Instructional Video in Teaching Electrical Installation and Maintenance (Eim)

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Abstract

The primary objective of the study was to develop and validate an instructional video in teaching Electrical Installation and Maintenance (EIM). Specifically, it sought to answer the following questions: the level of acceptability on components and features of instructional video in teaching Electrical Installation and Maintenance (EIM) and the level of student performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM). The researcher also identified the significant difference on the students' performance before and after using the instructional video and the significant effect of the component and features of instructional video to students' performance.

This study is experimental and descriptive in research design. It involved 100 Grade 10 students and 50 TVL and TLE teachers who were selected through the employment of purposive sampling technique. Students were given a self-made questionnaire before and after the utilization of the instructional video in teaching electrical installation and maintenance while teachers were asked to answer a self-made survey questionnaire based on their perception on the acceptability of the components and features of the instructional video.

Salient findings revealed that the developed instructional video in teaching Electrical Installation and Maintenance (EIM) is highly acceptable across various components and features. The level of student performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) improved from unsatisfactory to satisfactory performance showing' significant effect on the learning process. Meanwhile, the component of the instructional video has a partial effect on the students' performance while the features of the instructional video have no significant effect on the performance of the students.

There is a significant difference on the scores of tests before and after the utilization of the instructional video. Thus the stated hypothesis was rejected. Furthermore, the various components of the instructional video have a partial effect on the students' performance. However, the features of the instructional video in teaching Electrical Installation and Maintenance (EIM) have no significant effect on students' performance. Therefore the hypothesis stated were both accepted.

Based on the conclusions of this study, the following recommendations are forwarded: EIM teachers may subject the developed instructional video to revisions, modifications and reconstructions in the future depending upon the needs of their students and the teachers too; Developing video and other instructional materials is a skill that needs to be developed among EIM and TLE teachers. Therefore, they are encouraged to attend seminars and training programs regarding this skill; EIM teachers and TLE teachers in general may develop instructional video as supplementary materials in teaching.

Keywords: Maintenance; Electrical Installation; students' performance

1. Introduction

As stated in Aristotle's Philosophy of Education, learning should not be confined to passive reception of information but should involve active engagement with the subject matter. It also stressed the importance of practical application and hands-on experiences in the educational process. It is then argued that students should participate actively in their own learning through discussions, questioning and experimentation. Through active engagement and reflection on their experiences, students can develop a deeper understanding and acquire practical skills.

One of the ways to ensure students' development of deeper understanding and acquisition of practical skills is the use of instructional videos.

In 2022, online videos had an audience reach of almost 93% among internet users worldwide (Statistica, 2022). Abstract topics that once seemed difficult to teach and learn are now more accessible and understandable thanks to the availability of effective educational video platforms for online learning. Studies have shown that the use of short video clips allows for more efficient processing and memory recall. The visual and auditory nature of videos appeals to a wide audience and allows each user to process information in a way that's natural to them. In a nutshell, videos are good teachers. The use of videos in teaching and learning serves to not only benefit students, but also teachers, their affiliated institutions, and the entire school system. A 2022 study conducted by software company Kaltura concluded that 97% of education professionals believe that video is essential to students' academic experiences. They also serve to break down barriers, such as student and campus location, which were once insurmountable. As a result, educational institutions are faced with the task of meeting the rising demand for quality learning videos, online course offerings, and campus accessibility. Indeed, many are choosing to create their own educational video learning materials. Furthermore, teachers can use videos to deliver course information that can be extremely helpful in opening up class time. Lectures and other introductory information can be viewed before class, which allows for more practice- and skill-related class activities. These videos are accessible at the student's convenience and can be watched numerous times to assist with coursework and skill mastery.

Because of the claims mentioned about the importance and effectiveness of using instructional videos in teaching-learning process, the current study being undertaken by the researcher is about the development and validation of instructional video in teaching Electrical Installation and Maintenance or EIM.

1.1 Statement of the Problem

Specifically, it will seek answers the following questions:

1. What is the level of acceptability of components of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of:

    1.1. objectives;

    1.2. content;

    1.3. activities; and

    1.4. assessment?

2. What is the level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of:

    2.1. pronunciation;

    2.1. audio quality;

    2.3. functionality; and

    2.4. visual effect?

3. What is the level of students' performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of:

3.1. comprehension;

3.2. problem-solving;

3.3 abstract reasoning; and

3.4 critical thinking?

4. Is there a significant difference on the students' performance before and after using of instructional video?

5. Is there a significant relationship between the component of instructional video and the students' performance?

6. Is there a significant relationship between the features of instructional video and the students' performance?

2. Methodology

This design was used by the researcher to analyze the data systematically and to identify the effect of the instructional video in teaching electrical installation and maintenance to the selected students of Pagsanjan Integrated National High School in school year 2023-2024.

