Worksheets for the Improvement of Technical Drafting Skills of Electrical Installation and Maintenance Students

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Abstract

This study's goal was to assess the effectiveness of the developed Electrical Installation and Maintenance 9 worksheets, which were given to grade 9 students at Punta Integrated School in Calamba City, Laguna.

The study specifically aimed to answer the following questions: First, what is the component level of the worksheets? Second, what is the worksheets' feature level? Third, what is the level of Academic Performance of Grade 9 Students in terms of third quarter grade? Fourth, do the component of worksheet has significant effect on Academic performance of Grade 9 students? Lastly, do the feature o worksheet has significant effect on Academic performance of Grade 9 students?

The descriptive method of research was used in this study. The respondents were one hundred thirty (130) students at Punta Integrated School who used and evaluated the worksheets.

Based on the data gathered concerning the objectives of this study the following are the significant findings: (1) The component level of worksheets were all highly satisfactory; (2) Also the features level of the worksheet were all highly satisfactory; (3) In terms of third quarter grade, the level of Academic Performance of Grade 9 Electrical Installation and Maintenance students in terms of 3rd Quarter Grade was very competent; (4) The analyzed data revealed that the components of the worksheet had a partially significant effect on the students' performance; In addition to this (5) the features of the worksheet had a partially significant effect on students' performance.

Based on the results above, the researcher came to the conclusion that the components of the worksheet in terms of learning objectives, content, and assessment had no significant effect on students' performance. While the components of the worksheet in terms of activities has a significant effect on students' performance. On the other hand, the features of the worksheet in terms of usability, consistency, aesthetic value and had no significant effect on students' performance and the features of the worksheet with regards to adaptability has a significant effect on the performance of the students. Therefore, the null hypothesis is partially accepted.

Therefore it is recommended that TLE teachers may develop additional instructional learning materials based on the needs and interests of the students assimilated into other courses offered in Technology and Livelihood Education to enhance their skills in every situation they were in.

Keywords: Worksheets; Objective; Content; Activities; Assessment; Usability; Consistency; Aesthetic Value; Adaptability; Academic Performance; Electrical Installation and Maintenance.

Introduction

One of the larger schools in the Division of Calamba City that provides printed modular distance learning is Punta Integrated School. The major reasons why students preferred modular learning over online learning, according to the local LESFs, were the lack of gadgets and an internet connection. As members of the Technology and Livelihood Education Association, it is our responsibility to present the lesson in the most effective manner while taking into account the context in which our students live. Many issues were anticipated beforehand, and the teachers' considered solutions to each issue that may develop.

To meet the objectives of the day's lesson, every teacher requires instructional materials. Teachers are constantly on the lookout for solutions to problems that arise in every situation. This Pandemic challenge every teacher to give their students the knowledge and skill that they should acquire in the subject. In Technology and Livelihood Education we recognized that it is more on skills. Like in Electrical Installation and Maintenance, students must know how to install electrical wiring. They might not be able to perform the actual installation, but we want them to acquire other skills, such the technical drafting skill. Acquiring such skills will help the students to understand and relate to every lesson in the subject which led them to master the skills desired from the module presented to them. It may be considered pen and pencil test, but technical drafting skills will be developed. Worksheets will be used to create every activity engaging and relevant to the situation of students. This will engage students in using their critical thinking abilities to apply basic knowledge, logical understanding, and skills gained in the module.

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Background of the Study

In order to ensure that teaching and learning activities are effective, instructional materials are crucial. The importance of instructional materials in any teaching or learning process cannot be overstated. This is because using these materials makes teaching and learning more engaging, vivid, and tangible. S.K.D. Olawale (2013). To extend and pique students' interest in the subject, teachers must look for necessary and pertinent teaching resources to promote learning. Kochhar (2012).

One of the instructional materials that can help the teachers is the worksheet. A worksheet is a sheet that includes a title, learning competencies to be reached, objectives, rubrics, work steps, and brief information. In short students' worksheets, are a learning tool that provides questions and information in the form of sheets that students must complete. Worksheets are helpful, practical, and cost-effective instructional materials. For millennia, worksheets have been utilized in educational settings. Selahattin Kaymakcı (2012). Presidential Decree No. 6 – A, known as the Educational Development Act of 1972, Section 5(f) titled " Educational Development Projects" includes design, utilization, and improvement of instructional technology and development/ production and other instructional materials to attain one of the objectives which are to acquire the essential educational foundation for the development of a productive and versatile citizen. With this, the development of worksheet might help the students to improve their Technical Drafting skills, acquiring these skills will help them to become globally competitive.

According to the Technology and Livelihood Education (TLE) Curriculum Guide (2012), the TLE curriculum includes the development of technological proficiency based on knowledge and information, entrepreneurial concepts, process and delivery, work ethics, and lifelong skills. This means that effective TLE is based on adequate mastery of knowledge and information, skills, processes, and the acquisition of appropriate work values and life skills. The TLE is one that provides information on the cognitive, behavioral, psychomotor, and affective aspects of human development.

