YouTeaching in the New Normal: Effectiveness of Teacher-Made YouTube Video Lessons in Improving Students' Learning Performance on Random Variables

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ABSTRACT

This action research was carried out to aid the learners in distance learning education due to the forced closure of schools brought about by the COVID-19 pandemic. The purpose of this study was to determine the effectiveness of teacher-made video lessons about Random Variables uploaded on YouTube. True experimental research design was utilized in this action research. The participants of this study were thirty (30) Grade 11 students from 2 sections of the General Academic Strand. Fifteen (15) randomly selected students from each section were assigned to the control and experimental group, respectively. The data obtained were statistically analyzed using mean, standard deviation, Independent t-test, and Paired t-test. The results showed that students from control group (M = 9.67, SD = 1.54) and experimental group (M =9.33, SD = 1.63) had pretest results that were not significantly different (p=.570). This means that the two groups were comparable. On the other hand, the Independent t-test comparing the post-test scores of the two groups revealed that there was a statistically significant difference (p=.000) in the performance of the students from the experimental group (M =41.53, SD = 3.29) and control group (M =32.93, SD = 3.35) after the intervention. Students in the experimental group had higher posttest scores compared to the students in the control group. This leads to the conclusion that teacher-made YouTube videos on Random Variables is an effective supplementary instructional material to improve student's learning performance.

Keywords— COVID-19 Pandemic, New normal education, Teacher-made video lessons, YouTube, Random Variables, Learning Performance

INTRODUCTION

Mathematics is well-thought-out essential in all facets and fields in education. Every day we encounter numbers and mathematically related things that may be complex or not but are of vital importance. Mathematics is used for computation and mainly as a tool for more profound comprehension of concrete things. The importance of this discipline cannot be repudiated since it plays a significant role in forming the foundation of all other sciences concerned with numbers, operations, configuration, interrelation, and the like. Although mathematics is imperative, it has been less popular with students because of its intricacy and rigor. It is evident in the poor performances of the students in mathematics.

Poor mathematics performance of Filipino learners has been a big problem for many years in the Philippine educational system. In the 2018 Program for International Student Assessment or PISA results, the Philippines ranked 78th in Mathematics out of 79 participating countries. Relatively, students' mathematics performance on the 2018 National Achievement Test (NAT) has been steadily declining over the last three years, placing them in the "poor mastery" category, according to the Department of Education's descriptive level (Albano, 2019).

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Results in international standardized examinations are irrefutable proof of the educational crisis in the Philippines. Based on the report released by the World Bank in 2021, with its findings on the three international assessments the Philippines has partaken: the PISA in 2018, TIMSS in 2019, and the first cycle of the SEA- PLM in 2019, more than 80% of the students in the Philippines had below minimum levels of proficiency expected of them (Gita- Carlos, 2021). In other words, four out of five learners do not know what they should know at their grade level.

The undeniable low performance in mathematics could be made worse by the COVID-19 pandemic as we all live amidst a potentially great menace in our lifetime to global education. The closing of schools and prohibition of the conduct of face-to-face classes have been devastating to students who are stuck at their homes with little to no access to learning Mathematics. This unfortunate situation could cause them to lag behindhand in their learning.

With the forced closures of the schools worldwide, most countries, including the Philippines, adopted modalities limiting face-to-face interaction between teachers and students. Due to the increasing demand for a more flexible learning opportunity, schools throughout the Philippines shifted to distance learning to address the growing educational necessity. Distance learning allows the students to learn at their own pace, making them become independent learners. Learning materials such as modules, books, activity sheets, and the like are given to them as their resources to learn the required competencies in every subject area.

The concerted effort in the Department of Education gave birth to the Basic Education Learning Continuity Plan (BE- LCP) under DepEd Order No. 12, s. 2020. The continuity plan is designed with a legal framework responsive to the "new normal" setup. Under the new normal education in the Philippines, three types of delivery modalities are being implemented. The most common is modular distance learning, which features individualized instruction that allows learners to use self-learning modules (SLMs), learner's materials, textbooks, activity sheets, and study guides in print or digital copy from the Department of Education (Malaya, 2020). Next is online distance learning, which requires various technologies to facilitate communication between teachers and students (Berg, n.d.). Lastly, television and radio-based instruction, in this modality, educational materials and instructions will be broadcasted (Cantiga, 2020). These delivery modalities are viable for students to learn independently.

