



JOJAPS

eISSN 2504-8457



Journal Online Jaringan Pengajian Seni Bina (JOJAPS)

Application of Electrical Wire Trainer (EWT) in Electrical Wiring Course (DET1022)

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Abstract

This study was conducted to determine the effectiveness of the developed EWT to apply for the DET1022 course. EWT is a package consisting of eight (8) modules along with an interactive video produced specifically to ease the understanding and smooth a process of learning and teaching. The study was descriptive survey comprised the study sample consisted of 37 first semester students of the Diploma in Electrical Engineering (DET). The method used in this study was a questionnaire. The raw data were analyzed to determine the number of students to evaluate whether the characteristics of EWT is user-friendly in terms of motivation, interface design, application understanding and user comfort. The results from this study showed that students agree that the use of this EWT in DET1022 course help them to understand better and also can be the basis for all DET1022 course's lecturers to help the process of learning and teaching run smoothly and have positive impact on students

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Key-word: - EWT, DET1022 and DET

1. Introduction

Training and education for engineers and technicians need a well preparation where the industry tend to choose and hire those who have the engineering knowledge and skills in the related field. Thus, practical oriented education programs tend to practically-biased have been introduced in Malaysia. It is aligned with the convergence of the national education system to the development of human resource in the field of vocational and technical education. Public figures of educational psychology such as Lewin, Piaget and Vygosty were indirectly support the educational program which patterned practical biased by the theories of learning processes that have been raised by them. According to Lewis, the learning process is a process in which knowledge is created through the transformation of experience. Learning happens when the learner interacts with its environment (Kolb, 1984). Geoffrey Moss (1987) states an organization must be smart in planning and designing their training program. Eonard Nadler (1994) also state when someone want to implement training program, the person must be able to diversify hteir training methods until the training is geared towards the actual work area. He recommends that any training that they went through is their real works. Therefore, to create a quality engineers or technicians, manager of engineering program should provide a solid foundation and an effective implementation method in the lab-works which is practical-biased. Without any exposure to the laboratory work, workshop and field work, the efforts to produce quality engineers and technicians would be lame and dubious the professional agency (Wahid Razzaly, 2001). DET1022 course is the core subject that must be taken by all students in the first semester of Electrical Engineering Department. Students who have experience or had learned it during the Vocational and Technical School before, the course will be easy for them, but for students without technical and engineering background such as

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the arts and science course, this is not something they interest to because they are not exposed to the essence of the course from the early ages. They will face problems at an early stage and indirectly makes this course as a course that burden them. To find a solution to this problem, purchasing EWT is the best solution, in which students will be better visualize and understand the domestic electrical wiring connection of one phase more quickly, regardless of their educational background. Therefore, students are able to perform the actual wiring on their wiring board more faster, accurate and correct based on the developed interactive video which provide them a guide to make the connections. However, when the survey was done to the price of the brand EWT XXX, the prices are too high. **Figure 1** is a quote from the company :

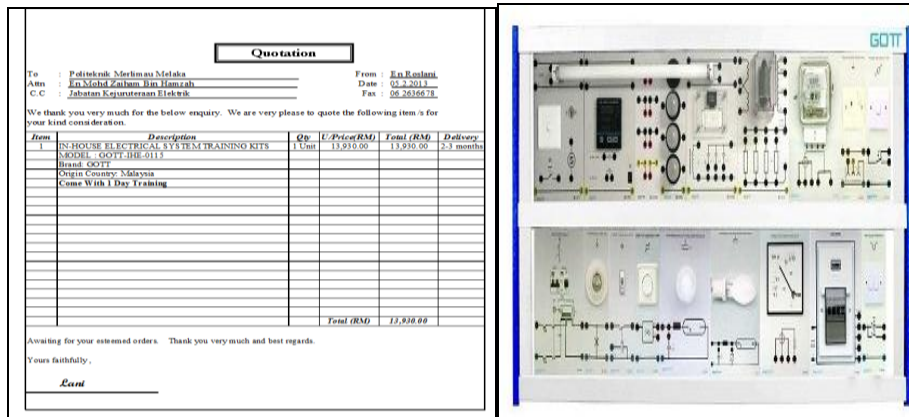


Figure 1 Electrical Wiring Trainer from brand XXX

As the price offered is high enough, the EWT was developed in Polytechnics. **Table 1** shows a list of accessories equipment used for development of EWT at the Polytech.

