

Development and Utilization of Instructional Video in Teaching Statistics and Probability

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Abstract

This study aimed to identify the level of Instructional Video's Component and Characteristics as a tool in teaching statistics and probability and to know if this teaching strategy affects the level of Performance based on the Pretest and Posttest results of Grade 11 Students of Laguna State Polytechnic University. The Grade 11 STEM students of Laguna State Polytechnic University and Junior and Senior High School Mathematics Teachers were the respondents for this study. The students are composed of 3 sections with a total of 112 samples, and the mathematics teachers are composed of 50 samples which are selected through purposive sampling to gather information and data in this study.

Based on the analyzed data, it was revealed that the level of developed video in teaching Statistics and Probability along its components and characteristics were all verbally interpreted as "Very High". The level of student's performance in Statistics and Probability as to Pretest was verbally interpreted as "Low" and on posttest was "moving towards mastery". It shows that there was a difference in the scores between the pretest and posttest after being exposed to the Instructional Video. Therefore, it was revealed that there is a significant difference in the Performance of Grade 11 Students in Statistics and Probability related to Pretest and Posttest, indicating that the null hypothesis was rejected. However, it was revealed that the Developed Instructional Video does not significantly affect the performance of Grade 11 Students in Statistics and Probability, indicating that the null hypothesis was accepted.

Based on the findings and conclusions, the following recommendations were drawn: (1) It is evident that instructional videos have the potential of being successful instructional tools based on the score of the students. The use of instructional video can be suggested by arousing student interest, helping focus on a topic, and helping students reach learning goals. (2) Since it was found that the Developed Instructional Video does not significantly affect the performance of the students, the researcher suggests that videos may be presented in an on-cam instructional video. Also, the researcher recommends that a teacher must have extensive knowledge about the content and information to be discussed in the video. (3) For teachers, the developed instructional video for statistics and probability can be a supplementary material for distance learning, especially for learners who can learn independently. (4) The researcher also recommends covering all the topics in statistics and probability in developing the instructional video and to formulate a more acceptable and excellent test. (5) As an implication for further studies, it is believed that designing an experimental study aiming to determine the effectiveness of instructional video compared to the regular online class session, to provide more reliable outcomes about the use of this instructional material. (6) The researcher recommends that the developed instructional video undergo evaluation and revision for utilization of materials in the DepEd Schools Division Office. (7) For future researchers, you may use this study for further improvement on the use of instructional video in teaching statistics and probability.

Keywords: Statistics and Probability; Instructional Video; Development; Utilization

1. Main Text

Introduction

Amid the COVID19 Pandemic, the educational system of the Philippines has been greatly affected. New ways of teaching and new ways of how learners will learn. In this kind of scenario, the instructional or teaching strategies of the teachers place a significant role in the new system of teaching and learning process. Nowadays online or virtual discussion is being used by some private and public schools to deliver the information and address the needs of the students. Virtual discussion is very similar to a face-to-face discussion in that they require moderation and active management by the teacher, preparation time, and summarization of the concepts covered. Online discussion is defined as communication between the teachers and students using interactive communication tools.

In line with this, it's challenging for both teachers and students to have a smooth and systematized interaction in a specific lesson. There are many problems and difficulties encountered during the Virtual Discussion. These hitches can't be evaded like

the internet connection, where everyone is experiencing it. As well as the teacher's knowledge in using the platforms for online/virtual discussion. In response to this problem, instructional videos can greatly help address the deficiency in virtual discussions.

The instructional video refers to the creation of videos that a teacher makes outside of class contact hours that specifically teach a concept or content. Kuiper, Carver, Posner, and Everson (2015) identified that this approach means that students can dramatically impact the pace of the course as it enables learners to proceed at their own rate. This has enormous implications for special needs students, who can view the video as many times as needed to ensure success (Plavnick, Sam, Hume, Odom; 2013).

These research aims are to address the difficulties encountered by the students and teacher during the Online Discussion using the Instructional Video as a teaching strategy for Statistics and Probability, and also to determine if Instructional Video significantly affects students' performance.