The researcher was inspired to create an Electrical Installation and Maintenance worksheet that focuses on improving students' drafting skills by creating diagrams and electrical wiring plans. She believes that students will understand more the lesson through the activities in the developed worksheets. Because current situation did not provide students with the ability to learn electrical installation skills, and the researcher believes that other skills should be developed. The researcher thought of using developed worksheets related to the technical drawing for Grade 9 to study because she believed that with this the

learners can improve their technical drafting skills. They might not be able to acquire the skills needed in Electrical Installation and Maintenance because of the situation they were in, through the worksheets other skills will be developed.

Theoretical Framework

According to this study, students build their own knowledge by employing a coding system to organize and categorize information. Hurst (2019) has simplified Bruner's constructivist method, which serves as its foundation. He believed that learning a coding system alone, as opposed to from an instructor, was the most effective strategy. The premise of exploration learning holds that students should develop their own knowledge. According to Hurst (2019), a theory of instruction should cover four key areas: (1) predisposition toward learning; (2) the best ways to organize a body of knowledge so that the learner can easily understand it; (3) the best ways to present material; and (4) the type and pace of rewards and punishments. Knowledge should be simplified, new ideas should be generated, and information manipulation should increase as a result of good knowledge structure techniques.

Constructivism is the name Piaget used to characterize his theory, which reflects his perspective on how children learn, according to Stupiansky and Cohen (2017). The learner is an active agent in his own learning, which is one of the most essential consequences of the Piagetian theory. Or to put it another way, the learner must be able to actively contribute to the development of the knowledge being taught. By using a worksheet, students can learn at their own pace. They could be utilized for self-direction or as a supplement to guiding abilities. An important ability in the worksheet is learning how to compose learning outcomes. As outlined in Piaget's intellectual development, there is a dynamic rearrangement of mental procedures due to organic development and natural contacts. Students can experience the learning material at their own speed because of the worksheet. They could be used to help with self-direction or as a supplement to guideline abilities. In the design of worksheets, knowing how to assemble learning materials is a vital skill.
In contrast to traditional classrooms, Gutek continued to believe that schools and classrooms should reflect real-life situations, allowing children to engage in learning activities in a variety of social settings interchangeably and adaptably.(Gutek, 2014).
While Flinders & Thornton (2013) believed that giving too much academic knowledge too quickly, out of context with children's social lives, was unethical teaching conduct. Giving students time to process and absorb the knowledge may be effective enough than to push them to their limit not enjoying the process.

Effective instructional materials stimulate learners by touching upon different skills and learning styles. Kurt (2015) made a significant contribution to the field of instructional design by advocating for a system view of instruction rather than viewing instruction as a collection of isolated parts. The model addresses the problem as a collection of isolated parts. The Model approaches instruction as a whole system, focusing on the interdependence of context, content, learning, and instruction. Instructors, learners, materials, instruction, activities, delivery system, and learning performance environment interact with each other and work together to achieve the desired student learning outcome. The teacher of Technology and Livelihood Education examined the presented theories in relation to the theories of the components of the worksheet. Dionisio (2019), stated that self-made instructional materials should be used in addition to existing instructional materials. All items should be simple and clearly defined; language should be simple and easily understood by its intended user, and everything that a teacher would normally discuss in class should be presented in detail.

CONCEPTUAL FRAMEWORK

This study used the IV-DV model as the conceptual framework while undergoing the study. The illustration below shows how the researcher uses the framework the fulfillment the objectives of the study. The Third Quarter Grades of Grade 9 students were the basis to determine the effectiveness of the Electrical Installation and Maintenance 9 worksheets.

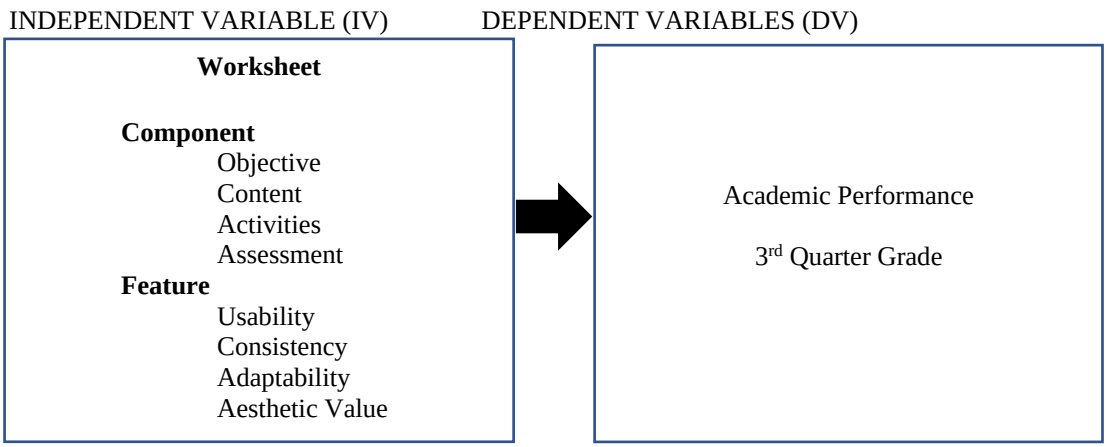

Figure 1. Paradigm of the study

In this framework, it shows the independent variable and dependent variable. The variables are presented in paradigm in terms of Component with regards to objective, content, activities, assessment and Feature with regards to usability, consistency, adaptability, aesthetic value of the worksheets in the Independent Variable and the academic performance through the 3rd Quarter Grade in Dependent Variable.