Furthermore, the used of descriptive method of research was also adopted in assessing the teachers' evaluation on the acceptability of the components and features of the instructional video in teaching electrical installation and maintenance and its effect to the performance of the students. This study also used survey techniques of descriptive research since data gathering was done through the conduct of survey using a self-made questionnaire. McCombes (2019) stated that descriptive research aims to describe a population, situation or phenomenon accurately and systematically. It can answer what, where when and how questions but not why questions. A descriptive research design can use a wide variety of research methods to investigate one or more variables.

3. Results and Discussion

This chapter enumerates the different results and discusses the results that were yielded from the treatment of the data that was gathered in this study. The following tabular presentations and discussions will further characterize the acceptability and effectiveness of the developed instructional video in teaching Electrical Installation and Maintenance (EIM).

Acceptability of components of instructional video in teaching Electrical Installation and Maintenance (EIM)

Table 1 Level of Acceptability of Components of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Objectives

The instructional video…	MEAN	SD	REMARKS
…consists objectives which are specific.	4.96	0.20	Strongly Agree
…consists objectives which are measurable.	4.98	0.14	Strongly Agree
…consists objectives which are attainable.	4.92	0.27	Strongly Agree
…consists objectives which are realistic.	4.68	0.47	Strongly Agree
…consists objectives which are time-bound.	4.94	0.24	

		Strongly Agree
Weighted Mean	4.90	
SD	0.26	
Verbal Interpretation	*Highly Acceptable*	

Table 1 illustrates level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of objectives. From the statements, "the instructional video consists objectives which are measurable." yielded the highest mean score (M=4.98, SD=0.14) and was remarked as Strongly Agree. On the other hand, "the instructional video consists objectives which are realistic" received the lowest mean score of responses with (M=4.68, SD=0.47) yet was also remarked Strongly Agree.

The level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of objectives attained a weighted mean score of 4.90 and a standard deviation of 0.26 and was highly acceptable among the respondents. This implies that the instructional video's objectives are highly acceptable to the respondents, as they are perceived to be specific, measurable, attainable, realistic, and time- bound, aligning well with the instructional needs of teaching Electrical Installation and Maintenance.

Table 2 Level of Acceptability of Components of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Content

The instructional video…	MEAN	SD	REMARKS
…contains lessons in Electrical and Installation Maintenance (EIM) subject.	4.76	0.43	Strongly Agree
…presents lessons which are relevant.	4.84	0.37	Strongly Agree
…contains examples which are realistic.	4.98	0.14	Strongly Agree
…presents topics which are timely.	4.94	0.24	Strongly Agree
…includes lessons which can be applied in true to life situations.	4.96	0.20	Strongly Agree
Weighted Mean	4.90		
SD	0.28		
Verbal Interpretation	*Highly Acceptable*		

Table 2 exemplifies the level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of content. From the statements, "the instructional video contains examples which are realistic." produced the highest mean score (M=4.98, SD=0.14) and was remarked as Strongly Agree. On the other hand, "The instructional video contains lessons in Electrical and Installation Maintenance (EIM) subject." received the lowest mean score of responses with (M=4.76, SD=0.43) yet was also remarked strongly agree.

The level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of content reached a weighted mean score of 4.90 and a standard deviation of 0.28 and was highly acceptable among the respondents. This means that the instructional video's content is highly acceptable to the respondents, as it contains relevant lessons, presents realistic examples, timely topics, and materials that can be applied in real-life situations, aligning well with the instructional needs of teaching Electrical Installation and Maintenance.

Table 3 Level of Acceptability of Components of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Activities

The instructional video…	MEAN	SD	REMARKS
…provides engaging activities to students.	4.94	0.24	Strongly Agree
…contains activities which are varied and diverse.	4.98	0.14	Strongly Agree
…presents activities which are student friendly.	4.88	0.33	Strongly Agree
…includes activities which are related to the lessons.	4.66	0.48	Strongly Agree
…presents activities which are well-designed.	4.94	0.24	Strongly Agree
Weighted Mean	*4.88*		
SD	*0.29*		
Verbal Interpretation	*Highly Acceptable*		

table 3 shows the level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of activities. From the statements, "the instructional video contains activities which are varied and diverse." produced the highest mean score (M=4.98, SD=0.14) and was remarked as Strongly Agree. On the other hand, "The instructional video includes activities which are related to the lessons" received the lowest mean score of responses with (M=4.66, SD=0.48) yet was also remarked strongly agree.