Background of the Study

In the year 2020, on the 16th day of March where the first coronavirus infection in the Philippines was confirmed. As time went by, suspected cases in the country were increasing so fast. As COVID-19 took hold, the Philippines and other countries across the world, entered lockdown with the closure of cultural and sports venues, all non-essential businesses, and schools. As a result, the end of the school year 2019-2020 has been so hard for all private and public schools in the Philippines on how they will continue the learning and eventually on conducting the recognition and graduation ceremonies.

As the Philippines opened up the academic year 2020-2021, the Department of Education provided three learning delivery modalities; Online Distance Learning, Modular Distance Learning, and TV/Radio-Based Instruction (DepEd Order No. 013, s. 2020). Some schools and universities adopted this kind of modality, including Laguna State Polytechnic University Santa Cruz Campus which offers an Academic and Technology and Livelihood Track for Senior High School students. Based on the LSPU-SHS Learning Continuity Plan S.Y 2020-2021, out of an estimated population of senior high school students of 684, 90.94% choose the Online Mode of Learning. In this kind of learning, there is a scheduled virtual discussion, and the rest of their schedule will be for their offline activities. In short, it's a combination of online and offline activities.

This mode of learning, especially in the virtual discussion, has been so challenging for both students and teachers. As I experienced as a teacher, there are some instances, students lost their connections, difficulties in operating the platform used in virtual discussion, and some external factors affecting the interaction between teachers and students. This problem occurs and is experienced by all private and public schools that utilize this kind of modality. In line with this problem that exists nowadays in the virtual discussion, in order for the students to acquire the desired knowledge, skills, and behavior following the Most Essential Learning Competencies (MELC), the researcher emphasizes the use of Instructional Video as an intervention to address the deficiency in the Virtual Discussion. This study aims to identify the level of use of Instructional Video in teaching statistics and probability and to know if the developed instructional video affects the performance of Grade 11 STEM Students of Laguna State Polytechnic University.

Theoretical Framework

A very useful theory to explore the benefits of Instructional Video is through the ways that it 'affords' teachers and students new possibilities when compared to a more traditional and technologically lacking classroom. Cope and Kalantzis (2009), out of the College of Education at Illinois, have proposed the 7 'e-affordances in eLearning' that outline the following elements which I will link to the possibilities of Instructional Video:

First, is ubiquitous learning. By making instructional videos widely and publicly available you allow your students the ability to watch, replay and revise key concepts consistent with retrieval-based approaches to learning (Karpicke, 2012; Karpicke & Grimaldi, 2012).

Second, is active knowledge-making. By making videos for students, you not only provide them with ever-accessible content but also a model for their video production. Further, by freeing up some of your own instructional time you are freed up to allow students to engage more freely and actively with their learning and explore new possibilities for learning pedagogies as a result of the time freed up.

Third, multimodal meaning. A particular passion of mine is the way that multimodal content allows for greater accessibility for students, for example, videos provide transcripts and captioning services that allow a broader range of students to access this content.

Fourth, is recursive feedback. Using audio, and more rarely video, feedback allows students to have, in theory, instant recursive feedback that can guide their thinking. Similarly, the comments section of videos allows students to engage with one another and the teacher to clarify key concepts and ideas.

Fifth is collaborative intelligence. As something of a side note, what I have enjoyed witnessing is seeing students work together to create a piece of knowledge of shared utility to them. As an example, there are several audiobooks on YouTube that students are actively time-stamping for chapters, key quotes, and sections to allow one another to share their knowledge and support one another through their explorations of the texts for their study.

The sixth is metacognition. Having students share experiences engaging with videos frees you up to ask students to explore and challenge misunderstandings of their own and discuss different approaches they have taken to engaging with that content.

Seventh, differentiated learning. The very concept of differentiation (Subban, 2006; Tomlinson, 2000) is something that is often contested by teachers and researchers as difficult or impossible to achieve (Brighton & Hertberg & Moon & Tomlinson & Callahan, 2005). This is in part due to the manner that differentiation places a burden of time and preparation upon teachers, this is something that cannot be overlooked regarding an instructional video. Whilst, I can attest to the fact that differentiated learning is possible when used in parallel with an instructional video, caution must always be considered in terms of the time required to achieve these dual goals.