Statement of the Problem

This study aimed to check the effectiveness of Electrical Installation and Maintenance 9 worksheets provided to Grade 9 students at Punta Integrated School in Calamba City, Laguna. This study will analyze the level of acceptability and validity of the worksheets through component and feature level.

Specifically, it sought answers to the following questions:

1. What is the component level of the worksheets with regards to:
   - 1.1 objective;
   - 1.2 content;
   - 1.3 activities; and
   - 1.4 assessment?
2. What is the feature level of the worksheets with regards to:
   - 2.1 usability;
   - 2.2 consistency;
   - 2.3 aesthetic value; and
   - 2.4 adaptability?
3. What is the level of Academic Performance of Grade 9 Electrical Installation and Maintenance students in terms of 3rd Quarter Grade?
4. Do the Component of the worksheet has a significant effect on the Academic Performance of Grade 9 Electrical Installation and Maintenance students?
5. Do the Feature of the worksheet has a significant effect on the Academic Performance of Grade 9 Electrical Installation and Maintenance students?

Hypothesis

There is no significant difference between the components and features of the developed worksheet in Electrical Installation and Maintenance 9 and the Academic Performance of Grade 9 students in Electrical Installation and Maintenance.

Significance of the Study

This study which pertains to the effectiveness of the worksheet in Electrical Installation and Maintenance 9 is deemed significant to the following stakeholders: Learners, Teachers, Parents, Future Researchers, and Researcher Herself.

Scope and Limitations of the Study

The study's aim was to develop effective worksheets for Punta Integrated School's Electrical and Installation Maintenance 9 students that will develop their Technical Drafting skills in time of modular approach. The third academic performance of Grade 9 Electrical and Installation Maintenance Students at Punta Integrated School is another focus of this study. The worksheets were validated and assessed by 16 instructors in Technology and Livelihood Education at SDO Calamba City, one Education Program Supervisor, two Head Teachers, and one Master Teacher in TLE/TVL. While using the grades of 150 students who utilized and assessed the worksheets.

The purpose of the study was to provide an intervention that could help learners improve their technical drafting skills and critical thinking abilities to apply basic knowledge, logical understanding, and

skills especially during this time of pandemic wherein they are learning at home alone or with the guidance of their parents or guardians.

The activities on the developed worksheets were focused on creating an electrical wiring diagram and electrical wiring plan to enhance the drafting skills of students. It gives them knowledge about the wiring diagram even if they were not able to perform it practically, however through this if they will be given a chance, they can reconnect their prior knowledge to the actual knowledge that they need to gain.

Research Design

The descriptive method is used in this study. The descriptive method is used to obtain information about the status of a phenomenon in order to describe "what exists" in terms of variables or conditions in a situation. The descriptive method was used to investigate the acceptability of the worksheets thoroughly. The goal of descriptive research is to describe a phenomenon and its characteristics. According to Nassaji (2015).

Respondents of the Study

In the research conducted, the needed data that were analyzed and interpreted came from one hundred fifty in Grade 9 that has Electrical Installation and Maintenance rea in the subject of Technology and Livelihood Education at Punta Integrated School.

Since reaching all the students and collecting data from them might require considerable time and effort which was not much possible for the researcher at the time of the study, the purposive sampling method was used. Sampling is the process by which a researcher selects a set of respondents as a sample from a wider population before producing a broad statement about the topic. Purposive sampling is a type of non-probability sampling that Crossman (2018) defines as judgemental, selective, or subjective sampling. In order to effectively choose eligible volunteers, researchers must have previous awareness of the study's goal. Furthermore, when the researcher needs to reach a specific sample rapidly and proportionality is a problem, this sort of sampling is beneficial.

Research Instrument

Questionnaires were used to assess the worksheets' components and features. Each question consisted of a series of questions that evaluated the characteristics of the worksheet's components and features in terms of objectives, content, activities, assessment and usability, consistency, aesthetic value, and adaptability. Each aspect that was evaluated consist of five questions.

The table of equivalents is the basis of the interpretation of the data will be:

Point	Range	Verbal Interpretation
5	*4.21-5.00*	*Highly Satisfactory*
4	*3.41-4.20*	*Very Satisfactory*
3	*2.61-3.40*	*Satisfactory*
2	*1.81-2.60*	*Moderate Satisfactory*
1	*1.00-1.80*	*Needs Improvement*

An comprehensive examination of many books, articles, and online sites was used to build the questionnaire stated above. The academics and panel members were given an early draft of the research instrument to review and provide feedback on. Validation was carried out to compare the i'ems' representation to those of others working on the same topic. The completed questionnaire was printed and distributed to the appropriate respondents.