The level of acceptability of components of instructional video in teaching electrical installation and maintenance (EIM) in terms of activities reached a weighted mean score of 4.88 and a standard deviation of 0.29 and was highly acceptable among the respondents. This implies that the instructional video's activities are highly acceptable to the respondents, as they are engaging, varied, diverse, student-friendly, related to the lessons, and well-designed, aligning well with the instructional needs of teaching Electrical Installation and Maintenance.

Table 4 Level of Acceptability of Components of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Assessment

The instructional video…	MEAN	SD	REMARKS
…contains assessment which is objective-based.	4.78	0.42	Strongly Agree
…includes assessment which is reliable.	4.88	0.33	Strongly Agree
…contains assessment which is balanced.	4.94	0.24	Strongly Agree
… includes assessment which is valid.	4.94	0.24	Strongly Agree
…presents assessment which targets the learning of the students.	4.96	0.20	Strongly Agree
Weighted Mean	*4.90*		
SD	*0.28*		
Verbal Interpretation	*Highly Acceptable*		

Table 4 shows the level of acceptability of components of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of assessment. From the statements, "the instructional video presents assessment which targets the learning of the students" produced the highest mean score (M=4.96, SD=0.20) and was remarked as Strongly Agree. On the other hand, "The instructional video contains assessment which is objective-based" received the lowest mean score of responses with (M=4.78, SD=0.42) yet was also remarked strongly agree.

The level of acceptability of components of instructional video in teaching electrical installation and

maintenance (EIM) in terms of assessment reached a weighted mean score of 4.90 and a standard deviation of 0.28 and was highly acceptable among the respondents. This implies that the instructional video's assessment components are highly acceptable to the respondents, as they are objective-based, reliable, balanced, valid, and effectively target the learning of the students, aligning well with the instructional needs of teaching Electrical Installation and Maintenance.

Level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM)

Table 5 Level of Acceptability of Features of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Pronunciation

The teacher in the instructional video…	MEAN	SD	REMARKS
…stresses words correctly.	4.64	0.48	Strongly Agree
…observes proper intonation.	4.90	0.30	Strongly Agree
…enunciates words correctly.	4.84	0.37	Strongly Agree
…remarks proper volume (loudness and softness of voice).	4.88	0.33	Strongly Agree
…observes proper pacing (speed).	4.82	0.39	Strongly Agree
Weighted Mean	*4.82*		
SD	*0.37*		
Verbal Interpretation	*Highly Acceptable*		

Table 5 proves the level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of pronunciation. From the statements, "the teacher in the instructional video observes proper intonation" produced the highest mean score (M=4.90, SD=0.30) and was remarked as Strongly Agree. On the other hand, "the teacher in the instructional video stresses words correctly" received the lowest mean score of responses with (M=4.64, SD=0.48) yet was also remarked strongly agree.

The level of acceptability of features of instructional video in teaching electrical installation and maintenance (EIM) in terms of pronunciation reached a weighted mean score of 4.82 and a standard deviation of 0.37 and was highly acceptable among the respondents. This means that the pronunciation-related features of the instructional video, including correct word stress, intonation, enunciation, volume control, and pacing, are highly acceptable to the respondents, aligning well with the instructional needs of teaching Electrical Installation and Maintenance.

Table 6 Level of Acceptability of Features of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Audio-Quality

The teacher in the instructional video …	MEAN	SD	REMARKS
…involves a good balance of dynamics, which refers to the range of loudness in the audio.	4.66	0.48	Strongly Agree
…eliminates noise, such as background noise or hiss, which can be a distraction and reduce the overall	4.92	0.27	Strongly Agree

quality of the audio.

...involves a full and balanced frequency response.	4.90	0.30	Strongly Agree
...contains balanced audio, where all of the elements are audible and in proper proportion to one another.	4.86	0.35	Strongly Agree
...contains sounds which are distinct and easy to understand.	4.90	0.30	Strongly Agree
Weighted Mean	*4.82*		
SD	*0.34*		
Verbal Interpretation	*Highly Acceptable*		

Table 6 explains the level of acceptability of features of instructional video in teaching electrical installation and maintenance (EIM) in terms of audio-quality. From the statements, "the teacher in the instructional video eliminates noise, such as background noise or hiss, which can be a distraction and reduce the overall quality of the audio" produced the highest mean score (M=4.92, SD=0.27) and was remarked as Strongly Agree. On the other hand, "the teacher in the instructional video involves a good balance of dynamics, which refers to the range of loudness in the audio" received the lowest mean score of responses with (M=4.66, SD=0.48) yet was also remarked strongly agree.