The drastic shift to distance learning adds even more daunting challenges to the students. Based on the survey done by Cambridge University Press that reached over 100 countries around the world, half of the learners said that remote learning is more complicated than they thought it would be (Brzoska, 2020). Students are lost and anxious in this new normal education. In a Rappler Talk interview, a Filipino senior high school graduate said she found the remote learning setup really difficult (Magsambol, 2021). Hence, self-paced learning does not work for most learners.

The pandemic paved the way for the learners to become independent learners. However, most students do not possess the soft skills of autonomous learning- an essential skill for learners in the new normal. Consequently, a significant number of students find it hard to cope with the new normal education. In a study conducted by Rotas and Cahapay (2020) on the difficulties in remote learning Filipino students face, one of the categories of difficulty they found is the limited teacher scaffolds. It delineates the students' need for a teacher who will support and guide them to develop and learn a new concept or skill and eventually move towards greater independence in the learning process.

Teacher scaffolds are much needed in learning complex subjects like Mathematics. According to Jerome Bruner, children need help from teachers and adults through active support when they learn new concepts until they become more independent in their thinking and acquire new knowledge and skills (Wheeler, n.d.). Students learn better when there is a teacher who models how to solve math problems. Correspondingly, it

helps them ignite their motivation to know more about the concept being taught. Modeling helps students acquire the technical know-how they need and successively develop their ability to solve other mathematics problems.

During this challenging time of the pandemic, the teachers must go the extra mile to support the students. To utilize and maximize what is available and take the initiative in providing better education in the time of COVID- 19 pandemic—evaluate the situation and look for solutions to the problem. As Dr. Valenzuela, the SEAMEO secretariat director, said, "We are in an era of technology and digitalization. Let us maximize all of these and continue to help each other and find solutions to the challenges that the educational sector is confronted with" (Amadora, 2020). Teachers need to challenge themselves to remain up-to-date with advances in technology and utilize it to produce engaging lessons, prepare students for the future, and eradicate that global achievement gap (Hunter & Jordan, 2009). Taking these steps could create an impact not only on the students but on the whole educational system.

Currently, technology is progressively growing its importance in the education sector. It has been incorporated into a good number of curriculums, even in non-technology and computer programs. These days, students rely on technology to accomplish their academic requirements and attain the competencies in their courses. Just a simple press of a button gives them the answers they are looking for. With the advent of technology, students are able to adapt to the new form of education.

The use of videos emerged as an element of technology application with a significant impact on students' learning experiences in mathematics. According to Kaur (2018), video technology can be a powerful tool as an engaging delivery system, especially when used as an active learning approach. It can also be an extremely effective intrinsic motivator and has a significant and positive impact on student's motivation and interest. Mccollum (2018) specified that one way to enhance learning outcomes and student performance is by utilizing videos as a teaching aid within and beyond the four walls of the classroom.

Videos are readily available on various social media platforms, and YouTube, amongst all, is the most popular platform for educational videos. One of its notable features that resulted in its widespread use is that videos from this video viewing and sharing site are entertaining to watch, and learners can watch them many times. According to Hashmi (2020), internet users watch a video on YouTube four times more than any other social media platform. During this time of the pandemic, the number of YouTube users has grown significantly. As of March 2021, YouTube holds the top position as the best Web 2.0 website worldwide, with an estimated one billion unique monthly visitors (eBizMBA, 2021).

Undoubtedly, YouTube is a prominent e-platform for learners to self-teach and enhance their learning skills in Mathematics during the COVID-19 Pandemic. In the study of Huda, Wahyuni and Fauziyah (2020), students had a good perception of online mathematics learning using YouTube and was positively associated with their learning achievement in mathematics. Likewise, Maziriri, Gapa and Chuchu (2020) showed that student's attitudes towards the use of YouTube had a significantly strong correlation with their behavioral intentions, suggesting that this e-platform is of immense help to the students at the tertiary level. While, based on the research of Marsudi, Lestari and Hidayati (2021), students who studied using YouTube with an ethnomathematical application had a positive effect on their conceptual cognitive ability and had better performance compared to those students who studied conventionally. Moreover, Baer and Vargas (2021) showed that watching video lessons from YouTube is effective and can be a probable approach to improving the mathematics achievement of senior high school learners in the Philippines.

Research on integrating mathematics videos in the teaching and learning process is constantly growing. Previous studies have examined the impact of the use of (mathematics) videos on the learning performances of the students through different interventions (Hsin & Cigas , 2013; Jacobson, 2015; Mirani & Ramon, 2015; Otto, 2015; Fößl, et al., 2016; Myllykoski, 2016; Sharma, 2018; McCollum, 2018; Hall, 2019).

