

LED TV TRAINER USE AS TEACHING AIDS FOR DEE 3052 ELECTRONIC EQUIPMENT REPAIR COURSES

Wan Ghani Wan Pi , Rohaizan Saher , Azura @ Nurul Shuhada Daud

*Electrical Engineering Department, Polytechnic Of Sultan Haji Ahmad Shah
25350 Semambu, Kuantan, Malaysia*

ARTICLE INFO

Article history:

Received : June 2015
Accepted : August 2015
Available online : January 2017

Keywords:

*Teaching Aid, LED TV Trainer,
Electronic Troubleshooting*

ABSTRACT

This paper proposed the development of the LED TV trainer as a teaching aids for Electronic Equipment Repair Course. Studies using new technologies such as LED TV definitely need a teaching aid for the students never see the internal circuit, operational and damage to the electronic device. The teaching aids developed using actual LED TV and a main circuit is removed from the TV. LED TV is equipped with a point trainer to check the selected voltage and switches damage to the device. The main purpose LED TV trainer is to increase the understanding of students in learning electronic equipment repair course. This teaching aids was built using the latest technology. Worksheets for laboratory testing were produced to facilitate students to understand basic principle of LED TV trainer. The development of LED TV trainer also as the measurement tools to test the functionality of LED TV trainer and apply this technique to troubleshoot fault diagnosis. LED TV trainer development is also seen as cost-effective as a trainer that was used in the R & D process can last longer. The LED TV Trainer also can help lecturer to control the student practical activities and saving cost for maintenance of broken TV main board.

1. INTRODUCTION

The process of teaching and learning largely depends on the available teaching materials. Today there are wide range of teaching aids which can be audio, video, mobile phone application, interactive prototype, and electronic trainer. Teaching aids are those materials that help the teachers explain better knowledge and help the students understand the subject matter. There are many benefit of teaching aid such as to retain more concepts permanently, motivate student, develop the proper and real image, provide complete example for conceptual thinking, create the environment

of interest for the students and provide direct experience to the students. Teaching aids is very important for technical and engineering fields to provide complete example for conceptual thinking and also provide direct experience to the students.

Electronic Equipment Repair is a course provides the knowledge and skills on troubleshooting and repairing the electronics equipment. This course offered for polytechnic student in Diploma Electronic Engineering on semester three. This course focuses on the identification of faults in audio amplifier, regulated dc power supply, radio

CD player, colour TV receiver and domestic electronic appliances.

In 2014, the revised syllabus remade and made improvements to enhance the quality of teaching, course name preserved but converted code from E3005 to DEE 3052 to fulfil Malaysian Qualification Accreditation (MQA) recognition. Description of a new amendment to the course syllabus electronic equipment repair emphasizes what will be accomplished by students after the course. It is expressed as the Course Learning Outcomes (CLO). The following is Course Learning Outcomes (CLO) for Electronic Equipment Repair (DEE3052):

- a. Apply the knowledge of hand tools, soldering technique and test equipment in troubleshooting and repairing electronic equipment.
- b. Solve problems related to electronic equipment repair using the correct diagnosis technique.
- c. Fix the electronic equipment fault using the correct diagnosis technique.
- d. Demonstrate an awareness of entrepreneurship in repairing the domestic electronic appliances through essay question within a stipulated time frame.

To meet the new curriculum that focuses on capacity development in the field of electronic technology, teaching aids are needed. The characteristics necessary teaching aids must be based on the latest electronic technology to be exposed to the students. The use of LED TV trainer as teaching aids for the course repair electronic equipment is indispensable. Students in electronic engineering should be exposed to new technologies so that they can be competitive in a real working environment later. Among the importance of teaching aids is to help students understand a topic in greater depth and realistic. LED TV trainer also serves as a tool that can enhance the interest of students to explore the field of electronic engineering and help them gain

experience. LED TV trainer used as teaching aids for course Electronic Equipment Repair is not only effective for teaching materials, even it is also very economical.