The level of acceptability of features of instructional video in teaching electrical installation and maintenance (EIM) in terms of audio-quality reached a weighted mean score of 4.82 and a standard deviation of 0.34 and was highly acceptable among the respondents. This means that the audio-quality-related features of the instructional video, including good balance of dynamics, elimination of noise, balanced frequency response, balanced audio, and distinct sounds, are highly acceptable to the respondents, potentially enhancing the learning experience and comprehension for students in Electrical Installation and Maintenance

Table 7 Level of Acceptability of Features of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Functionality

The teacher in the instructional video ...	*MEAN*	*SD*	*REMARKS*
...helps increase students' comprehension of the lesson.	4.78	0.42	Strongly Agree
...provides the core information that students need to experience, learn, and apply during their study of the subject.	4.86	0.35	Strongly Agree
...provides ways for students to review content.	4.92	0.27	Strongly Agree
...revisits difficult topics.	4.94	0.24	Strongly Agree
...allows for more active learning to occur with the teacher.	4.98	0.14	Strongly Agree
Weighted Mean	*4.90*		
SD	*0.28*		
Verbal Interpretation	*Highly Acceptable*		

Table 7 explains the level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of functionality. From the statements, "the teacher in the instructional video allows for more active learning to occur with the teacher." produced the highest mean score (M=4.98, SD=0.14) and was remarked as Strongly Agree. On the other hand, "the teacher in the instructional helps increase students' comprehension of the lesson" received the lowest mean score of responses with (M=4.78, SD=0.42) yet was also remarked strongly agree.

The level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of functionality reached a weighted mean score of 4.90 and a standard deviation of 0.14 and was highly acceptable among the respondents. This implies that the functionality-related features of the instructional video, including enhancing comprehension, providing core information, facilitating content review, revisiting difficult topics, and promoting active learning, are highly acceptable to the respondents, potentially improving the overall learning experience for students in Electrical Installation and Maintenance

Table 8 Level of Acceptability of Features of Instructional Video in Teaching Electrical Installation and Maintenance (EIM) in Terms of Visual Effect

The teacher in the instructional video …	MEAN	SD	REMARKS
...uses pictures and other visual materials to illustrate the topics or lessons.	5.00	0.00	Strongly Agree
...uses high quality illustrations in the design process.	4.98	0.14	Strongly Agree
...explains lessons or topics through illustrative examples.	4.86	0.35	Strongly Agree
...presents clear images and other visuals.	4.60	0.49	Strongly Agree
...contains graphics which help students further understand the lessons or topics.	4.94	0.24	Strongly Agree
Weighted Mean	*4.88*		
SD	*0.25*		
Verbal Interpretation	*Highly Acceptable*		

Table 8 exemplifies the level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of visual effect. From the statements, "uses pictures and other visual materials to illustrate the topics or lessons." produced the highest mean score (M=5.00, SD=0.00) and was remarked as Strongly Agree. On the other hand, "the teacher in the instructional presents clear images and other visuals" received the lowest mean score of responses with (M=4.60, SD=0.49) yet was also remarked strongly agree.

The level of acceptability of features of instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of visual effect functionality reached a weighted mean score of 4.88 and a standard deviation of 0.25 and was highly acceptable among the respondents. This implies that the visual-related features of the instructional video, including the use of pictures, high-quality illustrations, illustrative examples, clear images, and helpful graphics, are highly acceptable to the respondents, potentially enhancing the learning experience and comprehension for students in Electrical Installation and Maintenance.

The Level of Students' Performance Before and After Using the Instructional Video in Teaching Electrical Installation and Maintenance (EIM)

Table 9 Level of Student's Performance before and after using the Instructional Video in Teaching Electrical Installation and Maintenance in Terms of comprehension

Before				After			
Scores	Frequency	Percentage	Remarks	Scores	Frequency	Percentage	Remarks

Scores	Frequency	Percentage	Remarks	Scores	Frequency	Percentage	Remarks
9-10	0	0.00%	Outstanding	9-10	36	36.00%	Outstanding
7-8	6	6.00%	Very Satisfactory	7-8	45	45.00%	Very Satisfactory
5-6	27	27.00%	Satisfactory	5-6	18	18.00%	Satisfactory
3-4	41	41.00%	Unsatisfactory	3-4	1	1.00%	Unsatisfactory
1-2	26	26.00%	Poor	1-2	0	0.00%	Poor
Total	100	100%		Total	100	100%	

Weighted Mean = 4.26
SD=1.74

Weighted Mean = 8.32
SD=1.50

Table 9 demonstrate the level of student's performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of comprehension. Before using the instructional video, 0 student attained an outstanding performance while 26 of them got a poor performance. 6 students got unsatisfactory performance, 41 got a satisfactory performance while 41 of them got an satisfactory performance. After using the instructional video, 36 students gained an outstanding performance while 0 of them got a poor performance. 45 students got very satisfactory performance, 18 got a satisfactory performance while only 1 of them got an unsatisfactory performance.