Statement of the Problem

1. What is the level of developed instructional video in teaching Statistics and Probability along with its Components in terms of:
 - 1.1 objectives;
 - 1.2 content;
 - 1.3 instructional plan; and
 - 1.4 learning task?
2. What is the level of developed instructional video in teaching Statistics and Probability along with its Characteristics in terms of:
 - 2.1 visual quality;
 - 2.2 audio quality; and
 - 2.3 production quality?
3. What is the level of student's performance in Statistics and Probability in terms of:
 - 3.1 Pre-test; and
 - 3.2 Post-test?
4. Is there a significant difference between the performance in Statistics and Probability of Grade 11 STEM students related to pre-test and post-test scores?
5. Does the Developed Instructional Video in Statistics and Probability significantly affect the performance of Grade 11 STEM students?

Research Methodology

This research explores the use of instructional video towards learners' performance. However, specifically, it addressed the level using of Instructional Video in teaching statistics and probability and to know if this teaching strategy affects the level of Performance based on the Pretest and Posttest results of Grade 11 Students of Laguna State Polytechnic University.

Research Design

The One-group Pretest-Posttest Design which is a type of quasi-experimental method of research will be used in this study. In this design, the outcome of interest is measured 2 times: once before and once after exposing a non-random group of participants to a certain intervention/treatment (Reichardt CS., 2019).

Population and Sampling Technique

The study was about the Development and Utilization of Instructional Video. The respondents of the study are selected through Purposive Sampling which is composed of (112) Grade 11 STEM students from Laguna State Polytechnic University Sta. Cruz, Laguna which serves as the main respondents in this study. Selected students from Grade 11 Level will take the teachers' made test questionnaire.

On the other hand, the fifty (50) teachers who taught Mathematics subjects in the Junior and Senior High School Department will serve as the respondents to evaluate the level of Instructional Video.

Research Procedure

The researcher developed an instructional video to determine if this will affect the performance of the students in statistics and probability. The student's performance was measured through pretest and posttest in a multiple-choice type of test. Also, the proponent used a survey questionnaire which is validated and approved by the panel members to evaluate the Developed Instructional Video and gathered the data via Google Forms. Brief background of the study was provided to the respondents for them to know the study that the researcher conducted. The instructional videos developed by the researcher were validated by Master Teachers and Head Teachers in the field of Mathematics before utilizing it with the students.

After receiving the response of the respondents, the answer provided by the respondents will undergo statistical analysis to determine if there is a significant difference in the performance of grade 11 students related to pretest and post-test, and to know if the developed instructional video will affect the performance of the students. The data gathered will be interpreted accordingly and appropriately using different statistical treatments.

Research Instrument

The following research instruments were used in this study to know the Level of Developed Instructional Video in teaching Statistics and Probability and to determine if this will affect the performance of Grade 11 STEM students.

The survey questionnaire will be utilized to evaluate the level of Instructional Video in teaching Statistics and Probability. The questionnaire includes a checklist of various indicators. In a checklist questionnaire, a five-point scale rating is indicated in Table 1.

The researcher also formulated a multiple-choice type of test to identify the performance of the

Table 1. Likert Scale

Scale	Range	Verbal Description	Verbal Interpretation
5	4.20 - 5.00	Strongly Agree	Very High
4	3.40 - 4.19	Agree	High
3	2.60 - 3.39	Moderately Agree	Moderately High
2	1.80 - 2.59	Disagree	Low
1	1.00 - 1.79	Strongly Disagree	Very Low

students with the use of Instructional Video based on the results of Pretest and Posttest. According to the study of (Bibon, 2021), to analyze the result of the test in relation to the level of performance of the students, Table 2 will be utilized:

Table 2. Mean Percentage Score Scale

MPS Range	Verbal Interpretation
96 – 100	Mastered
86 – 95.9	Closely Approximating Mastery
66 – 85.9	Moving Towards Mastery
35 – 65.9	Average
15 – 34.9	Low
5 – 14.9	Very Low
0 – 4.9	Absolutely No Mastery

Statistical Treatment of Data

The following statistical tools will be utilized in this study:

a. Weighted mean and Standard Deviation was used to determine the level of developed instructional video in teaching Statistics and Probability in terms of its Components and Characteristics.

b. Mean and Mean Percentage Score was used to determine the

performance of students based on the pre-test and post-test scores.

c. T-test was utilized to measure the significance difference between pre-test and post-test of Grade 11 STEM students at Laguna State Polytechnic University.

d. ANOVA was utilized to know if the Developed Instructional Video significantly affects the performance of Grade 11 STEM students.