LED TV Trainer has been developed as a teaching aid which is to increase the student understanding of the LED TV and the type of failure occurs. The specific objectives of LED TV trainer are to exposed student to the LED TV system with a new technology so that they become competitive graduates. The development also has the characteristics of a good safety, exposure to the latest technology at minimal cost TV Trainer as a teaching aid in Electronic Equipment Repair (DEE3052) course.

2. LITERATURE REVIEW

Learning is an effort to acquire knowledge, acquire knowledge (Mok, 2000). This is because learning is a continuous process. The processes involved are as students get a description of the lecturers, make written or practical training so that there is a change in the students. Gagne *et. al* (1976), defines learning as a change in behaviour or abilities of someone who can be retained, excluding the change caused by the growth process. Overall, the learning means the process of acquiring knowledge or skill through stimulus-response, resulting in a change in behaviour. Such behaviour is permanent and stable. Meaningful learning includes cognitive processes which emphasize the existing experience, understanding, motivation and learning initiatives (Mok, 2000).

Learning is closely related to teaching. Teaching is to create learning. Learning effectiveness is dependent on the ability to use the teaching skills that can facilitate learning activities. There are two teaching function of stimulating learning and creating effective learning situation (Mok, 2000). For institutions of higher learning, appropriate teaching methods are essential to facilitate effective teaching and learning process.

There are various methods used by each lecturer to generate a process of learning and effective teaching. One very important way is through the use of tools and teaching aids. Teaching aids can cause excitement and desire of students to learn more about a lesson and also can make the learning process more engaging and effective.

The use of tools, materials and educational resources in a planned and orderly will make education more meaningful and positive impact on the teaching and learning process. Therefore, in the presentation of the teaching, the use of appropriate teaching aids are very important especially technical subjects. For example, technical subjects such as electrical engineering, practical learning, the use of simulation, training (Hands-On), the project, problem solving and solution of many examples is important to improve the understanding and experience of the students. (Nurhanim Saadah & Ramlan, 2010)

The use of teaching aid allows students to pursue investigations, can make students less reliant on their teachers, fosters cooperation with fellow students, and can provide students with feedback on progress (Ben Zvi & Friedlander, 1997). Recently, teaching approach should center on the student rather than the knowledge. Researchers have discovered that teaching aids enable the teacher and children to engage in solid conversation about something concrete (Mamokhele, 2002).

A teaching strategy for technical course should aim to develop the student's skill and expose them to the real problem. Technical education program operates on both a theoretical and practical level. Therefore, teaching aid must be prepared and selected carefully to ensure the student can relate the theory through experimentally. Lecturer should guide against using any teaching aid just for the sake of using it. Selected teaching

aids must serve a definite purpose in the lesson and contribute towards achieving specific objectives (Mamokhele, 2002).

As one of the TVET institutions, polytechnics are committed to prepare student with a good skill and knowledge. A skill such as equipment troubleshooting is a primary skill applied in the Electronic Equipment Repair (DEE3052) course. The development of LED TV trainer as a teaching aid in Electronic Equipment Repair (DEE3052) course is one of the efforts to improve student's skill and expose student to the latest technology. In addition, this LED trainer is also an improvement from the previous methods that do not have safety features.

3. METHODOLOGY

The performance or functional LED TV Trainer begins with the process of teaching and learning of Domestic Electrical Appliances. Lecturers will provide information to students about the following:

- Knowing color TV receiver
- Understand the basic principle of color TV receiver
- Apply the measurement tools to the test the functionality of color TV receiver
- Apply diagnosis technique to troubleshoot fault in color TV receiver
- Apply entrepreneurial skill in repairing the domestic electronic appliances environment

Students will be able to identify every stage in LED TV trainer, identify the specific components in LED TV trainer and hold the LED TV trainer during the learning process happens once can understand the principle and function of LED TV trainer is easily. Through this process, the lecturers can expose students to the latest technology and features good security. This trainer also exposed student to the real TV trouble shooting and latest applied in industry.