The weighted mean score increased from 4.26 before using the instructional video to 8.32 after using it, indicating a substantial improvement in comprehension. The standard deviation decreased from 1.74 to 1.50, indicating that student performance became more consistent after using the instructional video. This implies that there's a significant improvement in student performance after using the instructional video, as indicated by the increase in the percentage of students achieving higher scores. The results also suggest that the instructional video had a positive impact on student comprehension in Electrical Installation and Maintenance, leading to a notable improvement in performance across various proficiency levels.

Table 10 Level of Student's Performance before and after using the Instructional Video in Teaching Electrical Installation and Maintenance in Terms of Problem-Solving

Before				After			
Scores	*Frequency*	*Percentage*	*Remarks*	*Scores*	*Frequency*	*Percentag*	*Remarks*
9-10	0	0.00%	Outstanding	9-10	13	13.00%	Outstanding
7-8	1	1.00%	Very Satisfactory	7-8	37	37.00%	Very Satisfactory
5-6	21	21.00%	Satisfactory	5-6	39	39.00%	Satisfactory
3-4	50	50.00%	Unsatisfactory	3-4	8	8.00%	Unsatisfactory
1-2	28	28.00%	Poor	1-2	3	3.00%	Poor
Total	100	100%		Total	100	100%	

Weighted Mean = 3.90
SD=1.46

Weighted Mean = 6.98
SD=1.85

Table 10 shows the level of student's performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of problem-solving. Before using the instructional video, 0 student attained an outstanding performance while 28 of them got a poor performance. 1 student got very satisfactory performance, 21 got a satisfactory performance while 50 of them got an unsatisfactory performance. After using the instructional video, 13 students gained an outstanding performance while 3 of them got a poor performance. 37 students got very satisfactory performance, 39 got a satisfactory performance while only 8 of them got an unsatisfactory performance.

The weighted mean score increased from 3.90 before using the instructional video to 6.98 after using it, indicating a substantial improvement in problem-solving abilities. The standard deviation also increased from 1.46 to 1.85, suggesting that there was more variability in student performance after using the instructional video, potentially indicating that some students responded more positively to the video than others. This implies that there's a noticeable improvement in student performance after using the instructional video in terms of problem-solving skills, as indicated by the increase in the percentage of students achieving higher scores. The results suggest that the instructional video had a positive impact on students' problem-solving skills in Electrical Installation and Maintenance, leading to an improvement in performance across various proficiency levels.

Table 11 Level of Student's Performance before and after using the Instructional Video in Teaching Electrical Installation and Maintenance in Terms of Abstract Reasoning

Before				After			
Scores	Frequency	Percentage	Remarks	Scores	Frequency	Percentage	Remarks
9-10	13	13.00%	Outstanding	9-10	28	28.00%	Outstanding
7-8	37	37.00%	Very Satisfactory	7-8	38	38.00%	Very Satisfactory
5-6	39	39.00%	Satisfactory	5-6	28	28.00%	Satisfactory
3-4	8	8.00%	Unsatisfactory	3-4	6	6.00%	Unsatisfactory
1-2	3	3.00%	Poor	1-2	0	0.00%	Poor
Total	100	100%		Total	100	100%	

Weighted Mean = 5.42
SD=1.89

Weighted Mean = 7.76
SD=1.78

Table 11 presents the level of student's performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of abstract reasoning. Before using the instructional video, 13 student attained an outstanding performance while 3 of them got a poor performance. 37 students got very satisfactory performance, 39 got a satisfactory performance while 8 of them got an unsatisfactory performance. After using the instructional video, 28 students gained an outstanding performance while 0 of them got a poor performance.

Got a 38 before using the instructional video, 0 student attained an outstanding performance while 26

of them got a poor performance. 6 students got very satisfactory performance, 41 got a satisfactory performance while 41 of them got a satisfactory performance. After using the instructional video, 36 students gained an outstanding performance while 0 of them got a poor performance. 45 students got very satisfactory performance, 18 got a satisfactory performance while only 1 of them got an satisfactory performance. 38 students got very satisfactory performance, 28 got a satisfactory performance while only 6 of them got an unsatisfactory performance.