Studies with similar context were also conducted during the COVID-19 pandemic (Luna-Lucero, et al., 2020; Salsabila & Pradipta, 2021; Naidoo & Hajaree, 2021; Marbán, et al., 2021). Furthermore, research about the use of mathematics videos from YouTube during the pandemic has likewise arisen (Maziriri, Gapa & Chuchu, 2020; Attard & Holmes, 2020; Huda, Wahyuni & Fauziyah, 2020; Marsudi, Lestari & Hidayati, 2021; Baer & Vargas, 2021).

Despite the availability of YouTube research and research on the use of mathematics videos in improving students' mathematics performance, it is critical to note that there is still a dearth of empirical evidence about the significant impact on the students' mathematics performance using math videos from YouTube. The novelty of this research lies in using teacher-made instructional math videos to enhance the performance in finding the mean, variance, and standard deviation of the discrete random variables of the Grade 11 General Academic Strand students of Leyte National High School in a distance learning class setting. The teacher-made videos that were used in this research were uploaded or shared on YouTube so that students will be able to watch them at their homes. The researcher chose YouTube as the video viewing and sharing site in delivering the videos because aside from its popularity, YouTube has a feature that allows users to download the video for offline viewing. A helpful feature in the conduct of this study since poor internet connectivity has long been a problem in the Philippines.

Several YouTube videos from different creators have been proven to affect the student's learning outcomes positively. However, due to the myriad of videos available on YouTube, students might not be able to watch the right video aligned with their lesson. A teacher-made video that was made available on YouTube as a form of modeling could significantly improve students' performance since the teacher can create a video with utmost adherence to the learning objectives and competencies of the given topic.

LITERATURE REVIEW

Education has played a critical role in molding civilizations since the dawn of human history. However, due to changing times and growing competition, specializations in preferred fields and discipline, and means of transferring and disseminating information and knowledge, education has developed to a multifaceted level in the contemporary world (Agarkar and Brock, 2017). Today's competitive world necessitates education as vital for man after food, clothing, and shelter. It has and will always be an avenue – the ultimate path towards success. Education can be viewed metaphorically as the backbone of every man's life and society. It empowers minds to conceive good thoughts and ideas and prepares a nation to be personally, socially, and economically developed. As the great Nelson Mandela once uttered, "Education is the most important asset you can utilize to transform the world."

Teachers are the core of the education system and act as an essential agent of bringing social change by enabling their students as good human beings and what they want to become, viz., a doctor, an engineer, a manager, and the like. (Asadullah & Shafeeq, 2019). Teachers have taken on a substantial role in society by educating today's youth and preparing them for the ever-changing technological demands by incorporating different technology-driven platforms in pedagogy and instruction.

The unprecedented shift of the educational setup from face-to-face instruction to distance teaching and learning during the COVID-19 pandemic brought about a real challenge for teachers and learners. To meet the difficulties of the new normal schooling, stakeholders in the education industry are turning to technology. In the global context, technology is seen as extremely prevalent in society today, so educational institutions need to take advantage of this medium to improve students' pedagogical process and learning achievement amidst the COVID-19 pandemic. The use of various technologies in mathematics education has become extensive in recent years, and its positive impact is accumulating considerable evidence. One crucial way that the technology is utilized is to make instructional videos for mathematics classes that have

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already proven to play a pivotal role in mathematics education at all levels.

The COVID- 19 pandemic has caused students to widely use videos as a form of instructional materials as they adjust to the new normal education scheme. A video is a type of multimedia that transmits information across two sensory channels at the same time: auditory and visual. It frequently employs a variety of presentation styles, such as verbal and pictorial representation in the case of on-screen print and closed captioning in the case of closed captioning (Mayer, 2001; as cited in Kaur, 2018, p. 5). Technology allows mathematics students to access and utilize instructional video tutorials, allowing for modeling, observation, collaboration with peers, and the development of self-efficacy that theorists characterize as necessary in social learning.

Video technology has an advantage because of its innovative features that make the discussion more interesting to students. One of the significant advantages of video technology is that it can focus on facts that could not be readily presented in a typical classroom setting due to limitations such as size, location, and cost This can be anything as simple as access in a natural setting in the classroom. However, because watching videos is a passive activity, it should be employed as part of an active learning technique to be effective, particularly in keeping students' attention (Houston, 2000; as cited in Kaur, 2018, p. 8).