Research Procedure

In order to conduct the study, the researcher followed a certain procedures.

Fig. 2 Flow Chart of Research Procedure

Results and Discussion

Table 1. Level of the Worksheet in terms of Component with regards to Objectives.

The objectives are…	**Mean**	**SD**	**Verbal Interpretation**
…clearly stated.	4.85	0.35	Highly Satisfactory
…stated based on Grade 9 Learning Competencies.	4.83	0.38	Highly Satisfactory
…constructed with simple words to make it clear and comprehensive.	4.84	0.37	Highly Satisfactory
…measurable in terms of results of activity and assessment.			
…within the schemata of the grade 9 students' ability and knowledge.	4.80	0.40	Highly Satisfactory
	4.78	0.43	Highly Satisfactory
Grand Mean	4.82	0.39	Highly Satisfactory

Table 1 reveals the level of the worksheet in terms of components with regard to the objectives. It shows that the objectives are clearly stated (M=4.85, SD=0.35). It also shows that the objectives are stated based on Grade 9 Learning Competencies (M=4.83, SD=0.38). The table indicates that the objectives are constructed with simple words to make it clear and comprehensive (M=4.84, SD=0.37). It also indicates that the objectives are measurable in terms of results of activity and assessment (M=4.80, SD=0.40). It also shows that the objectives are within the schemata of the grade 9 students' ability and knowledge (M=4.78, SD=0.43).

It can be gleaned from Table 1, that level of the worksheet in terms of components about the objectives is Highly Satisfactory with (M=4.82, SD=0.39). It demonstrates that the objectives of worksheets have been carefully crafted and developed so that students can grasp exactly what is expected of them simply by reading the objectives themselves.

Similarly, to the finding of Kampitan (2019) in his studies "Development and Validation of Instructional Materials for Struggling Primary Learners" with Weighted Means of 4.67 and a Standard Deviation of 0.68. It implies that the objectives of the Instructional Materials were very high. The data implies that the teacher inspected the educational materials with regards to objectives, and they figured out that these will assist the students with understanding the materials since it contains goals that are achievable. Assuming the targets have been accomplished the teacher can have confidence that the instructional materials were compelling.

Table 2. Level of the Worksheet in terms of Components with regards to Contents

The contents are …	Mean	SD	Verbal Interpretation
…appropriate to the student's comprehension level.	4.70	0.46	Highly Satisfactory
…parallel with the objectives and activities.	4.82	0.39	Highly Satisfactory
…align to the content in the current module in Electrical Installation and Maintenance.	4.85	0.36	Highly Satisfactory
…current and updated to keep the students abreast with concepts, understanding grammar, knowledge, and skills.	4.68	0.49	Highly Satisfactory
…sufficient to allow the students to enhance their knowledge in Electrical Installation and Maintenance.	4.82	0.39	Highly Satisfactory
Grand Mean	4.77	0.42	Highly Satisfactory

Table 2 reveals the level of the worksheet in terms of the component with regard to the contents. It shows that the contents are appropriate to the student's comprehension level (M=4.70, SD=0.46). It also shows that the contents are parallel with the objectives and activities (M=4.82, SD=0.39). The table indicates that the contents are aligned to the content in the current module in Electrical Installation and Maintenance (M=4.85, SD=0.36). It also indicates that the contents are current and updated to keep the students abreast with concepts, understanding grammar, knowledge, and skills (M=4.68, SD=0.49). It also shows that the contents are sufficient to allow the students to enhance their knowledge in Electrical Installation and Maintenance (M=4.82, SD=0.39).

It can be gleaned from Table 2, that level of the worksheet in terms of a component is highly satisfactory as verbal interpretation with (M=4.77, SD=0.42).

The findings were supported by Acero. Et al. (2012) as cited by Odejar (2015) enumerated some guiding principles in content selection. They are as follows: a) it must be aligned with the goals of education and the institutions' mission and vision, b) it must include varied relevant expenses, and c) it should promote higher expectations for students' performance and a more demanding curriculum. Therefore, the content of the worksheets was evidently needed and suitable as learning resources for Electrical Installation Maintenance students to raise their level of performance based on the data presented above.