The weighted mean score increased from 5.42 before using the instructional video to 7.76 after using it, indicating a substantial improvement in abstract reasoning abilities. The standard deviation decreased slightly from 1.89 to 1.78, suggesting that there was slightly less variability in student performance after using the instructional video. This means that there is a significant improvement in student performance after using the instructional video in terms of abstract reasoning skills, as indicated by the increase in the percentage of students achieving higher scores. The results also suggest that the instructional video had a positive impact on students' abstract reasoning skills in Electrical Installation and Maintenance, leading to an improvement in performance across various proficiency levels.

Table 12. Level of Student's Performance before and after using the Instructional Video in Teaching Electrical Installation and Maintenance in Terms of Critical Thinking

Before				After			
Scores	Frequency	Percentage	Remarks	Scores	Frequency	Percentage	Remarks
9-10	0	0.00%	Outstanding	9-10	36	36.00%	Outstanding
7-8	6	6.00%	Very Satisfactory	7-8	45	45.00%	Very Satisfactory
5-6	27	27.00%	Satisfactory	5-6	18	18.00%	Satisfactory
3-4	41	41.00%	Unsatisfactory	3-4	1	1.00%	Unsatisfactory
1-2	26	26.00%	Poor	1-2	0	0.00%	Poor
Total	100	100%		Total	100	100%	

Weighted Mean = 4.26   *Weighted Mean = 8.32*
SD=1.74   *SD=1.50*

Table 12 illustrate the level of student's performance before and after using the instructional video in teaching Electrical Installation and Maintenance (EIM) in terms of critical thinking. Before using the instructional video, 0 student attained an outstanding performance while 26 of them got a poor performance. 6 students got unsatisfactory performance, 41 got a satisfactory performance while 41 of them got an satisfactory performance.

After using the instructional video, 36 students gained an outstanding performance while 0 of them got a poor performance. 45 students got very satisfactory performance, 18 got a satisfactory performance while only 1 of them got an unsatisfactory performance.

The weighted mean score increased from 4.26 before using the instructional video to 8.32 after using it, indicating a substantial improvement in critical thinking. The standard deviation decreased from 1.74 to 1.50, indicating that student performance became more consistent after using the instructional video. This implies that there's a significant improvement in student performance after using the instructional video, as indicated by the increase in the percentage of students achieving higher scores. The results also suggest that the instructional video had a positive impact on student critical thinking in Electrical Installation and

Maintenance, leading to a notable improvement in performance across various proficiency levels.

Significant Difference on the Students' Performance Before and After Using of Instructional Video

Table 13. Significant Difference between the Performance of Grade 10 Students before and after using the Instructional Video

Performance	Test	Mean	Mean Difference	t-value	P	Cohen's d
Comprehension	Before	4.22	4.08	50.50**	<.001	5.07 (Very Large)
	After	8.30				
Problem-Solving	Before	3.85	3.09	27.54**	<.001	2.76 (Very Large)
	After	6.94				
Abstract Reasoning	Before	5.37	2.36	26.89**	<.001	2.70 (Very Large)
	After	7.73				
Critical Thinking	Before	4.66	2.88		<.001	1.18 (Very Large)
	After	7.55		11.75**		

*df = 28;   **Significant at .01 level;   Cohen's d: 0.20 (Small); 0.50 (Medium);*
0.80 (Large)

Table 13 demonstrates the significant difference on the students' performance before and after using of instructional video.

As reflected on table 13, the level of performance in terms of comprehension shows that before using the instructional video, the mean comprehension score was 4.22, while after using it, the mean score significantly increased to 8.30. The mean difference is 4.08, with a t-value of 50.50, indicating a highly significant improvement in comprehension skills after using the instructional video. Cohen's d, a measure of effect size, is very large at 5.07, indicating a substantial impact of the instructional video on comprehension.

Secondly, in terms of problem-solving, before using the instructional video, the mean problem-solving score was 3.85, while after using it, the mean score significantly increased to 6.94. The mean difference is 3.09, with a t-value of 27.54, indicating a highly significant improvement in problem-solving skills after using the instructional video. Cohen's d is also very large at 2.76, suggesting a substantial impact,

Thirdly, in terms of abstract reasoning, before using the instructional video, the mean abstract reasoning score was 5.37, while after using it, the mean score significantly increased to 7.73. The mean difference is 2.36, with a t-value of 26.89, indicating a highly significant improvement in abstract reasoning skills after using the instructional video. Cohen's d is very large at 2.70, indicating a substantial impact.