3.1 LED TV Trainer

The model used is the type of TV Haier LE24T1000F as shown in Figure 1. The monitor of LED (Light Emitting Diode) has the same technology as LCD. A physical difference between LED and LCD is generally lies in a thinner shape. The main difference for each type of TV is the lighting system. For LED TV display technology, the lighting system is LED backlight technology. There are a few advantages of LED TV which can save electricity consumption, the picture is very sharp contrast, long LED life, dimensional monitor very thin and light is better than LCD.



Figure 1: Model Type Haier LE24T1000F TV

The trainer development is a modification of the main circuit LED TV as shown in Figure 2. The trainer development is replacing of CRT TV technology. Recently, the use of CRT TV (Cathode Ray Tube) have decline. The main reason of this situation happened because of its large and heavy that it requires additional space compare than LED TV which is more slim and light.

Figure 2: Main Circuit Board of LED TV Haier LE24T1000F

The main board circuit of LED TV has been modified, which are four switches was created to represent the failure condition. There are four failure condition involve in



this trainer namely power supply, backlight, LCD and audio failure. The process flow of LED TV trainer development is shown in Figure 3.

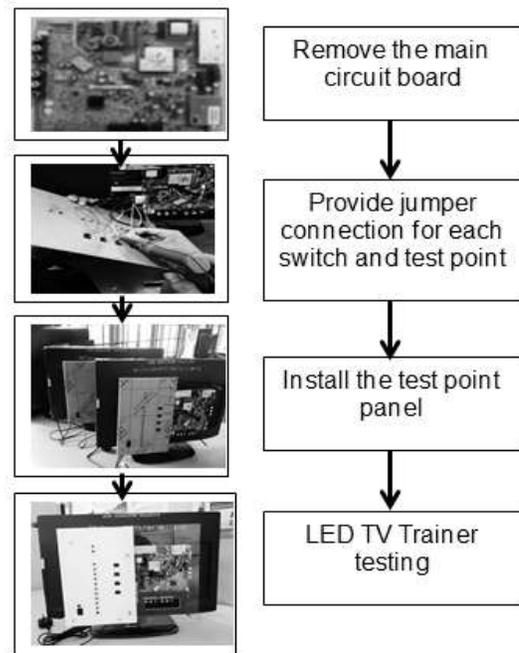
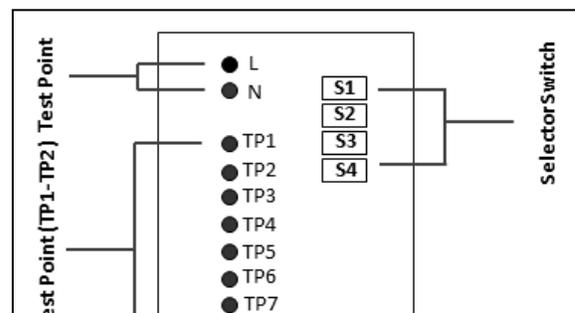


Figure 3: The process flow of LED TV trainer development

The main panel is comprised of LED trainer faulty switch and test point to help lecturers and students choose the type of failure. Student can measure the voltage value or each type of TV failure by using test point at the main panel. There are 4 selector switch has been provided to represent the type of failure and the 11 test points (TPA & TP1 - TP10). The actual position of the main panel and the main circuit is shown in Figure 4 and Figure 5.



problem such as display and audio. The details of each test points are shown in Table 1 below.

Table 1: Voltage Test Point

TEST POINT	COMPONENTS/PARTS
TPA	Power supply
TP1	Adjustable Precision shunt Regulator (TL4311)-PIN Ref
TP2	Adjustable Precision Shunt Regulator (TL4311)-PIN Cathode
TP3	Power Schottky Rectifier (MBR201000FCT)-PIN Cathode
TP4	Backlight LED Voltage
TP5	Input LCD (Orange)
TP6	Input LCD (Red)
TP7	Remote Control Input Voltage
TP8	12 Volt Input Voltage
TP9	5 Volt Input Voltage
TP10	Sound IC (TDA1517P)-PIN 7

Figure 4: Selection switch and test point



Figure 5: Panel position attach at the Haier LE24T1000F

3.2 Fault Test Point Voltage Reading

There are 11 test points provided at the main panel to help students understand common failures in LED TVs. The TPA test is used to measure the voltage on the power supply, while TP1 to TP10 are used for other components.