Bil	Senarai Aksesori/Peralatan	Harga Semnit	Kuantiti Digunakan	Jumlah
Modul Pendawaian Satu Fasa				
1	Meter KWJ	50	1	50.00
2	Neutral Link	15	1	15.00
3	Main Fuse	18	1	18.00
4	Red Terminal	0.5	54	27.00
5	Black Terminal	0.5	28	14.00
6	Green Terminal	0.5	14	7.00
7	Main Switch	12	1	12.00
8	ELCB	8	1	8.00
9	M.B 10A	6	3	18.00
10	M.B 20A	6	3	18.00
11	Lamp Holder	1	8	8.00
12	Base Lamp Holder	0.7	8	5.60
13	One Way Switch	5	1	5.00
14	Dimmer Switch	5	1	5.00
15	Two Way Switch	8	4	32.00
16	Switch Holder	1	9	9.00
17	Switch Pertengahan	12	1	12.00
18	Socket Outlet	14	4	56.00
19	Trimmer Rack	250	1	250.00
20	Kabel Merah	50	1	50.00
21	Kabel Hitam	50	1	50.00
22	Kabel Hijau	50	1	50.00
23	Lain Lain	100	-	100.00
Jumlah				819.60

Table 1 List of accessories and equipments.

2. Methodology

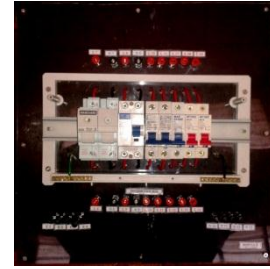
The modules were developed according to the course syllabus of DET1022 with one additional module which is solar power systems. **Figure 2** shows all eight modules developed for completing the EWT.



One Way Switch Assembly



Kilo Watt/Jam Assembly



Distribution Board Assembly



Two Way Switch Assembly



Intermediate Switch Assembly






Socket Outlet Assembly

Figure 2 Modules developed for completing the EWT.

3. Interactive Video Design

After eight modules has been developed and tested to ensure it works properly, an interactive video was developed to enable students understand how to use the methods correctly. Figure 3 is an interactive video that has been developed.

Video	Details about Interactive Video
	<p>Front page developed interactive video</p>
	<p>The main menu is divided into several sub-topics such as Profiles, introduction, block and Video</p>
	<p>Sub-topic for blocks for the modules developed.</p>



Menu for all demo videos for each practical.

Figure 3 Developed Interactive Video.

4. Research Methods

Assessment of Product Design

A total of 37 students taking the DET1022 course were taken as sample. They were students of DET 1C. Overall population was taken to increase the size of the study sample. The research method used was questionnaire. This study consists of two parts.

Part A

Part A consists of respondent demography.

Part B

Part B was on the effectiveness of the design development of EWT. This section consists of 17 items which divided into 4 sub topics of motivation, design interface, understanding the application and user comfort. The rating scales were as follows:

- Strongly Disagree = 1
- Disagree = 2
- Less Disagree = 3
- Agree = 4
- Strongly Agree = 5

The data and goals derived from the questionnaires were processed and analysed by the number of students who were asked agreed with the items.

Analysis and Results

Findings of Product Design



Figure 4 Developed EWT.

Demography

Table 2 showed the number and percentages of respondent by sex who responded to the questionnaire distributed.

Sex	Number of Respondents	Percentage (%)
Male	31	83.78
Female	6	16.22
Total	37	100.0

Table 2 Number and percentage of respondent by sex.