According to Kaur (2018), when video technologies are utilized as part of an active learning strategy and the same target structures are presented, they can have a considerable influence. The learning process necessitates repetition, and video technology provides another channel of possibilities. Because of the number of options available, video technology is a great learning approach that is employed in a wide range of scenarios. It allows students to put their intellectual abilities to the test in situations that they may encounter that cannot be accurately duplicated in the classroom. Furthermore, video technology can be employed to allow pupils to exhibit their comprehension skills. In the classroom, video technology can enhance students' inherent skills to acquire, process, and apply their knowledge. They can also be utilized to actively engage students in the learning process. Through active learning approaches and multimedia materials, students can be encouraged to take on the role of educator.

There are several types of social applications or platforms where educational videos or mathematics videos may be available; some of these are the following: Facebook, Instagram, Twitter, Khan Academy, teacher blogs and YouTube. These platforms require an internet connection so students can access them and watch the educational videos they want to watch.

YouTube is a video-based multimedia platform founded in 2005 by Chad Hurley, Jawed Karim, and Steve Chen. In 2016, the Statistics Brain Research Institute reported that the "hours of video uploaded per minute" on YouTube has increased from 13 hours in 2008 to 300 hours in 2016. Hence, YouTube is the third most visited website in the world. Every day, about five billion videos are viewed on YouTube (Sharma, K. J., 2018). YouTube can be utilized to upload and download videos. "YouTube is one of the many video sharing sites available on the Internet. Students, parents, or teachers can share and view videos without downloading files to their computers.

YouTube videos can be played in the classroom to provide additional resources to support the teacher. YouTube videos are free, easy to use and provide various learning tools for the teacher to use in the classroom. YouTube is one of the largest accessible databases in the world. It presents insightful information and entertaining videos to viewers all over the world. In education, integrating videos in math class is one way to formulate a real-world application to improve problem-solving skills for students. Students come across videos every day in a variety of ways. Videos are mainly used for entertainment purposes, but videos are being used more and more in education. The ability to capture and share video enables students and teachers to share how mathematics is used in the real world and do this in more meaningful and vivid ways than through text or verbal description alone. Educators are turning to YouTube

to help students improve their math skills. Students can apply the real-world application of mathematics on YouTube. It is also a technologically possible technique of providing students with online assignment tutoring support. It's vital to ensure that all students have access to YouTube videos via libraries, through Internet at home, or DVDs (Stohlmann, 2012; as cited in Mccollum, 2018, p. 38)

Technology plays a crucial role in ensuring quality education and the use of technological platforms is immensely widespread, especially during this challenging time of the COVID-19 pandemic. It helps the students learn concepts without the help of their teachers. A platform like YouTube is seen to be potentially beneficial to students' learning acquisition, especially in improving their mathematics performance.

The positive impacts on the integration of video technology available from online platforms in the teaching-learning process are lone evident to the countries with stable internet connectivity and students who have the means to access them. Since the locale of the study does not have stable internet connectivity and not all student- respondents have gadgets, this study primarily focused on the use of YouTube, where teacher-made video lessons were uploaded. YouTube was used in this study since videos in this video-viewing site can be downloaded even with unstable internet connectivity for future viewing. At the same time, teacher-made video lessons were uploaded instead to guarantee that the content of the video adheres to the lesson's learning objective.

A**ction Research Questions**

This study aimed to identify if teacher-made videos in finding the mean, variance, and standard deviation of the discrete random variables shared on YouTube can improve the performance of the Grade 11 GA students of Leyte National High School. This action research sought answers to the following questions:

1. What are the pretest and posttest results in finding the mean, variance, and standard deviation of the discrete random variables of the control group and experimental group?
2. Is there a significant difference between the pretest and posttest result of the:
    - control group, and
    - experimental group?

3. Is there a significant difference between the control group and experimental group in the:
    - pretest results, and
    - posttest results?

Null hypotheses

This action research tested the following hypotheses:

1. There is no significant difference between the pretest and posttest of the:
    - control group, and
    - experimental group
2. There is no significant difference between the control group and experimental group in the:
    - pretest results,
    - and posttest results

RESEARCH METHODS

Research Design

The true experimental research design, a quantitative type of research was employed in this study to identify

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the effectiveness of teacher-made video lesson in Statistics and Probability on finding the mean, variance, and standard deviation of the discrete random variables uploaded to YouTube. This design is commonly used to establish the effect an independent variable has on a dependent variable. In addition, the true experimental research design was utilized since there were experimental group and control group in the study. Correspondingly, participants were assigned to the two groups randomly.