Table 3. Level of the Worksheet in terms of Components with regards to Activities

The activities …	Mean	SD	Verbal Interpretation
…are in order to maintain the students' interest in each phase of the work.	4.72	0.45	Highly Satisfactory
…focus on the main goal which is the development of learners' Technical Drafting Skills.	4.75	0.44	Highly Satisfactory
…stimulate students' skills, and abilities to study independently.	4.78	0.41	Highly Satisfactory
…are parallel to the objectives and the content of the lesson.	4.85	0.35	Highly Satisfactory
…are relevant to the expected outcome of objectives.	4.68	0.47	Highly Satisfactory
Grand Mean	4.76	0.43	Highly Satisfactory

Table 3 reveals the level of the worksheet in terms of the component with regard to the contents. It shows that the activities are in order to maintain the students' interest in each phase of the work (M=4.72, SD=0.45). It also shows that the activities focus on the main goal which is the development of Technica drafting skills (M=4.75, SD=0.44). The table indicates that the activities stimulate students' skills, and abilities to study independently (M=4.78, SD=0.41). It also indicates that the activities are parallel to the objectives and the content of the lesson (M=4.85, SD=0.35). It also shows that the activities are relevant to the expected outcome of objectives (M=4.68, SD=0.47).

It shows from Table 3, that level of the worksheet in terms of a component with regards to the Activities is highly satisfactory as verbal interpretation with (M=4.85, SD=0.36). It is similar to the finding of Pisuena (2017 p.61) which the activities in the developed module were as rated highly acceptable by the Privates and Publics Schools Mathematics teachers with a grand mean of 4.87 and 4.43 respectively.

The findings were supported by Nilawati, et al. (2017) said that the worksheet is a learning resource that can be developed by teachers as facilitators in learning activities. Worksheets make learning more meaningful. Hence the worksheets based on the findings have activities that stimulate students' skills and make the learning process enjoyable and engaging.

Table 4. Level of the Worksheet in terms of Component with regards to Assessment

The assessment …	Mean	SD	Verbal Interpretation
…are evident in every topic.	4.78	0.41	Highly Satisfactory
…are used to support the multiple intelligences among the students.	4.39	0.51	Highly Satisfactory
…values formation is evident.	4.40	0.49	Highly Satisfactory
…provides the opportunity for self-assessment advancement.	4.74	0.52	Highly Satisfactory
…follows appropriate learning where that is congruent to the objectives.	4.83	0.38	Highly Satisfactory
Grand Mean	4.63	0.50	Highly Satisfactory

Table 4 reveals the level of the worksheet in terms of the component with regard to the contents. It shows that the contents are appropriate to the student's comprehension level (M=4.78, SD=0.41). It also shows that the contents are parallel with the objectives and activities (M=4.39, SD=0.51). The table indicates that the contents are aligned to the content in the current module in Electrical Installation and Maintenance (M=4.40, SD=0.49). It also indicates that the contents are current and updated to keep the students abreast with concepts, understanding grammar, knowledge, and skills (M=4.74, SD=0.52). It also shows that the contents are sufficient to allow the students to enhance their knowledge in Electrical Installation and Maintenance (M=4.83, SD=0.38).It can be gleaned from Table 4 that level of the worksheet in terms of a component with regards to the Assessment is highly satisfactory as verbal interpretation with (M=4.63, SD=0.50).

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The said findings were consistent with the statement of Lee (2015) stated that all in-test questions, as well as self-assessment and feedback quizzes, should be included as part of the worksheet. Exercises and activities are carried out during the application of concepts to enable students to master the concepts and improve their performance. Following the activities, an evaluation/assessment should be carried out to determine whether or not learning occurred. The assessment should be conducted always there a lesson. Thus, through assessment one can find out if the learner understood the given lesson.

Table 5. Level of the Worksheet in terms of Features with regards to Usability

The worksheet in Electrical Installation and Maintenance …	Mean	SD	Verbal Interpretation
…gives additional instructional material.	4.72	0.45	Highly Satisfactory
…provides discussions and activities designed to improve students' knowledge, skills, and abilities.	4.65	0.48	Highly Satisfactory
…serves as supplementary instructional materials.	4.75	0.44	Highly Satisfactory
…offers exercises for reinforcements and mastery of concepts and skills.	4.85	0.36	Highly Satisfactory
…provides a self-assessment to improve students' skills and abilities.	4.42	0.58	Highly Satisfactory
Grand Mean	4.68	0.49	Highly Satisfactory

As reflected in table 5 the Grand Mean of the worksheets as rated by the respondents with regards to the usability (M=4.68, SD=0.49) respectively are interpreted as highly satisfactory.

These findings are similar to Dionisio (2019) who also obtained a highly acceptable rating in the aspect of usability with a grand mean of 4.68 and 4.37 which also revealed that the learning materials are highly acceptable in terms of usability. Bermum (2012) suggests that the best-known definition of usability is one from ISO, the International Organization for Standardization. (92411-11). It refers to the extent to which a product can be used for specific users to achieve specified goals with effectiveness and satisfaction in a specified content of use. Usability means students may interact productively and voluntarily instead of simply acting and reacting.

It shows that the worksheet in Electrical Installation and Maintenance 9 gives additional instructional material (M=4.72, SD=0.45). It also shows that the worksheet in Electrical Installation and Maintenance 9 provides discussions and activities designed to improve students' knowledge, skills, and abilities (M=4.65, SD=0.48). The table indicates that the worksheet in Electrical Installation and Maintenance serves as supplementary instructional materials (M=4.75, SD=0.44). It also indicates that the worksheet in Electrical Installation and Maintenance 9 offers exercises for reinforcements and mastery of concepts and skills (M=4.85, SD=0.36). It also shows that the worksheet in Electrical Installation and Maintenance 9 provides a self-assessment to improve students' skills and abilities (M=4.42, SD=0.58).