EWT Effectiveness

Table 3 is an evaluation study on the question of motivation based on the questionnaire distributed.

Item No.	Statement
1	I enjoy using this EWT
2	EWT has inspired me to explore the field of electrical
3	Process of learning and teaching with EWT has interest me.
4	EWT is giving me the opportunity to try out themselves how the wiring is done

Table 3 Question on motivational aspects.

Based on **Figure 5**, there was 20 students strongly agreed that they enjoyed this EWT and 17 students agreed that they enjoyed this EWT. EWT has inspired me to explore the field of electrical is the second item and a total of 18 students strongly agreed while 19 students agree. The process of learning and teaching using EWT interest me, the number of students is the same as the second item that were previously of 17 people agree and 18 students strongly agreed. For the last item that asked for the assessment of this aspect of motivation is EWT gave me the opportunity to try out themselves how the wiring still showing the number of students agree and strongly agree is the same number of students to item 2 and item 3.

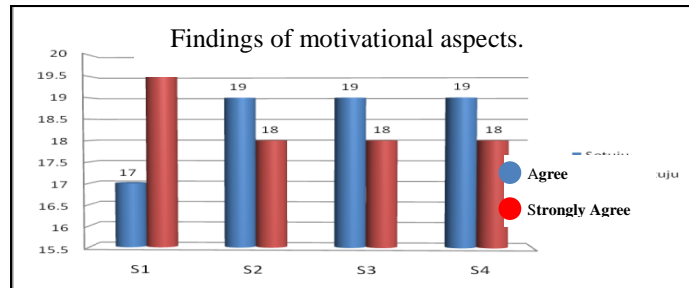


Figure 5 Findings of motivational aspects.

Table 4 is the question of evaluation study on interface design based on a questionnaire distributed.

Item No.	Statement
1	EWT provides easy and proper wiring methods
2	Accessories and equipment are in right place and easy to reach
3	The overall design reflects the EWT single phase wiring system
4	There were no parts/components in the EWT can harm or injure users

Table 4 Question on interface design aspects.

Based on **Figure 6**, there was a total of 25 students strongly agree EWT item provide easy and proper wiring methods while 12 students agree with this item. For item accessories and equipment are at the right place and easy to reach, 26 students strongly agreed and 11 students agree. Item design can reflects the overall EWT single phase wiring system gained 26 students who strongly agree and only 11 students agree to this item. The last item aspect of interface design is no parts/components in the EWT can harm or injure the user gets the number of students who strongly agree and agree the same as the second and third item.

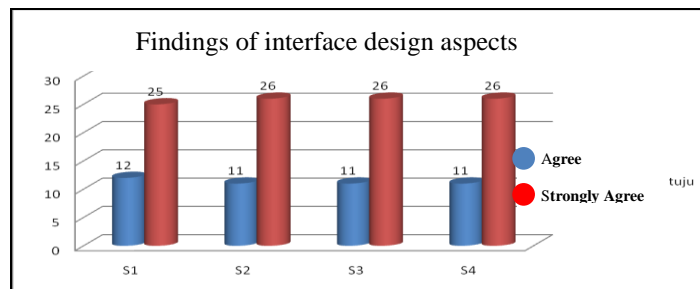


Figure 6 Findings of interface design aspects.

Table 5 is the question of evaluation study on understanding based on the questionnaire distributed.

Item No.	Statement
1	The process involved in this EWT is described in details
2	EWT is giving me the opportunity to observe the application of single phase wirng system clearly
3	EWT can train students to make wiring form one module to other modules.
4	EWT can stimulate the development of ideas in the application of wiring system.

Table 5: Question on application understanding aspects.

