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Effectiveness And Acceptability Of Audio Amplifier Trainer

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ABSTRACT

Audio amplifier servicing is one of the competencies needed to acquire electronic product assembly and servicing skills. The students taking this course found difficulties in learning the basic troubleshooting of an audio amplifier because of the absence of available learning materials for the hands-on experience in understanding essential audio amplifier servicing. It inspired the researcher to develop the audio amplifier trainer through research and development to improve the knowledge and skills of electronic product assembly and servicing students through simulation of the basic troubleshooting and servicing of a transistorized audio amplifier circuit. The study used the exploratory sequential approach method to determine the level of instructional device's level of acceptability and effectiveness; data were statistically analyzed using the weighted mean and the t-test; according to the study's findings, the experts assess portability, usability, and content assessment of the instructional device as Very Much Acceptable. The trainer effectively demonstrated the basic primary rubles of an audio amplifier, revealing a significant difference in the level of performance between the controlled and experimental groups, showing that the trainer is an effective instructional device.

1. INTRODUCTION

Instructional materials are human and nonhuman materials and utilities that can support, inspire, strengthen, and stimulate teaching and learning activities. They are any resources that are employed during the teaching process. They are a vast group of resources that could help teachers be more effective. (2015, IGI Global). Teaching and learning activities use various methods defined by the tools used to assist the learner in grasping the concept. (Mulwa et al., 2020). The Model and the Mock-up represent a somewhat different class of concrete teaching materials than the object and the specimen. These teaching materials have a definite place in the teacher's approach to a unit of instruction (Blanc, n.d).Educators who can provide direct, real-world experience to students, particularly in Vocational High School, are ideal for the learning process. If this is impossible, it can be provided using a computer program and the experience of imitation, dramatizations, demonstrations, field experience, modeling, or simulation. (Ramadhan et al., 2017). The study used a mock-up to show the fundamental issues of using g an audio amplifier as a teaching tool. Instructional aides are devices that assist a teacher in the teaching-learning process. Instead of transporting, supplementing, or reinforcing what is being taught, instructional aids augment, supplement, or reinforce what is

being taught. (Part One: Instructional Aids and Training Technologies, 2020). Ex presidential learning is founded on the premise that the best way to improve new things is via experiences. (2020, Western Governors University) The constructivist approach is a widely recognized learning philosophy educators use to engage students to enhance learning. The philosophy mentioned above is based on the notion that people actively construct or make their ideas, and the learning experiences shape their reality. (Western Governors University, 2020b). Simulations are a type of experiential learning. It is a strategy that adheres to student-centered and constructivist learning and teaching principles. (Simulations | UNSW Teaching Staff Gateway, 2018). The learner gains knowledge by doing things on their own. Actual hands-on experiences are used to learn. (Dale's Cone of Experience, n.d.). With this instructional device, students had hands-on experience in learning the basic troubleshooting of an audio amplifier.

Under the technical vocational livelihood track, Service Consumer Electronic Products and Systems is one of the core competencies under Electronic Products Assembly and Servicing. It encompasses the technical skills and practices required to install consumer electronic products, services, and systems. A combination of formal education and on-the-job experience is the cornerstone of vocational education. (Rahman and colleagues, 2014). Installing, maintaining, and repairing audio-video products/systems, as well as household electronic appliances and home security systems, are all necessary to service consumer electronic devices and systems. TESDA (TESDA, 2013). In acquiring this qualification, the learner must accomplish different competencies through various activities, such as practical demonstrations for developing knowledge and skills (McClure, n.d.). Access to and use of oratory materials in a subject strongly correlate with student performance in a particular topic. (Olufunke, 2012). The lack of available instructional material led the researcher to come up with the study to address the need to teach the basic troubleshooting of an audio amplifier.