Table 6. Level of the Worksheet in terms of Features with regards to Consistency

The worksheet in Electrical Installation and Maintenance 9 …	Mean	SD	Verbal Interpretation
…provides the summary of the discussion paralleled to the objectives and activities.	4.85	0.35	Highly Satisfactory
…contains topics that are logically related to each other.	4.72	0.45	Highly Satisfactory
…presents topics consistent with concepts being taught.	4.75	0.43	Highly Satisfactory
…focuses on the main goal which is to improve students' technical drafting skills.	4.74	0.46	Highly Satisfactory
…includes activities that answer the expected outcome of the objectives.	4.45	0.52	Highly Satisfactory
Grand Mean	4.70	0.46	Highly Satisfactory

Table 6 reveals the level of the worksheet in terms of the features with regard to consistency. It shows that the worksheet in Electrical Installation and Maintenance 9 provides the summary of the discussion paralleled to the objectives and activities (M=4.85, SD=0.35). It also shows that the worksheet in Electrical Installation and Maintenance contains topics that are logically related to each other with (M=4.72, SD=0.45). The table indicates that the worksheet in Electrical Installation and Maintenance presents topics consistent with concepts being taught (M=4.75, SD=0.43). It also indicates that the worksheet in Electrical Installation and Maintenance 9 offers focuses on the main goal which is to improve students' technical drafting skills (M=4.74, SD=0.46). It also shows that indicates that the worksheet in Electrical Installation and Maintenance 9 includes activities that answer the expected outcome of the objectives with (M=4.45, SD=0.52).

It can be seen from Table 6, that level of the worksheet in terms of features concerning consistency (M=4.42, SD=0.58) rated as highly satisfactory as verbal interpretation.

This study may support Oliveros (2017) study that revealed acceptability in terms of consistency was highly attested by the overall mean (M=4.63, SD=0.36 and M=4.52, SD=0.47) given by both groups of evaluators. In the same way Covrig & Newman (2013). Stated that the logical alignment of the objective, content, activities, and assessment is what consistency is all about.

Table 7 reveals the level of the worksheet in terms of the features with regard to consistency. It shows that the worksheet in Electrical Installation and Maintenance 9 utilizes appropriate text, font size, and type with (M=4.75, SD=0.44). It also shows that the worksheet in Electrical Installation and Maintenance contains templates and layout to enhance understanding of learning contents with (M=4.76, SD=0.45). I reveals that the worksheet in Electrical Installation and Maintenance provides an appropriate design to boost learners' interest and preferences with (M=4.64, SD=0.48). It implies that the worksheet in Electrical Installation and Maintenance 9 offers uses creative ideas in developing new and original worksheets with (M=4.35, SD=0.50). It also shows that indicates that the worksheet in Electrical Installation and Maintenance 9 observes balance and is well laid out with (M=4.45, SD=0.52).

The aesthetic value of the worksheet was rated as highly satisfactory by the respondents with (M=4.61, SD=0.50) as shown in table 7.

Table 7. Level of the Worksheet in terms of Features with regards to Aesthetic Value

The worksheet in Electrical Installation and Maintenance …	Mean	SD	Verbal Interpretation
…utilizes appropriate text, font size, and type.	4.75	0.44	Highly Satisfactory
…contains templates and layout to enhance understanding of learning contents.	4.76	0.45	Highly Satisfactory
…provides appropriate design to boost learners' interest and preferences.	4.64	0.48	Highly Satisfactory
…uses artistic/creative ideas in developing new and original worksheets.	4.55	0.52	Highly Satisfactory
…observes balance and is well laid out.	4.35	0.50	Highly Satisfactory
Grand Mean	4.61	0.50	Highly Satisfactory

The aesthetic value of the worksheet was rated as highly satisfactory by the respondents with (M=4.61, SD=0.50) as shown in table 7.

The work of Domingo (2017) with mean 4.74 and 4.74 respectively for the two sets of respondents gained an extremely acceptable level of acceptability in the aesthetic value similar to the present study.

Table 8. Level of the Worksheet in terms of Features with regards to Adaptability.