Based on **Figure 7**, there were 23 students strongly agreed process involved in the EWT is described in details while only 14 students agree with this item. EWT is giving me the opportunity to observe the application of single phase wiring system clearly is the second item asked to students where 19 students could not agree on this item and only 18 students agreed on this item. A total of 25 students could not agree on this item EWT can train students to make wiring from one module to the other modules and a total of 12 students agreed with this item. EWT can stimulate the development of idea in the application of wiring system is the last item where we can see a total of 24 students strongly agree with this item compared with only 13 students agreed with this item.

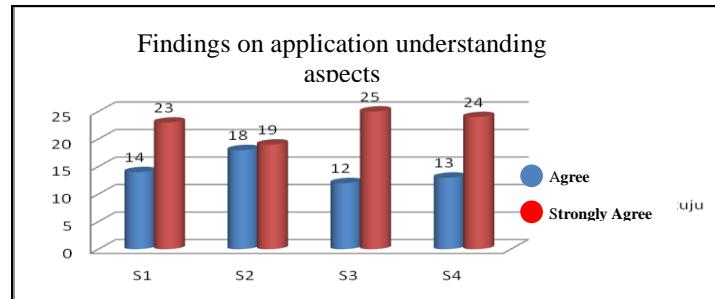


Figure 7 Findings on application understanding aspects

Table 6 is a question of evaluation study on user comfort based on the questionnaire distributed.

Item No.	Statement
1	EWT is easy to use
2	I do not have a problem when making wiring and operate EWT
3	Each of the instructions given in the video is easy to understand for implementation
4	I do not have to provide a lot of additional/side equipment to carry out for practical use of this EWT
5	I feel the use of the EWT in the process of teaching and learning in DET1022 course is suitable

Table 6 Question on user comfort aspects.

Based on **Figure 8**, there were 5 items that being asked in terms of user comfort where the first item is the EWT is easy to use, shows a total of 20 students strongly agree with this item, while 17 students agree with this item. I do not have a problem when making wiring and operate EWT is the second item that being asked and the results showed a total of 22 students strongly agreed and only 15 students agreed with this item. For the third item, 21 students strongly agreed and 16 students agree each of the instructions given in the video is easy to understand for implementation. I do not have to provide a lot of additional/side equipment to carry out for practical use of this EWT is the fourth item and the results that were revealed showed a total of 21 students strongly agreed and only 16 students agreed with this item. The last item that asked for the user’s comfort is I felt the use of EWT in the process of teaching and learning in DET1022 course is suitable showed as many as 19 students strongly agreed while 18 students agreed with this item.

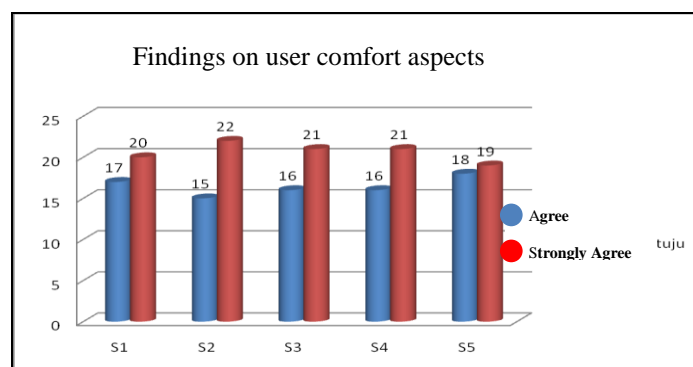


Figure 8 Findings on user comfort aspects.

Conclusion

EWT is not only developed at a cost cheaper than the market price and even the provision of the interactive video had helped to improve students understanding. The questionnaire administered to the characteristics of this system shows that the majority of students agreed that the design of EWT is user-friendly in process of learning and teaching for DET1022 course. The results from the analysis showed that the assessment of all aspects of the evaluation such as motivation, interface design, application understanding and also user comfort evaluation showed that all students of the DET 1C program is agreed 100%. With the implementation of this innovation in process of teaching and learning, it has given an added value to the lecturers to be more competent and consistent with current technology.

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