In servicing audio amplifiers, transistor failure is the most common cause of trouble in direct-coupled amplifiers. Usually, two or more transistors fail. Ohmmeter in-circuit tests of all the transistors in the chain of transistors usually pinpoint defective ones. The DC operation of each transistor in a direct-coupled amplifier depends on one another. It means that one lousy affects the operation of the others in the amplifier (Pagarigan, n.d).

This research aimed to develop an instructional device called an audio amplifier trainer. The primary objective of this instructional device is to simulate the fundamental troubles of a transistorized audio amplifier. Another object of this instructional device is to demonstrate to the students the basic troubleshooting technique of an audio amplifier instead of the usual amplifier system. This will address the problem of the availability of an audio amplifier system to be used in an actual classroom setup.

The instructional device provides basic troubleshooting and servicing of the typical troubles of a transistorized audio amplifier, such as no audio, distant sorted, and weak sound.

It likewise provoffersortunities to test electronic components (resistor, capacitor, and transistor), volts age reading,d checking open and short circuits. A further objective of this instructional device is to provide economic advantages by using a simple amplifier circuit with simulation switches connected across the different portions of the course for the simulation of the primary troubles rather than using an audio amplifier unit which is expensive and impractical in learning the basic troubleshooting of an audio amplifier.

In this research, the respondents were Grade 12 Senior High School (SHS) students specializing in Electronics. It aimed to answer the following questions: 1) What is the level of acceptability of the audio amplifier trainer in terms of (a) portability, (b) usability, and (c) content; and 2) What is the level of effectiveness of the audio amplifier trainer in teaching audio servicing?

OBJECTIVES OF THE STUDY

This research aims to develop a utility model called an audio amplifier trainer. The primary objective of this utility model is to simulate the fundamental troubles of a transistorized audio amplifier. Another object of this utility model is to demonstrate to the students the basic troubleshooting technique of an audio amplifier instead of the usual amplifier system. It will address the problem of the availability of an audio amplifier system to be used in an actual classroom setup.

The utility model provides basic troubleshooting and servicing of the typical troubles of a transistorized audio amplifier, such as no audio, distant sorted, and weak sound. It likewise provoffersortunities to test electronic components (resistor, capacitor, and transistor), volts age reading, and checking open and short circuits. A further objective of this utility model is to provide economic advantages by using a simple amplifier circuit with simulation switches connected across the different portions of the circuit for the simulation of the primary troubles rather than using an audio amplifier unit which is expensive and impractical in learning the basic troubleshooting of an audio amplifier. The data gathered strictly adhered to research norms and ethics, the Data Privacy Act was followed, and their information was used solely for research purposes.

2. METHODS

The research method used in this study is the exploratory sequential approach. The experimental research method was employed in this study to analyze and interpret the data gathered from the expert's acceptability of the instructional device using an adopted and modified questionnaire to evaluate the device in terms of portability, usability, and content. Acceptability relates to whether a pa the target respondents will take a particular intervention or its elements and how well they will suit the demands of the target demographic and organizational setting. (Also called adaptability, Green & Kreuter, 1999; Steckler & Linnan,

2002). The sequential method focused on evaluating the effectiveness of the audio amplifier trainer through posttest-only design. In a research design in which at least two groups are utilized, one does not undergo treatment or intervention, and results on the outcome measure are obtained after the treatment or intervention is completed, known test-only control group design. The control group is the one that will not get the treatment or intervention that they want. (Frey B, 2018). The researcher administered a post-test to measure the student's performance after being applied to the treatment to measure the effectiveness of the instructional device.

For the acceptability of the device, the respondents considered in this study were the five purposively selected experts in the field of electronics technology, one (1) expert is a professor from Sorsogon State University, another expert is a professor from TESDA San Francisco Institute of Science and Technology. And the remaining three (3) experts are senior high school teachers from the Department of Education. They were purposively selected con, considering their expertise in this field of study. The data were gathered through their responses to the questionnaire; it was tallied and treated statistically using a weighted mean.