For each test point, the voltage readings recorded are different depending on the failure parts. The power supply unit failure (S1) will cause voltage readings at all test points to be 0 volts. For LED backlight failure (S2), the voltage values obtained at TP4 are 0 volts. Meanwhile, if a failure occurred on the LCD input (S3), the voltage readings obtained are higher when compared to the normal voltage reading. For faults involving the audio

Table 2: Test point voltage reading in normal and failure condition

TEST POINT	NORMAL CONDITION	POWER SUPPLY(S1)	LED BACKLIGHT(S2)	LCD INPUT(S3)	AUDIO (S4)
TP1	2.2 V	0 V	2.2 V	2.2 V	2.2 V
TP2	10 V	0 V	10 V	10 V	10 V
TP3	11 V	0 V	11 V	11 V	11 V
TP4	36 V	0 V	0 V	36 V	36 V
TP5	0.14 V	0 V	0.14 V	2 V	0.14 V

TP6	11 V	0 V	11 V	11 V	11 V
TP7	2.8 V	0 V	2.8 V	2.8 V	2.8 V
TP8	11 V	0 V	11 V	11 V	11 V
TP9	4.65 V	0 V	4.65 V	4.65 V	4.65 V
TP10	11 V	0 V	11 V	11 V	0 V

system (S4) voltage reading recorded at test point is 0 volts. The details voltage reading for each failure condition is shown in Table 2.

4. RESULTS AND DISCUSSIONS

LED TV trainer as a teaching aid has been practiced for short semester students who take the course in May 2014 Electronic Equipment Repair (DEE 3052). To obtain feedback on the use of LED TV trainer as teaching aids, questionnaires were conducted on lecturers. The survey responses have been made on lecturers who teach the course Electronic Equipment Repair and who have an academic background in the field of study electrical engineering and electronics.

All question items in this questionnaire was constructed personally by the researcher based on the suitability of the title. This instrument is divided into two parts, namely:-

a. Section A :

This section contains four items that refer to the background of the respondent, namely, gender, age, education status and teaching experience.

b. Section B :

This section contains 10 items frequently built on questions of development of study which LED TV trainer and effectiveness of its use as teaching aids. The respondent is required to indicate the level of consensus on the items with mark on each box of items submitted in accordance with the level of their respective agreements.

According to Mohd Majid (1994), stating that 'likert scale' can be used to distribute attitude. Five likert scales are as follows:

Table 3: Likert scale 5 points

LIKERT	CLASSIFICATION
1	Strongly Disagree
2	Disagree
3	Not Sure
4	Agree
5	Strongly Agree

Table 4 : Mean Score Table

Skor Min	Level
1.00 - 2.33	Low
2.34 - 3.67	Medium
3.68 - 5.00	High

Through the use of a five-grade Likert scale, the data were analyzed and expressed by number and mean. In this study, researchers using the mean of each item questions asked to the respondents to answer questions regarding study LED TV trainer use as teaching aids for Electronic Equipment Repair (DEE3052) course. The average mean is 3.63. This shows a high degree of agreement among the lecturers of the use of LED TV trainer.

Table 4: Satisfaction level of respondents to the use of LED TV trainer as teaching aids

No	Question items	Min	Level
1.	LED TV development trainer has safety features than previous methods	3.6	High
2.	The development of LED	3.7	High

	TV trainer can improve the skills of students repair electronic equipment with the latest technology		
3.	The development of LED TV trainer can save the cost of purchasing equipment internship	3.7	High
4.	The use of LED TV trainer attract students	3.9	High
5.	Students are more focused and eager to learn.	3.9	High
6.	Planning and practical implementation to run smoothly	3.3	Medium
7.	Practical time set for this topic is appropriate.	3.3	Medium
8.	Increased knowledge / understanding of students than ever before.	3.6	High
9.	LED TV trainer who used to associate the theory and the actual situation.	3.7	High
10.	On the whole, the practice can be implemented successfully.	3.6	High

Based on the findings of the analysis carried out, the researcher can conclude that the use of LED TV as a trainer teaching aids for electronic equipment repair course can help students increase their understanding of technical repair electronic equipment. Besides that, the usability of LED TV trainer in teaching and learning process is getting approved with a high level of agreement among the lecturers who teach and of electrical engineering and electronics.