Results and Discussion

Level of Developed Instructional Video in Teaching Statistics and Probability along its Components

The level of instructional video in teaching Statistics and Probability along its components in terms of objectives, content, instructional plan, and learning task were treated statistically using weighted mean and standard deviation.

Table 3. Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Objectives

Statements	Mean	SD	Remarks
1. The objectives were clearly stated in the video.	4.86	0.35	Strongly Agree
2. The objectives were attainable and achievable by the students.	4.80	0.40	Strongly Agree
3. The objectives were presented in the video were parallel with the content of the video.	4.82	0.44	Strongly Agree
4. The objectives were aligned with Most Essential Learning Competencies.	4.78	0.42	Strongly Agree
5. The objectives were helpful to enhance the students critical thinking skills.	4.82	0.39	Strongly Agree

Overall Mean = 4.82 SD = 0.30 Verbal Interpretation = Very High

Table 3 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Objectives was Very High, which has a computed overall mean of 4.82 with a standard deviation of 0.30. This implied that objectives should be seen and identified by the viewers before the start of the discussion. The respondent strongly agreed that the objectives were clearly stated in the video which obtained the highest mean of (M=4.86, SD=0.35).

As stated by Shields (2020), learning objectives are the heart of every lesson. Objectives give purpose to learning. They are the foundations for lesson planning. Shields also indicated that objectives provide criteria for evaluating student achievement, and stresses that objectives ensure learning and know what is expected of them.

Table 4. Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Content

Statements	Mean	SD	Remarks
1. The content of the video is accurate and up-to-date.	4.82	0.48	Strongly Agree
2. The content of the video is generally useful.	4.84	0.37	Strongly Agree
3. The video is bias-free, including stereotyping concerning age, sex, ethnicity, race, physical impairment, values, dress, language, or social class.	4.92	0.27	Strongly Agree
4. The content of the video supports achieving the learning objectives.	4.96	0.19	Strongly Agree
5. The content is in-depth, enhances conceptual understanding and engages higher-order thinking skills and manipulative skills.	4.84	0.37	Strongly Agree

Overall Mean = 4.87 SD = 0.22 Verbal Interpretation = Very High

Table 4 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Content was Very High, which has a computed overall mean of 4.87 with a standard deviation of 0.22. This implied that video should stimulate, motivate and inform the learner to act on the information presented and learners should incorporate the ideas presented in their life. The respondents strongly agreed that the content of the video supports achieving the learning objectives which obtained the highest mean of ($M=4.96$, $SD=0.19$).

Research has shown that after using instructional videos, students tend to feel they have an enhanced understanding of content, and some studies have indicated better learning outcomes as evidenced by improved grades Wiese and Newton 2013. As supported in the study of (Vajoczki et al. 2011), that students believe that instructional video will increase their overall understanding of content and help them recall more of information presented.

Table 5. Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Instructional Plan

Statements	Mean	SD	Remarks
1. The video began with a motivating introduction to stimulate interest.	4.78	0.42	Strongly Agree
2. The content detail is controlled to promote understanding.	4.80	0.40	Strongly Agree
3. The video suggested methods for the learner to apply the newly acquired knowledge.	4.84	0.42	Strongly Agree
4. The video led to self-reflection for the learner.	4.74	0.44	Strongly Agree
5. The video met the learning objectives and needs of the learner.	4.90	0.30	Strongly Agree

Overall Mean = 4.81 SD = 0.27 Verbal Interpretation = Very High

Table 5 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Instructional Plan was Very High, which has a computed overall mean of 4.81 with a standard deviation of 0.27. This implied that the instructional plan of the video should be visually depicted fit the learning objectives, and should be made in the introduction. The respondents strongly agreed that the video met the learning objectives and needs of the learner, which obtained the highest mean of ($M=4.90$, $SD=0.30$).

Supported in (VDOE, 2011, p.3), that the purpose of instructional planning is to ensure that teachers are adequately prepared to meet the educational goals of all students, including various tools to design comprehensive lessons, that meet the learning objectives.