The pretest and posttest were given to both the control and experimental groups. Before the experiment, a pretest was provided. A posttest followed after the experimentation. The scores in the pretest and posttest of students in the two groups were compared, and significant differences were determined. In addition, the significance of the difference between each group's pretest and posttest was calculated to establish if there is a significant increase in scores. The t-test for independent sample groups and paired t-test was used in the statistical analyses.

Participants

The study participants were two sections out of the six sections in grade 11 General Academic Strand at Leyte national High School and their Statistics and Probability teacher. One section was assigned as the control group (without video lesson) from the two randomly selected sections and the other was the experimental group (with video lesson). The researcher excluded students who did not get at least an average grade of 85% in their General Mathematics subjects from the sampling frame to avoid the possible existence of covariate variable in the study. The researcher randomly chose 15 students from each section so that distribution in the two groups will be approximately the same in terms of their aptitude in Mathematics

Data Collection

The data were collected using a researcher-made test for the pretest and posttest. It contains 11 problems about finding the mean, variance, and standard deviation of the discrete random variables. Each problem was given 5 points, hence the highest score in the test is 55. Students received a printed copy of the pretest and posttest during the distribution of their self-learning modules. Accomplished pretest and posttest were submitted in the next distribution of their modules. The teacher-researcher was the one who checked the pretest and posttest of the students. The results of which were tallied in preparation for the statistical analysis.

The researcher sought permission to conduct the study from the concerned Division Officials and school head of Leyte National High School. Students' consent was required for them to be included as participants of the experiment. Confidentiality of the results was assured to the groups of participants in the study. They were informed of their rights, including the ability to consent or reject to participate in the study at any time.

Data Analysis

In analyzing the data, the following statistical procedures were applied: Mean and Standard Deviation were used as the descriptive measures of the performance of the students in the pretest and posttest. Generally, t-test was used to determine the significant differences between and within the means of two groups in this study because the researcher made sure that no covariate variable such as the average grade of the students in General Mathematics may affect the results Moreover, the data gathered met the assumptions for using t-test. Specifically, the Paired t-test was used to determine the significance of increase between the pretest and posttest of each group. While Independent samples t-test was used to determine the difference in the pretest and posttest scores between the experimental and control groups.

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Intervention

This study used a teacher-made video lesson in finding the mean, variance, and standard deviation of the discrete random variables that was uploaded to YouTube as a platform to improve the students' learning performance. The teacher-made video lesson was made available to the grade 11 GA students assigned as the experimental group.

The students' Statistics teacher was the one who created the video lesson about Random Variables to ensure that the content of the video is connected with the topic and meets the lesson objectives. Since YouTube is the most common and popular video sharing and viewing site among students, it was utilized to share the teacher-made video lesson. Moreover, YouTube has a feature that allows users to download the video for later viewing. This feature is of immense help in carrying out the study since most students suffer from poor internet connectivity in their respective places. Hence, once the video is downloaded from the site, students can watch the video without interruption, even if the internet connection is poor.

In YouTube, only users with an account or channel can upload videos to the site. The teacher then created a channel to conduct this study. He sent the link of his YouTube channel to the students in the experimental group to have access to the teacher-made video lessons about Random Variables. On the other hand, students in the control group was instructed to refrain from watching any videos from YouTube and only use the self-learning module given to them to ensure that the study results are accurate. During the implementation of the intervention, the researcher monitored the students in both the treatment and control groups.