A total of 42 Grade 11 Senior High School Electronic Products Assembly and Servicing (EPAS) students from Marcial O. Ranola Memorial School (MORMS), Guinobatan Albay clustered equally into experimental and control groups through a fishbowl technique were the subjects of this study. The data was statistically analyzed using the t-test to see if there was a significant difference between the means of the two groups. (Hayes, n.d.) considering its level of effectiveness as an instructional device.

3. RESULTS AND DISCUSSION

RESULTS

3.1 Level of acceptability

The Tables present the technical experts' assessment results based on the trainer's degree of acceptability in terms of ability, usability, and content. (n=5).

Table 1. Portability of the device

Parameters	$\sum_F$	$\cdot$ X	Descriptive Interpretation
1) Portability			
a) The device used locally available materials typically found in the market.	**25**	**5**	VMA
b) The device is light in weight	**23**	**4.6**	VMA
c) The device may be easily carried or moved	**24**	**4.8**	VMA
Average	**4.8**		VMA

As seen in Table 1, in terms of the portability letter (a), it got a weighted mean of 5 and was evaluated as Very Much Acceptable, which means that the device made use of locally

available materials typically found in the market. Under Letter (b), got a weighted mean of 4.6, resulting in Much Acceptable; this means that the device is light in weight. For letter (c), which resulted in a weighted mean of 4.8, interpreted as Very Much Acceptable, showed that the device may be easily carried or moved. Computing the three (3) sub-parameters, 4.8 is the total average under this parameter which can be interpreted as Very Much Acceptable. A portable device is any device that can easily be carried (Techopedia, 2013)—implying that the device is handy or portable.

Usability of the device

Table 2. The experts assessed the device's acceptance along with Usability

Parameters	Σ_F	.X	Descriptive Interpretation
2) Usability			
Ease of Use			
a) It allows the user to work effectively by making more than one choice, leading to the correct outcome.	**23**	**4.6**	VMA
b) It offers redundant navigation	**22**	**4.4**	MA
c) The user needs less time and effort to make navigation and action choices	**23**	**4.6**	VMA
d) The device is pleasant and satisfying to use.	**23**	**4.6**	VMA
Easy to manipulate	**22**	**4.4**	MA
a.) The device helps the user recover from errors that occur			
b) It adopts a user-centered design	**25**	**5**	VMA
Safety			
a.) The device follows basic safety precautions to help reduce any hazards	**24**	**4.8**	VMA
Average	**4.6**		VMA

The usability under ease of use got a weighted mean of 4.6, interpreted as Very Much Acceptable under letter (a); this showed that the device allowed the user to work effectively. Under letter (b), it resulted in a weighted mean of 4.4 and was interpreted as Much Acceptable, meaning it displayed redundant navigation in this device. For letter (c) got a weighted mean of 4.6, interpreted as a Very Much Acceptable mean, meaning the user needs less time navigating the device. For letter (d), The audio amplifier trainer was satisfying to use and got a weighted mean of 4.6, descdescribedVery Much Acceptable. Under the easy to manipulate, for the letter (a), two (2) got a weighted mean of 4.4 and is interpreted as Much Acceptable, meaning that the device is a great help in recovering from errors. For letter (b), the device displays a user-centered design with a weighted mean of 5 and is interpreted as Very Much Acceptable. For the safety letter (a), The trainer is safe to use got a weighted mean of 4.8 and described as Very Much Acceptable. It is a total average of 4.6, which is acceptable for usability. Device usability refers to the features of the User Interface that

facilitate use and make it easier for users to perceive information. (Best Medical Device Usability - I3CGLOBAL, 2021).