Lastly, in terms of critical thinking, Before using the instructional video, the mean critical thinking score was 4.66, while after using it, the mean score significantly increased to 7.55. The mean difference is 2.88, with a t-value of 11.75, indicating a highly significant improvement in critical thinking skills after using the instructional video. Cohen's d is very large at 1.18, suggesting a substantial impact.

From the findings above, we can infer that at 0.05 level of significance, the null hypothesis "There is no significant difference on the students' performance before and after using of instructional video" is rejected. Thus, the alternative should be accepted which incites that there is a significant difference between them. A significant and substantial improvement in students' performance across all domains after using the instructional video, indicating its effectiveness in enhancing various cognitive skills among Grade 10

students.

Significant Effect of Component of Instructional Video to the Students' Performance

Table 14 illustrates the significant effect of component of instructional video to the students' performance.

Table 14. Significant Effect of Components of Instructional to the Students' Performance

Comprehension	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	25.474	7.220		3.528	<.001
Objectives	-0.820	0.954	-0.127	-0.859	0.859
Content	-0.539	4.737	-0.090	-0.113	0.910
Activities	-1.722	0.924	-0.265	-1.863	0.069
Assessment	-0.199	4.853	-0.032	-0.041	0.967
R = .342; R^2 = .117; Adj. R^2 =0.0387, F(4, 45) = 1.49; p.220					
Problem-Solving					
(Constant)	-3.018	6.979		-0.433	0.667
Objectives	1.767	0.922	0.281	1.916	0.068
Content	10.462	4.578	1.800	2.285	0.027
Activities	0.546	0.893	0.086	0.611	0.544
Assessment	10.498	4.691	1.742	2.238	0.030
R = .369; R^2 = .136; Adj. R^2 =-0.0591, F(4, 45) = 1.77; p.152					
Abstract Reasoning					
(Constant)	3.177	0.496		6.410	<.001
Objectives	0.153	0.066	0.493	2.310	0.027
Content	0.054	0.047	0.215	1.160	0.254
Activities	-0.075	0.047	-0.281	-1.580	0.122
Assessment	0.058	0.043	0.251	1.350	0.187
R = .376; R^2 = .141; Adj. R^2 =-0.0433, F(4, 45) = 1.44; p.241					
Critical Thinking					
(Constant)	14.907	2.340		1.788	0.081
Objectives	0.146	1.100	0.020	0.133	0.895
Content	-4.106	5.470	-0.624	-0.751	0.457
Activities	-0.747	1.070	-0.104	-0.700	0.488
Assessment	3.520	5.600	0.516	0.628	0.533
R = .192; R^2 = .0370; Adj. R^2 =-0.0486, F(4, 45) = 0.432; p.785					

As shown on table 14, the significant effect on the components of instructional video to the students' performance in terms of comprehension shows that the components of the instructional video, including objectives, content, activities, and assessment, do not show a significant effect on comprehension as indicated by the p-values (> 0.05). The overall model's adjusted R-squared is 0.0387, suggesting that the components

considered explain only a small proportion of the variance in comprehension scores.

Secondly, in terms of problem solving, the components of the instructional video, including objectives, content, activities, and assessment, show a significant effect on problem-solving as indicated by the p-values

for content and assessment. The adjusted R-squared is -0.0591, indicating that the components considered do not explain much of the variance in problem-solving scores.

Thirdly, in terms of abstract reasoning, the components of the instructional video, including objectives, content, activities, and assessment, show a significant effect on abstract reasoning as indicated by the p-values (< 0.05) for objectives. The adjusted R-squared is -0.0433, indicating that the components considered do not explain much of the variance in abstract reasoning scores.

Lastly, in terms of critical thinking, the components of the instructional video do not show a significant effect on critical thinking as indicated by the p-values (> 0.05). The adjusted R-squared is -0.0486, suggesting that the components considered do not explain much of the variance in critical thinking scores.

The results suggest that the components of the instructional video have varying effects on students' performance across different domains. While some components show a significant effect on certain domains, others do not. This indicates the complexity of instructional design and the need for further investigation into the specific components that contribute most to student learning outcomes in each domain.

From the findings above, we can infer that at 0.05 level of significance, the null hypothesis "There is no significant effect on the component of instructional video to the students' performance" is partially rejected. Thus, the alternative should be partially accepted which incites that there is a partial significant effect exist between them. The components of the instructional video have varying effects on students' performance across different domains. While some components show a significant effect on certain domains, others do not. This indicates the complexity of instructional design and the need for further investigation into the specific components that contribute most to student learning outcomes in each domain.