Table 6. Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Learning Task

Statements	Mean	SD	Remarks
1. The exercises provided in the video will keep the students engaged.	4.78	0.42	Strongly Agree
2. The activities in the video will enhance the understanding of the lesson.	4.88	0.32	Strongly Agree
3. The learning task in the video keeps an on-going record of the learner's progress and allows the teacher to monitor learner's performance.	4.76	0.48	Strongly Agree
4. It can be used to promote active learning.	4.76	0.48	Strongly Agree
5. It reinforces concepts necessary for mastery.	4.86	0.35	Strongly Agree

Overall Mean = 4.81 SD = 0.29 Verbal Interpretation = Very High

Table 6 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Components in terms of Learning Task was Very High, which has a computed overall mean of 4.81 with a standard deviation of 0.29. This implied that, learning task/activities were meaningful, ensures student development, and engage students that will enhance the understanding on the lesson. The respondents strongly agreed that the activities in the video will enhance the understanding of the lesson which obtained the highest mean of ($M=4.88$, $SD=0.32$).

According on the Session Outcomes Page (2021), activities should build on previous activities and avoid being repetitive, they should enable students to engage with and develop their skills, knowledge and understandings in different ways. Meaningful activities engage students in active, constructive, intentional, authentic, and cooperative ways. Useful learning activities are ones where the student is able to take what they have learnt from engaging with the activity and use it in another context, or for another purpose.

Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics

The level of instructional video in teaching Statistics and Probability along its characteristics in terms of visual quality, audio quality, and production quality were treated statistically using weighted mean and standard deviation.

Table 7 below revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Audio Quality was Very High which has a computed overall mean of 4.86 with a standard deviation of 0.21, and verbally interpreted as Very High. This implied that, in developing instructional video, audio must be precisely hear the content to be delivered in order to understand the lesson. Any incoherent sounds will disrupt delivery of learning to the students.

Table 7. Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Visual Quality

Statements	Mean	SD	Remarks
1. The background is appropriate for the video lesson.	4.76	0.47	Strongly Agree
2. Videos uses appropriate text format, images or symbols to highlight important learning concepts effectively	4.96	0.20	Strongly Agree
3. Text graphics remain on the screen long enough for the “average” reader to read them.	4.78	0.42	Strongly Agree
4. Video text available includes only minor errors in capitalization, punctuation, spelling, spacing and timing.	4.86	0.45	Strongly Agree
5. Video is recorded, editing and delivered in the highest HD resolution, typically 1920x1080 or 1440x1080.	4.90	0.30	Strongly Agree

Overall Mean = 4.85 SD = 0.23 Verbal Interpretation = Very High

The respondents strongly agreed that, the videos use appropriate text format, images or symbols to highlight important learning concepts effectively which obtained the highest mean of (M=4.96, SD=0.20). Quality of media within video lectures represents the appearance of the presentation and design of the video lecture, or essentially how the learner sees it (Heribanova et al., 2011). It is important to ensure that the quality of visual media is complementary to student engagement and ultimately learning.

Table 8. Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Audio Quality

Statements	Mean	SD	Remarks
1. Off-camera narration is clearly audible and listenable	4.78	0.42	Strongly Agree
2. There are no sounds of clothing or jewelry rubbing against the microphones.	4.92	0.27	Strongly Agree
3. The videos’ audio project a sense of likability and friendliness.	4.90	0.36	Strongly Agree
4. Audio level of the video was consistent throughout the video with no significant high or low incidents	4.84	0.37	Strongly Agree
5. There is no background noise, drop out, echo, or other unwanted noise is detachable.	4.88	0.33	Strongly Agree

Overall Mean = 4.86 SD = 0.21 Verbal Interpretation = Very High

Table 8 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Audio Quality was Very High which has a computed overall mean of 4.86 with a standard deviation of 0.21. This implied that, in developing instructional video, audio must be precisely hear the content to be delivered in order to understand the lesson. Any incoherent sounds will disrupt delivery of learning to the students.