Content of the device

Table 3. Acceptability of the device as assessed by the experts along with Content

Parameters	$\sum_F$	.X	Descriptive Interpretation
3) Content			
a) The design is by a trainer simulator instructional device	**23**	**4.6**	VMA
b) The trainer possesses a display that presents information necessary to correct the operation of controls	**23**	**4.6**	VMA
c) The device simulates the fundamental troubles of an audio amplifier	**23**	**4.6**	VMA
d) The device covers the learning competencies and needs of the learner regarding the actual situation of an audio amplifier	**23**	**4.6**	VMA
Average	**4.6**		VMA

For the content, letter (a), the constructed device is a trainer simulator instructional material, got a weighted mean of 4.6 and described as Very Much Acceptable. For letter (b), the trainer presented enough information in operating the device, called a rating of 4.6, and is described as Very Much Acceptable. For letter (c), the primary troubles of an audio amplifier are being simulated by this device, which got a weighted mean of 4.6 and was interpreted as Very Much Acceptable. And for the last letter (d), the required learning competencies needed by the learner about the essential trouble of audio amplifier is being covered by this device, got a weighted mean of 4.6 as Very Much Acceptable, which means that the device covered the competencies about essential troubles of an audio amplifier. Static content intended to introduce concepts to the learner is called instructional content. (Instructional Content, 2018).

Table 4. Summary of the Level of acceptability of the audio amplifier trainer

Table 4. Summary of the Level of Acceptability

Parameters	.X	Descriptive Interpretation
1) Portability	**4.8**	VMA
2) Usability	**4.6**	VMA
3) Content	**4.6**	VMA
Average	**4.6**	VMA

As shown in the table, the evaluation results are the following: a) The weighted mean for portability was 4.8, which is very acceptable, indicating that the device is light in weight and made from locally available materials. b) usability got 4.6 which is very much acceptable and means that the device is easy to manipulate and provides safety for the users. c) It received a weighted mean of 4.6 for the content, which is very acceptable, indicating that the device demonstrates the fundamental problems of an audio amplifier and covers the necessary competencies about the fundamental problems of an audio amplifier. It was evaluated as very much acceptable.

3.2. Level of effectiveness

The developed audio amplifier trainer was used in the teaching-learning process by the researcher to determine its effectiveness as an instructional device. The researcher used the post-test-only design in this experiment. The control group used a simple amplifier circuit and lecture method, while the experimental group used the audio amplifier trainer to learn an audio amplifier's basic troubleshooting. Afterward, the post-test and the result of both group tools were statistically treated with a t-test through a computer-generated computation called Simplified Statistics for Beginners (SSB).

Table 5 shows the development of the calculation. As reflected in the table, the Null Hypothesis was rejected; hence There is a significant difference in performance between the two groups. The experimental group has a mean score of 90.48, which is higher than the control group's mean score of 75.33. This result suggests that students' performance using the audio amplifier trainer is superior to that of students using the conventional instructional device. As a result, the trainer is a highly effective instructional tool for troubleshooting audio amplifiers.

Table 5. The controlled and experimental groups' SSB results on the t-test

Respondent	Performance Test Mean Difference	Degree of Freedom	Level of Significance	T- value Computed Value	Critical Value	Decision
Control Group	75.33	40	0.05	-10.6	2.021	Reject Ho
Experimental Group	90.48					

4. CONCLUSION

The audio amplifier trainer was made possible using available materials in the area. The expert rated the instructional device as Very Much Acceptable in terms of portability, usability, and content. The trainer effectively demonstrated the primary troubles of an audio amplifier, revealing a significant difference in performance between the controlled and experimental groups. It shows that the trainer is an effective instructional device. The researcher recommends that further developmental studies be conducted on the design and packaging

of the device for mass production purposes. Institutions offering electronics technology courses can utilize this instructional device to enhance teaching-learning.

RECOMMENDATION

Based on the summary of findings and the conclusion reached, the following are recommended:

1. The Trainer can be an additional instructional device in the laboratory room.
2. The Trainer can be utilized by students taking up EPAS NC II from TESDA.
3. It can also be used by the students who are taking up Electronics Technology courses.
4. The researcher also recommends developing some additional features of the device.
5. The teacher's guide is a great help for the teachers/trainer or instructor as a reference in utilizing the device.

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