A high level of approval is also obtained from lecturers who showed LED TV trainer link theory and the actual situation. Ratio applied by the researchers in this study is to help reduce vulnerabilities have been identified students cannot understand the basic concepts of electronic equipment repair. This means that LED TV trainer has been able to create a situation of active learning and effective. After conducting the study, researchers found that theoretical knowledge followed by practical training can help students to better understand the concept of

electronic equipment repairs and also to apply the knowledge and experience they have gained effectively in their learning process.

An aspect of safety features found on the LED TV trainer has a very high approval of the lecturer. LED TV development trainer as teaching aids for electronic equipment repair course was better than the CRT TV trainer that was used before. Very high approval was obtained from the lecturers regarding development of LED TV trainer that can increase student proficiency repair electronic equipment with the latest technology. In addition, the lecturer also agreed development trainer LED TV will save the cost of purchasing laboratory equipment. With the TV LED trainer as a teaching aid, it has become a tool that not only helps the process of teaching and learning, but it also has the characteristics of a good safety, exposure to the latest technology at minimal cost.

5. CONCLUSIONS

The development of LED TV trainer as teaching aids in Electronic Equipment Repair (DEE3052) course will assist lecturer explain the latest TV system to the student. Besides that this trainer also can help students understand the type of failure happened on the LED TV. In addition, the presence of the test points on the panel trainer can reduce faulty happened on the main board. Previously approaches, students must measure the voltage directly to the TV main circuit board. This method caused a lot of faulty to the TV model that is used as a result of procedural errors in measurement and control equipment. Thus, with this trainer mentioned problems no longer arise because students only need to measure the voltage at each point of the test that has been provided. Trainer LED development is also seen as cost-effective as a trainer that was used in the R & D process can last longer. The LED TV Trainer

also can help lecturer to control the student practical activities and saving cost for maintenance of broken TV main board.

ACKNOWLEDGEMENT

We thank the Electrical Engineering department for providing equipment, facilities and financial until this project completed. We also want to thank those who were involved in the experiments, directly or indirectly, to ensure the success of this project. We also thank to the Polytechnic Sultan Haji Ahmad Shah management for providing a good learning environment and encouraging a culture of research and innovation among staff and student.

On The Role Of Technology In Teaching and Learning Statistics (pp. 45-55). Vooburg, The Netherlands : International Statistical Institute.

Mamokhele Julia Maduna. (2002). *An Analysis Of The Use Of Teaching Aids and The Implications for Teaching and Learning Mathematics in QWAQWA Phase One Schools (South Africa), Thesis Master of Arts, Concordia University Montreal, Quebec, Canada.*

Mohd Majid Konting (1994), *Kaedah Penyelidikan Pendidikan*, Kuala Lumpur. Dewan Bahasa dan Pustaka.

REFERENCES

Mok Soon Sang (2000). *Pendidikan di Malaysia* . Subang Jaya, Selangor : Kumpulan Budiman Sdn. Bhd.

Gagne, Holt, Rinehart and Winston (1976), *The Conditions of Learning*. NY.

Nurhanim Saadah Abdullah, Ramlan Zainal Abidin dan Suhaimi Mohamad (2010). Kesan Penggunaan Kit Pengajaran Bersepadu Magnetik – PLC (Programmable Logic Controller) Terhadap Kefahaman Konsep Asas Kawalan Magnet Dan PLC: *World Congress on Teacher Education for TVET in Conjunction with World Teachers Day Celebration*, 5-6 10 2010, Universiti Tun Hussein Onn Malaysia

Ben-Zvi, Di, & Friedlander, A. (1997). Statistical Thinking in a Technological Environment. In J.B. Garfield & G.Burrill (Eds.), *Research*