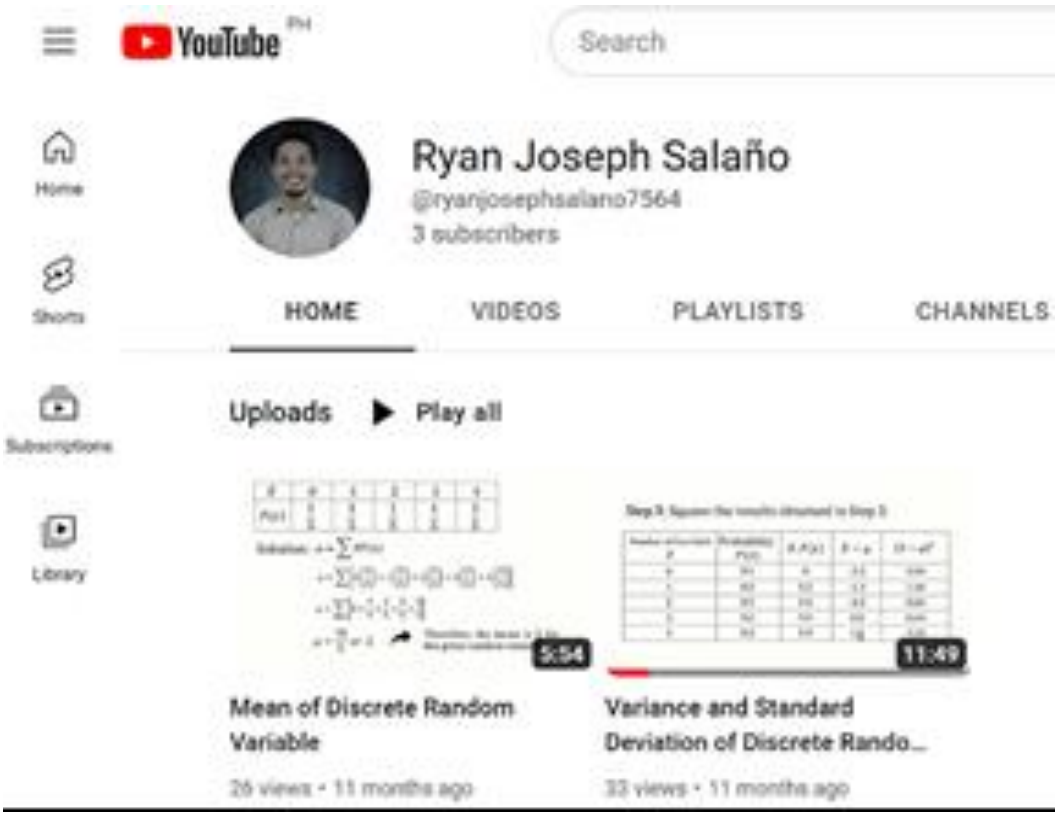

Fig. 1. YouTube channel of the researcher

RESULTS AND DISCUSSION

Results

Research Question number 1.

TABLE I PRE-TEST SCORES OF THE STUDENTS IN THE CONTROL AND EXPERIMENTAL GROUP

Pre-test Scores	Experimental Group		Control group		Total
	f	%	*f*	%	
6-10	11	73.33	11	73.33	22
11-15	4	26.67	4	26.67	8
Total	**15**	**100**	**15**	**100**	**30**

As seen in the table, 11 or 73.33 percent students from each group had pre-test scores between 6-10 over 50. While, 4 students or 26.67 percent of the participants from each group had scores between 11-15.

TABLE 2 POST-TEST SCORES OF THE STUDENTS IN THE CONTROL AND EXPERIMENTAL GROUP

Post-test Scores	Experimental Group		Control group		Total
	f	%	*f*	%	
26-30	3	20	0	0	3
31-35	9	60	0	0	9
36-40	2	13.33	6	40	8
41-45	1	6.67	7	46.67	8
46-50	0	0	2	13.33	2
Total	**15**	**100**	**15**	**100**	**30**

In the post-test results, most of the scores of the students in the control group fall between 31-35, 9 students in total, 3 students had scores 30 and below, 2 had scores between 36-40, and only 1 student got a score between 41-45. On the other hand, there were 6 students from the control group who got scores between 36-40, 7 students had scores between 41-45, and 2 students had scores between 46-50.

Research Question number 2.

TABLE 3 PAIRED T-TEST OF PRETEST AND POST-TEST SCORES OF CONTROL GROUP

Control Group	n	M	SD	t	df	p-value	decision
Pre-test	15	9.67	1.54	33.23	14	.000	reject Ho
Post-test	15	32.93	3.35				

The test scores in finding the mean, variance, and standard deviation of the discrete random variables of the control group were compared before and after the lesson. On average, the students in the control group performed better in the post-test (M=32.93,SD=3.35) than in the pre-test (M=9.67,SD=1.54). This improvement, 23.26, was statistically significant, $t(14)=(33.23), p<.000$.

