRO-TECH TRAINER BOARD SERIES-E09 that enhances the teaching- learning process in AC- DC Industrial Motor Control for Electrical Technology course.

Specifically, the study seeks to;

1. Design and construct low cost Electro-tech trainer;
2. Perform try-out and revision;

3. Determine the acceptability of the trainer board using the following criteria:
 - 3.1. Functionality
 - 3.2. Usefulness
 - 3.3. Safety
 - 3.4. Maintenance
4. Determine the significant difference on the evaluation made by the respondents and experts with respect to the above cited criteria on the comparison conducted between the low cost electro-tech trainer board, series-E09 and commercially available trainer board in the market.

Review of Related Literature and Studies:

Some trainers of different fields of technology can develop their own trainer to make teaching –learning process more effective and challenging. At this time, existing trainers are developed only for utilizing certain aspect of the course, not the entire lesson content; which consequently means a need for another trainer on the next area of the study or lesson. Optimistically, the researcher developed instructional materials different from the others, as the trainers can perform several numbers of industrial motor control circuits and simulate a number of different control troubles. The idea of developing training package is to equip the learners with advance knowledge and technical know-how in industrial motor control, as similarly done in the industry.

Quintal (2002) in his feasibility study likewise proved that it is technically feasible to design and construct an automotive body electrical system trainer to help solve the problem of inadequacy of training equipment to meet the needs of automotive students in acquiring technical knowledge in automotive body electricity.

Bonot, as cited by Nito (2002), in her dissertation states that the curriculum cannot be effectively implemented without the necessary

facilities and equipment for instruction. Her study affirms that instructional materials, tools and equipment assist in the development process, as much as supplement the teachers' work in developing the students' skills and potentials.

Lardizabal (2001) holds that the teacher should use good teaching aids, as tools that facilitate instruction, tools and equipment that are concrete and visual materials that give the feeling of reality. Richer in ideas they can help students see, feel and investigate.

To Tejada (1994) teaching effectiveness can be fully attained in the laboratory or shop areas, which are adequately equipped and supplied with materials for instruction. Through the actual manipulation and frequent use of tools and equipment, the students will be able to develop skills and abilities needed in the industry.

All of the above reviewed studies relate to the present study since sought to identify the importance of instructional materials and the necessity of improvised trainer boards.

Materials and Methods:

In this study, the researcher used the locally available industrial motor controller materials and devices for the development of trainer board. For determining the acceptability, the low cost Electro-tech Trainer, Series-E09 was utilized after the try-out and revisions. A self developed questionnaire checklist was administered by the expert and student respondents to gather the data as regards its functionality, usefulness, safety and maintenance; and to find out the significant difference between the evaluations made by the 2 groups of respondents on the acceptability of the trainer board.

Results and Discussion:

The weighted mean for acceptability of the LOW COST ELECTRO-TECH TRAINER, SERIES-E09 in terms of functionality, usefulness, safety and maintenance, as perceived by the Respondents, is presented in Table 1. Based on the perception of its functionality it got an average weighted mean of 4.6 with verbal interpretation of ‘Extremely Functional’, Usefulness, with an average weighted mean of 4.6 and verbally interpreted as “Extremely Useful”, and safety, with an average weighted mean of 4.5 and verbally interpreted as “Extremely Useful. For Maintenance it got an average weighted mean of 4.6 and verbally interpreted as extremely maintained.

Table 1

Summary of Computed Weighted Mean on the Acceptability of the Low Cost Electro-Tech Trainer Board, Series-E09 in terms of the given Variables

VARIABLES	Experts			Students		
	W _x	VI		W _x	VI	
FUNCTIONALITY	4.6	EF		4.8	EF	
USEFULNESS	4.6	EU		4.6	EU	
SAFETY	4.5	ES		4.48	ES	
MAINTENANCE	4.6	EM		4.62	EM	

It is implied that the Low cost Electro- tech trainer, Series-E09 is extremely accepted in regard to the above given variables, as revealed by the respondents.