The respondents strongly agreed that the are no sounds of clothing or jewelry rubbing against the microphones which obtained the highest mean of (M=4.92, SD=0.27). According to (Cunningham et al., 2010), audio issues involving intelligibility occur when students cannot recognize what is being said due to the level of the sound, the mechanical nature of the speech, or technical issues that make the sound distorted (Cunningham, Fägersten, & Holmsten, 2010). When audio is unintelligible, studies have found that it can disrupt the learning process, causing students to go back and replay the audio.

Table 9. Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Production Quality

Statements	Mean	SD	Remarks
Voice narration is delivered at a speed that is both natural sounding, and allows viewers time to process and comprehend the content.	4.76	0.48	Strongly Agree
Content is organized and presented in a logical, easy to follow sequence	4.92	0.27	Strongly Agree
The length of the video is appropriate to material covered and engaged attention span of intended audience.	4.90	0.30	Strongly Agree
Viewers feel a positive connection with the speaker or narrator based on how the narrator express himself to the audience.	4.84	0.42	Strongly Agree
Narrator uses inflection, cadence and pitch to emphasize key phrases, and to set the tone or mood of the video.	4.88	0.39	Strongly Agree

Overall Mean = 4.86 SD = 0.24 Verbal Interpretation = Very High

Table 9 revealed that the Level of Developed Instructional Video in Teaching Statistics and Probability along its Characteristics in terms of Production Quality was Very High which has a computed overall mean of 4.86 with a standard deviation of 0.24. This implied that in developing an instructional video, speed of voice narration is really essential. The narrator itself takes a vital part in developing the content of the video, in order the students effectively process the information disseminated by them.

The respondents strongly agreed that the content is organized, presented in a logical, and easy to follow sequence which obtained the highest mean of (M=4.92, SD=0.27). If visual media are delivered too quickly, student comprehension levels may suffer (Fisher et al., 2017). The speed at which auditory media are delivered also plays a role in the cognitive processing of online

learners (Mayer, 2014). The appropriate pace of instructor speech is important to ensure that learners effectively process information disseminated to them. Ultimately, speaking rates affect engagement and learning (Guo et al., 2014). Speech delivered quickly may overload learners, while speech that is too slow can fail to stimulate them (Koumi, 2013).

Level of Student's Performance in Statistics and Probability

The level of student's performance in Statistics and Probability in terms of Pretest and Posttest were treated statistically using mean and mean percentage score.

Table 10. Level of STEM Grade 11 Student's Performance in Statistics and Probability

Test	Mean	Mean Percentage Score	Verbal Interpretation
Pretest	15.49	34.42	Low
Posttest	32.97	73.27	Moving Towards Mastery

Table 10 revealed that the students' performance in Statistics and Probability in Pretest has a mean percentage score of 34.42 which is verbally interpreted as Low. On the other hand, the Posttest obtained 73.27 of mean percentage score which is verbally interpreted as Moving Towards Mastery. This implied that using the Developed instructional Video in teaching Statistics and Probability provides learning that increases student's knowledge and information on a certain course.

According to Munter (2014), it emphasizes that the pretest and posttest are the quantifying of the knowledge attained in the class from a group of students with diverse learning styles and educational backgrounds. More specifically, the test indicates how the students are learning in the course.

Difference between the Performance of Grade 11 Students in Statistics and Probability

To determine the difference between the performance in Statistics and Probability of Grade 11 students in Pretest and Posttest, the data gathered by the researcher were computed electronically using the SPSS, and treated statistically using Paired Sample T-test

Table 11. Test of Difference on the Performance of Grade 11 Students in Statistics and Probability related to Pretest and Posttest

Test	t-value	df	p-value	Verbal Interpretation
Pretest and Posttest	30.042	111	0.000	Significant

Legend:

P-value	Interpretation
P<0.05	Significant
P>0.05	Not Significant

Table 11 showed the Test of Difference on the Performance of Grade 11 Students in Statistics and Probability related to Pretest and Posttest obtained p-value of 0.000 which is less than 0.0.5, which is verbally interpreted as Significant. This implied that there is a significant difference on the performance of the students between pretest and posttest in Statistics and Probability related.

Therefore, the findings of this inferential statistics indicates that the null hypothesis will be rejected.