TABLE 4 PAIRED T-TEST OF PRETEST AND POST-TEST SCORES OF EXPERIMENTAL GROUP

Experimen-tal Group	n	M	SD	t	df	p-value	Deci-sion
Pre-test	**15**	**9.33**	**1.63**	**45.67**	**14**	**.000**	**reject Ho**
Post-test	**15**	**41.53**	**3.29**				

The test scores in finding the mean, variance, and standard deviation of the discrete random variables of the experimental group were compared before and after the intervention. On average, the students in the experimental group performed better in the post-test (M=41.53,SD=3.29) than in the pre-test (M =9.33,SD=1.63). This improvement, 32.2, was statistically significant, $t(14)=(45.67), p<.000$

Research Question number 3.

TABLE 5 INDEPENDENT SAMPLES TEST RESULTS COMPARING THE PRE-TEST SCORES OF CONTROL AND EXPERIMENTAL GROUP

Group	n	M	SD	df	p-value	decision
Control	15	9.67	1.54	28	.570	do not reject Ho
Experimental	15	9.33	1.63			

The results indicate that the mean pretest scores for control group and experimental group are 9.67 and 9.33, respectively. Looking in the Standard Deviation column, it can be seen that they are exactly equal, and they are close enough to assume equal variances. Since, the p-value (.570) for the independent samples t-test is greater than the standard significance level of 0.05, we cannot reject the null hypothesis. The sample data do not support the hypothesis that there is difference between the pre-test scores of control and experimental group. Hence, students in both groups had the same performance in the pre-test on Random Variables.

The 15 participants in the experimental group (M =9.33, SD = 1.63) compared to the 15 participants in the control group (M = 9.67, SD = 1.54) demonstrated a not significant score difference between in their pre-test scores.

Group	n	M	SD	df	p-value	decision
Control	15	32.93	3.35	28	.000	reject Ho
Experimental	15	41.53	3.29			

TABLE 6 INDEPENDENT SAMPLES TEST RESULTS COMPARING THE POST-TEST SCORES OF CONTROL AND EXPERIMENTAL GROUP

The mean difference between post-test scores of control and experimental groups is -8.60, this can also be interpreted as an 8.60 – point higher from the post-test scores of control group to experimental group. The mean difference is negative because post-test scores of the experimental group were subtracted from the post-test scores of the control group. The 95% confidence interval for that difference is -11.08 to -6.12. Take note that if both sides of the interval have the same sign, the limits should be converted to positive. Hence, the confidence interval indicates that the increase in scores from pre to post was somewhere between 6.12 to 11.08 points. Moreover, the confidence interval tells how precise the estimate of the difference is. In this case we can be 95% confident that the population difference between post-test scores of the control and experimental groups is between 6.12 to 11.08 points. Since the confidence interval does not cover zero, there is at most 5% probability that the population difference is 0. When the 95% confidence interval does not cross zero, there will be a difference that will be significant at $p < .05$, and this is supported with the obtained p– value of < .000 (in the last column, “Sig. (2- tailed)” is “.000”)

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DISCUSSION

The primary objective of this study was to determine the effectiveness of teacher-made YouTube videos in improving the performance of the grade 11 students in Statistics and Probability, particularly, about finding the mean, variance, and standard deviation of the discrete random variable.

In the initial descriptive of this study, it was determined that 22 out of 30 or 73.33 percent of the students from both groups had pre-test scores between 6-10 over 50. Moreover, most of the scores of the students (N= *9*) in the control group fall between 31-35, while, majority from the control group (N=*7*) got scores between 41-45. Lastly, the control group's pretest mean and standard deviation were 9.67 and 1.54, respectively. While the mean value and standard deviation for the experimental group were 9.33 and 1.63. The mean and standard deviation were higher in the control group.

The paired t-test of pretest and post-test scores of Control Group revealed that the students in the control group performed on average better on the post-test (M=32.93,SD=3.35) than on the pre-test (M=9.67,SD=1.54). Statistically speaking, this improvement, 23.26, was significant (t(14)=(33.23), p .000). On the other hand, the experimental group did much better in the post-test (M=41.53, SD=3.29) than in the pre-test (M=9.33, SD=1.63). This increase, 32.2, was also statistically significant, t(14)=(45.67),p.000.

For the Independent samples test results comparing the Pre-test scores of Control and Experimental group, it presented that the sample data do not support the premise that there is a difference between the control and experimental groups' pre-test scores. Thus, students in both groups performed the same on the pre-test in finding the mean, variance, and standard deviation of the discrete random variables.