Significant Effect of Features of Instructional Video To the Students' Performance

Table 15 Significant Effect of Features Instructional Video to the Students' Performance

Comprehension	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	8.131	1.000		8.130	<.001
Pronunciation	0.053	0.652	0.037	0.081	0.935
Audio-Sound	0.020	0.608	0.014	0.033	0.973
Functionality	-0.413	0.863	-0.292	-0.478	0.634
Visual Effect	0.603	0.763	0.426	0.790	0.433
R = .212; R^2 = .0447; Adj. R^2 =-0.0365, $F_{(4, 45)}$ = 0.550; p.700					
Problem-Solving					
(Constant)	6.098	0.951		6.413	<.001
Pronunciation	-1.467	0.620	-0.970	-2.366	0.022
Audio-Sound	-0.126	0.578	-0.082	-0.218	0.829
Functionality	1.004	0.820	0.664	1.224	0.227
Visual Effect	1.052	0.725	0.694	1.451	0.153
R = .495; R^2 = .246; Adj. R^2 =0.181, $F_{(4, 45)}$ =3.82; p.009					

Abstract Reasoning					
(Constant)	8.140	1.083		7.518	<.001
Pronunciation	-0.641	0.706	-0.420	-0.908	0.368
Audio-Sound	0.531	0.658	0.346	0.807	0.424
Functionality	0.370	0.934	0.242	0.396	0.694
Visual Effect	-0.071	0.826	-0.046	-0.086	0.932

$R = .201$; $R^2 = .0403$; Adj. $R^2 = -0.0413$, $F(4, 45) = 0.434$; p.740

Critical Thinking					
(Constant)	8.087	1.700		4.766	<.001
Pronunciation	0.678	1.110	0.287	0.613	0.543
Audio-Sound	0.199	1.030	0.084	0.193	0.847
Functionality	-0.814	1.460	-0.345	-0.556	0.581
Visual Effect	-0.093	1.290	-0.039	-0.072	0.943

$R = .110$; $R^2 = .0120$; Adj. $R^2 = -0.0721$, $F(4, 45) = 0.143$; p.965

Table 15 illustrates the significant effect of features of instructional video to the students' performance.

As shown on table 15, the significant effect on the features of instructional video to the students' performance in terms of comprehension shows that none of the features of the instructional video (pronunciation, audio-sound, functionality, and visual effect) show a significant effect on comprehension. The overall model's adjusted R-squared is -0.0365, indicating that the features considered do not explain much of the variance in comprehension scores.

Secondly, in terms of problem solving, the pronunciation feature of the instructional video shows a significant negative effect on problem-solving, while other features (audio-sound, functionality, and visual effect) do not show a significant effect. The adjusted R-squared is 0.181, suggesting that the features considered explain a moderate proportion of the variance in problem-solving scores.

Thirdly, in terms of abstract reasoning, none of the features of the instructional video show a significant effect on abstract reasoning. The adjusted R-squared is -0.0413, indicating that the do not explain much of the variance in abstract reasoning scores.

Lastly, in terms of critical thinking, none of the features of the instructional video show a significant effect on critical thinking. The adjusted R-squared is -0.0721, suggesting that the features considered do not explain much of the variance in critical thinking scores.

From the findings above, we can infer that at 0.05 level of significance, the null hypothesis "There is no significant effect on the features of instructional video to the students' performance" is accepted. Thus, the alternative should be accepted which incites that there is no significant effect exist between them. The result suggest that the features of the instructional video have no varying effects on the students' performance.

4. Conclusion and Recommendations

From the foregoing findings the following conclusions were obtained:

The researcher rejected the first null hypothesis because the used of instructional video in teaching Electrical Installation and Maintenance (EIM) is significantly effective because there is a significant

difference on the mean scores of test before and after the utilization of the instructional video. This means that the instructional video enhanced the performance of student in various cognitive domain such as comprehension, problem solving, abstract reasoning and critical thinking.

Furthermore, the researcher partially accepted the second null hypothesis because the various components of the instructional video such as objectives, content, activities and assessment has a partial effect on different cognitive domain such as comprehension, problem solving, abstract reasoning and critical thinking.

However, the researcher rejected the third null hypothesis because the features of the instructional video such as pronunciation, audio-sound, functionality and visual effect has no significant effect on the different cognitive domain such as comprehension, problem solving, abstract reasoning and critical thinking.

Based on the conclusions of this study, the following recommendations are forwarded:

1. EIM teachers in secondary schools in the Division of Laguna may use the developed instructional video as recommended by the Education Program Supervisor in TLE and approved by the Schools Division Superintendent.

2. EIM teachers may subject the developed instructional video to revisions, modifications and reconstructions in the future depending upon the needs of their students and the teachers too.

3. Future researchers may further validate the instructional video in teaching Electrical Installation and Maintenance.

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