Instructional Videos and Performance of Grade 11 Students in Statistics and Probability

To determine if the developed instructional videos in Statistics and Probability affect the performance of Grade 11 STEM students, the data gathered by the researcher were computed electronically using the SPSS, and treated statistically using ANOVA. The table below shows the f-values and p-values of the following variables.

Table 12. Test of Effect of Instructional Video in the Performance of Grade 11 Students in Statistics and Probability

Instructional Video	Performance of Grade 11 Students	f-value	p-value	Verbal Interpretation
Components	Posttest	0.711	0.589	Not Significant
Characteristics		0.777	0.610	

Legend:

P-value	Interpretation
P<0.05	Significant
P>0.05	Not Significant

Table 12 showed the Test of Effect of Instructional Video along its Components and Characteristics in the Performance of Grade 11 Students in Statistics and Probability obtained p-values of 0.589 and 0.610 respectively which is greater than 0.0.5, which is verbally interpreted as Not Significant. It indicates that the Developed Instructional Video do not significantly affect the performance of Grade 11 STEM students in Statistics and Probability.

Therefore, the findings of this inferential statistics indicates that the null hypothesis will be accepted.

Parallel with the study of Castro Superfine et al. (2015) also found no effects of videos. In this quasi-experimental study, the authors investigated if the use of video cases supported pre-service elementary teachers' noticing of children's mathematical thinking. The authors found no significant differences between experimental and control groups in terms of their noticing of children's mathematical thinking but suggested that an additional factor to consider when using videos for instruction are the faculty and student perceptions.

Findings

Based on the gathered data, the findings of this study were the following:

1. The level of developed video in teaching Statistics and Probability along its components were all verbally interpreted as "Very High". It shows that the objectives, content, instructional plan and learning task in the instructional video were observed, as objectives were clearly stated in the video, the content of the video supports achieving the learning objectives. The video also met the learning objectives and needs of the learners as to its instructional plan. Lastly, the activities in the video enhance the understanding of the lesson.

2. The level of developed instructional video in teaching Statistics and Probability along its Characteristics were all verbally interpreted as "Very High". It shows that the visual quality, audio quality and production quality were reflected and seen in the instructional video. Where videos used appropriate text, format, images or symbols to highlight important learning concepts effectively. There are no sounds against the microphones. And lastly, its content is organized and presented in logical, and easy to follow the sequence.

3. The level of student's performance in Statistics and Probability as to Pretest was verbally interpreted as "Low" and on posttest was "moving towards mastery". It shows that there was a difference on the scores between the pretest and posttest after being exposed with the Instructional Video.

4. There is a significant difference on the Performance of Grade 11 Students in Statistics and Probability related to Pretest and Posttest.

5. The Developed Instructional Video do not significantly affect the Performance of Grade 11 Students in Statistics and Probability.

Conclusion

In view of the aforementioned findings, the study has drawn the following conclusion. The hypothesis stating that there is no significant difference between the performance in Statistics and Probability of Grade 11 STEM students related to pre-test and post-test scores was rejected. However, the developed instructional video does not significantly affect the performance of Grade 11 STEM students based on the gathered data resulting to accept the hypothesis, indicating that the null hypothesis was accepted.

Recommendations

In the light of the foregoing finding and conclusions of this study, the following recommendations are offered:

1. It is evident that instructional videos have the potential of being successful instructional tools based on the score of the students. The use of instructional video can be suggested by arousing student interest, helping focus on topic, and helping students reach learning goals.
2. Since it was found out that the Developed Instructional Video does not significantly affect the performance of the students, the researcher suggests that videos may be presented in an on-cam instructional video. Also, the researcher recommends that a teacher must have an extensive knowledge about the content and information to be discussed in the video.
3. For teacher, the developed instructional video for statistics and probability can be a supplementary material for distance learning especially for learners who can learn independently.
4. The researcher also recommends to cover all the topics in statistics and probability in developing the instructional video, and to formulate a more acceptable and excellent test.
5. As an implication for further studies, it is believed that designing an experimental study aiming to determine the effectiveness of instructional video compared to regular online class session, to provide more reliable outcomes about the use of this instructional material.
6. The researcher recommends that the developed instructional video undergo evaluation and revision for the purpose of utilization of materials in the SDO.
7. For the future researchers, you may use this study for further improvement on the use of instructional video in teaching statistics and probability.

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