The worksheet in Electrical Installation and Maintenance 9 …	Mean	SD	Verbal Interpretation
…uses across the curriculum.	4.75	0.43	Highly Satisfactory
…aligns with the various learning styles of the students.	4.68	0.56	Highly Satisfactory
…contains activities that can be done on target learners of different aptitude levels.	4.68	0.47	Highly Satisfactory
…is revised in order to fit the purposes.	4.62	0.50	Highly Satisfactory
…encourages the students to become actively involved in the learning activities.	4.82	0.39	Highly Satisfactory
Grand Mean	4.71	0.48	Highly Satisfactory

Table 8 shows the level of the worksheet in terms of the features with regard to adaptability. It shows that the worksheet in Electrical Installation and Maintenance 9 uses across the curriculum with (M=4.75, SD=0.43).It also shows that the worksheet in Electrical Installation and Maintenance aligns with the various learning styles of the students with (M=4.68, SD=0.56). The table indicates that the worksheet in Electrical Installation and Maintenance contains activities that can be done on target learners of different aptitude levels with (M=4.68, SD=0.47). It also indicates that the worksheet in Electrical Installation and Maintenance 9 offers is revised in order to fit the purposes with (M=4.62, SD=0.50). It also shows that indicates that the worksheet in Electrical Installation and Maintenance 9 encourages the students to become actively involved in the learning activities with (M=4.82, SD=0.39).

It reflected from Table 8, that level of the worksheet in terms of features with regard to adaptability is highly satisfactory with grand mean (M=4.71, SD=0.48). Adaptability in instructional material, according to Ho, et al. (2020), involves allowing students to actively participate in which they can customize individual learning differences and determine what they need to learn. This is best fostered when the objective, themes, and actions are all essential.

The above findings were supported by the study of Dionisio (2019) shows the level of acceptability in terms of adaptability were interpreted as highly acceptable. The two sets of respondent's teachers and students rated the contextual learning materials with the weighted mean (M=4.35 and 4.30) respectively.

Table 9. Level of Students' Performance of Grade 9 Electrical Installation and Maintenance Students.

Grading Scale	Frequency	Percentage	Verbal Interpretation
90 - 100	43	33.08%	Advance
85 - 89	33	25.38%	Proficient
80 - 84	34	26.15%	Approaching Proficiency
75 - 79	20	15.38%	Developing
Below 75	0	0%	Beginning
Total	130	100%	
	Mean= 85.82	SD = 5.764	Proficient

Table 9 reflected the students' performance of Grade 9 Electrical Installation and Maintenance Students. It showed that most of the respondents belong to advance, which is represented by forty-three (43) or thirty-three and eights hundredths percent (33.08 %). The second range of the respondent belongs to proficient comprises thirty-three (33) or twenty-five and thirty-eight hundredths percent (25.38%) Followed by approaching proficiency which consists of thirty-four (34) or twenty-six and fifteen-hundredths percent (26.15%). Then Developing which consist of twenty (20) or fifteen and thirty-eight hundredths percent(15.38%). It also depicts that there was no beginning. Many students were in developing. It only means that some students were having difficulty in understanding the lesson at home. But still the 43 students who were in Advance really tried their best to understand every lesson in the subject.

The over-all mean of 85.82 indicates that the performance in the worksheets was highly satisfactory. This means that based the average academic performance in 3rd quarter grade, were very competent.

Table 10. Regression Analysis of Worksheet in terms of Components and Students' Performance.

Worksheet in terms of Components	Coefficient	t-value	p-value	Verbal Interpretation
Objectives	0.403827	1.384702	0.168553	Not Significant
Contents	0.479577	1.750543	0.082421	Not Significant
Activities	0.662199	2.442962	0.015931	Significant
Assessments	-0.13754	-0.4725	0.637375	Not Significant

Constant 1.9785

The result of the analysis showed that worksheet components such as learning objectives, content, and assessment has the coefficient of, 0.403827, 0.479577, and -0.13754, with t-value 1.384702, 1.750543, and -0.4725 respectively are not above the critical value of 1.677 with degree freedom of 49 at alpha 0.05 are interpreted as not significant. On the other hand, the Worksheet Component in terms of activities has a coefficient of 0.662199 with a t-value of 2.442962 is above the critical value of 1.677 with degree freedom 49 at alpha 0.05 is interpreted as significant.

Similar to the study of Kampitan (2019), Self-made Instructional Module: Practical guide in housekeeping for Grade 10, the results shows the computed t-value of 4.57 is greater than the cv of 2.145 at 0.05 level of significance with a degree of freedom of 9 means there is a significant difference in the level of validity between evaluators' assessments of Self-made Instructional materials in terms of simulation. There is no significant difference in terms of Objectives, Contents, Discussions, Activities, Organization, and assessment with t-value of 0.43, 0.97, 0.10, 1.24, -0.37, -0.92 consecutively.

Table 11. Regression Analysis of Worksheet in terms of Features and Students' Performance

Worksheet in terms of Features	Coefficient	t-value	p-value	Verbal Interpretation
Usability	0.290635	1.118744	0.265344	Not Significant
Consistency	0.25137	0.863015	0.389743	Not Significant
Aesthetic Value	0.232818	0.948625	0.344599	Not Significant
Adaptability	0.532678	2.260983	0.025448	Significant

In this study, the worksheet in terms of Features with regards to the usability, consistency, aesthetic value and adaptability, and the Students' Performance.