To find the significant difference between the evaluations made by the Electrical Experts and Electrical Students on the acceptability of the LOW COST ELECTRO-TECH TRAINER, SERIES-E09 as to functionality, usefulness, safety and maintenance, independent t-test was applied (see Table 2)

Table 2

Computed t-value on the Significant Difference between the Functionality, Usefulness, Safety and Maintenance of the LOW COST ELECTRO-TECH TRAINER, SERIES-E09

VARIABLES	MEAN		Mean Difference	Df	Computed t-value	Tabulated t-value	HO	VI
	Experts	Students						
Functionality	4.7	4.6	0.1	18	0.577	2.101	A	NS
Usefulness	4.6	4.7	0.1	18	0.577	2.101	A	NS
Safety	4.6	4.5	0.1	18	0.577	2.101	A	NS
Maintenance	4.7	4.6	0.1	18	0.577	2.101	A	NS

Table 2 shows that as a whole, general average weighted mean of 4.7 in electrical experts and 4.6 in the electrical students got a mean difference of 0.1. The computed t-value of 0.577 appears lower than the tabulated t-value of 2.101 and 0.05 level of significance with 18 degrees of freedom. Therefore, the null hypothesis, that states that there is no significant difference between the evaluation made by the respondents on the acceptability of Low cost Electro- tech trainer, Series-E09 in terms of functionality, usefulness, safety and maintenance, is accepted.

The result implies that the low cost electro-tech trainer board, series-E09 is accepted as instructional material useful for teaching-learning process in electrical technology courses.

Findings:

The study yielded these findings:

1. The Low Cost Electro-Tech Trainer Board, Series- E09 could be developed out of locally available materials.
2. Trainer board was extremely accepted by the respondents as to functionality, usefulness, safety and maintenance.
3. In comparing the acceptability of the trainer board, both experts and students revealed that it is extremely accepted, based on given criteria.
4. In general, no significant difference exists between the evaluations made by the experts and the students on the acceptability of the trainer board.

Conclusion:

Based on the findings as to the level of acceptability of the Low cost Electro- Tech Trainer Board, Series - E09, the hypothesis that there is no significant difference in the level of acceptability of the two groups of respondents with respect to its functionality, usefulness, safety and maintenance was extremely accepted is affirmed.

Implications and Recommendations:

Drawn from the results of the study, it is recommended that:

1. The developed trainer board be utilized further to a control group and experimental group of respondents for in-depth evaluation;

2. The developed trainer board power supply be secured with in male plug;
3. The developed trainer board be utilized in teaching-learning activities.
4. One developed trainer board be produced for commercialization purposes.

Bibliography:

A. Books

- Borrich, G. D. (1992). *Effective Teaching Method*, New York. Mc Millan Publishing Co.
- Rossenber, R. S. copy right *Industrial Motor Repair*, New York.
- Lardizabal, A. S.(2000). *Principles and Methods of Teaching*, Quezon City, Phoenix Publishing House Inc.
- Prosser, C. A. (1949). et. al, *Vocational Education* Chicago,USA: Np., 216

B. Unpublished Thesis/Dissertation

- Tejada, A. B. (1994). *Factors on Enrollment in the Technical Education Courses at the Palawan College of Arts and Trades*, Technological University of the Philippines, Manila
- Nito, D. F. (2002). *“Program Performance of Dualtech Training Center”*. Dissertation, Technological University of the Philippines, Manila

Quintal, S. N. (2002). “*Automotive Body Electrical System: A Technical Feasibility Study*”, Marikina Institute of Science and Technology, Marikina Metro Manila

Appendices

Appendix A

RESEARCH GANTT CHART

Development of Low Cost ELECTRO-TECH TRAINER BOARD, SERIES –E09 In AC/DC Industrial Motor Controls

First/Second Semester, SY 2011-2012

ACTIVITIES	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1. Research proposal preparation										
2. Presentation of RP										
3. Requisition of Supplies /Materials										
4. Designing										
5. Constructing										
6. Try-out & revision										
7. Evaluation										
8. Statistical treatment/ interpretation										
9. Final preparation of manuscript										
10. Final report/submission										

Appendix B

THE TECHNICAL DESCRIPTION

The development of Low Cost Electro-Tech Trainer Board, Series-E09



TECHNICAL FEATURES

Board size: 60 cm X 50 cm X 13 cm

Board made: Plywood, Formica sheet & Aluminum frame

Supply voltage: 220 volts AC, 60 hz

Circuit protection: 15 Ampere CB

FUNCTION/ACTIVITIES:

Industrial motor control devices identification, Devices terminal identifications, Basic full-voltage/reduced-voltage IMC control circuit wiring connections, Sequential Electric motor control wiring connection Electrical parameter testing & measurements, IMC trouble shooting and repair.