The result of the analysis showed that the Regression Analysis of Worksheet in terms of Features such as usability, consistency, and aesthetic value, with coefficients of 0.290635, 0.25137, 0.232818 with t-value 1.118744, 0.863015, 0.948625 respectively had no significant effect on the Students' Performance. While the feature with regards to adaptability with 0.532678 and 2.260983 coefficient and t-value consecutively has a significant effect on students' performance.

The findings were similar to the study of Suyod (2019) the usability and consistency of the module got the same remarks of not significant while the adaptability, appropriateness, and aesthetic value got significant differences. He mentioned that the validity or acceptability is not all or non-characteristic (valid or invalid), and it can never be proved. Rather it varies depending on the extent of the research evidence supporting a test score's validity or acceptability.

Summary

This study utilized the descriptive method of research to develop and validate the worksheets in Electrical Installation and Maintenance 9 in teaching Technology and Livelihood Education. The Education Program Supervisor of TVL/TLE of School Division of Calamba City, two Head Teachers, one Master Teacher in TLE, and sixteen teachers in Technology and Livelihood Education in Division of Calamba were validated and evaluated the worksheets. While the grades of one hundred thirty (130) students who used and evaluated the worksheets were used in this study.

This study sought answers to the following questions: 1). What is the component level of the worksheets with regards to objectives, content, activities, and assessment? 2) What is the feature level of the worksheets with regards to usability, consistency, aesthetic value, and adaptability? 3) What is the level of Academic Performance of Grade 9 Electrical Installation and Maintenance students in terms of 3rd Quarter Grade? 4) Do the Component of the worksheet has a significant effect to the Academic Performance of Grade 9 Electrical Installation and Maintenance students? 5) Do the Feature of the worksheet has a significant effect on the Academic Performance of Grade 9 Electrical Installation and Maintenance students?

The respondents used the questionnaire in the validation of the worksheet in EIM 9. Weighted mean and standard deviation were used in determining the component level of the worksheet in terms of learning objectives, content, activities, and assessment; feature level of the worksheet in terms of usability, consistency, aesthetic value, and adaptability, and level of students' performance of Grade 9 as to third-quarter grade in Technology and Livelihood Educat–on - Electrical Installation and Maintenance subject in establishing the relationship in the evaluation of worksheet in Electrical Installation and Maintenance 9 given by the Technology and Livelihood Education teachers, group of experts, and student-respondents.

Based on the finding the component level of worksheets with regards to learning objectives, contents, activities and assessments were validated and accepted with verbal interpretation as highly satisfactory. While the feature level of worksheets with regards to usability, consistency, aesthetic value, and adaptability were validated and accepted with verbal interpretation as highly satisfactory. Meanwhile, the level of Academic Performance of Grade 9 Electrical Installation Maintenance students in terms of their third quarter grades were very competent. Based on the data collected, most of the respondents belong to advance, which is represented by forty-three (43) or thirty-three and eights hundredths percent (33.08 %). The second range of the respondent belongs to proficient comprises thirty-three (33) or twenty-five and thirty-eight hundredths percent (25.38%) Followed by approaching proficiency which consists of thirty-four (34) or twenty-six and fifteen-hundredths percent (26.15%). Then Developing which consist of twenty (20) or fifteen and thirty-eight hundredths percent(15.38%). It also depicts that there was no beginning.

On the other hand, the analyzed data revealed that the components of the worksheet in terms of learning objectives, contents, and assessment had no significant effect on the students' performance as indicated that all of the corresponding t-values are higher than the designated critical value. While the worksheet components with regards to activities had a significant effect on the students' performance. And lastly, based on the data presented, the features of the worksheet with regards to usability, consistency, and aesthetic value had no significant effect on the students' performance. While the features of worksheet with regards to adaptability has a significant effect on students' performance.

Conclusions

On the basis of the foregoing findings, the following conclusions were drawn.The level of validity and acceptability of the worksheet's components is highly satisfactory. While the level of acceptability of the features of the module is also highly satisfactory. Hence it is valid to be used in Electrical Installation and Maintenance, one area in Technology and Livelihood Education subject and can be improved based on the comments of the respondents. The components of the worksheet in terms of learning objectives, content, and assessment had no significant effect on students' performance. While the components of the worksheet in terms of activities has a significant effect on students' performance. On the other hand, the features of the worksheet in terms of usability, consistency, aesthetic value and had no significant effect on students' performance while the features of the worksheet with regards to adaptability has a significant effect on the performance of the students. Therefore, the null hypothesis is partially accepted.

Recommendations

Based on the conclusions formulated from the findings, the following recommendations are hereby formulated:

1. The TLE teachers may develop additional instructional learning materials based on the needs and interests of the students assimilated into other courses offered in Technology and Livelihood Education.
2. The TLE teachers are encouraged to attend seminars, workshops, and training programs to acquire new knowledge and updated background information on developing instructional learning materials.
3. The TLE teachers are entitled to modify and reconstruct the worksheet in Electrical Installation and Maintenance 9 to fulfill the demands of education in the future.
4. Future researchers can further validate the worksheets in EIM 9 to measure and assess the effectiveness of the instructional tool.

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