Finally, Independent samples test results comparing the Post-test scores of Control and Experimental Group revealed that the post-test scores of the control and experimental groups have a mean difference of -8.60, which can also be translated as an experimental group score that is 8.60 points higher than the control group score. Because the post-test scores of the experimental group were deducted from the post-test scores of the control group, the mean difference is negative. That difference has a 95 % confidence interval ranges from -11.08 to -6.12. Since, the limits should be made positive if the interval's two sides have the same sign. Therefore, according to the confidence interval, the improvement in scores from pre to post ranged from 6.12 to 11.08 points. Additionally, the confidence interval reveals how accurate the difference estimate is. In this instance, we have a 95% confidence interval for the population difference between the post-test scores of the experimental and control groups, which ranges from 6.12 to 11.08 points. There is only a 5% chance that the population difference is zero because the confidence interval does not include zero. The obtained p-value of .000 (in the last column, "Sig. (2- tailed)" is ".000") supports the hypothesis that there will be a difference that will be significant at $p<.05$ when the 95% confidence interval does not cross zero.

In general, data showed that there was a significantly large difference in the performance of the students from the experimental group and control group after the intervention. This leads to the conclusion that Teacher-made YouTube videos about finding the mean, variance, and standard deviation of the discrete random variables are an effective supplementary instructional material to improve student's learning performance.

In corpus of literature, there are a number of studies conducted on students with the general aim to determine the effectiveness of educational videos from different platforms and modes to improve the performance of the learners. In these related studies, similar results were obtained from our study.

According to Hsin and Cigas (2013), integrating videos in an online course boosted student satisfaction and raised the likelihood that they would pass the course. Furthermore, Mirani and Ramon's (2015) research revealed that students who watched quick video lessons for arithmetic consistently had higher passing rates than those who did not. The significant number of pupils thought the movies were beneficial.

The team-based learning and lecture video acceleration classroom, according to Jacobson (2015), can give students a more productive and efficient learning environment. While, Fößl, Ebner, Schön, and Holzinger (2016) showed that a video-supported seamless learning environment greatly improved the learning performance of primary school students. The usage of tools by students during remedial mathematics lessons was examined by Myllykoski (2016), who demonstrated how educational videos are a beneficial addition to remedial mathematics. Math remedial instruction via videos is a successful strategy for teaching students the subject. However, because it has little to no impact on students' performance, employing mathematical movies as lessons is not practical (Kahrmann, 2016).

According to Sharma (2018), consistent exposure to videos and real-life activities effectively improves the students' mathematics achievement since the performance of the classes receiving the videos was greater than classes receiving only some of the unique instructional treatments. While in the study of McCollum (2018), utilizing EngageNY online homework videos increased parental involvement in a rural school in a Midwest state. It also made a significant difference in homework completion rate at a rural grade school in a Midwest state. It made a remarkable difference to the students' math achievement in a rural school of a Midwest state. Whereas Hall (2019) proposed that computer-assisted technology can impact students' mathematics learning outcomes, self-efficacy, and anxiety.

Maziriri, Gapa and Chuchu (2020) showed that students positively perceive YouTube as an educational tool for learning and tutorials. There was a significant relationship between student attitudes toward YouTube and behavioral intentions, possibly indicating that this e-platform is a success with student learning at the tertiary level. Additionally, Marsudi, Lestari, and Hidayati (2021) demonstrated that, after controlling for baseline skills, students learning using Corel Video Studio X10 with an ethnomathematical application via YouTube had a positive impact on their conceptual cognitive ability and outperformed those learning traditionally.

Based on the study of Attard and Holmes (2020), students reported the videos to be more stimulating than traditional texts. They liked being able to re-watch the videos, and they thought that videos from YouTube gave them a different perspective on the arithmetic topic. Also, students have a good perception of online mathematics learning using youtube, and there is a positive relationship between students' perceptions and learning achievement (Huda, Wahyuni and Fauziyah, 2020). Baer et al. (2021) demonstrated that watching YouTube video lectures is advantageous and can be a viable technique for improving senior high school students' math achievement in the San Jose City division.

Luna-Lucero et al. (2020) showed that Magic Math Minutes video design as a form of intervention using mathematics videos could foster adults' knowledge of early learning and justify further research in the use of videos in early intervention or family and teacher learning programs. Salsabila and Pradipta (2021) found that instructional videos on the E-learning platform improved students' mathematical problem-solving ability. Students who learned through instructional films performed better than those who learned through traditional means in completing mathematical problems. Utilizing instructional videos during the COVID-19 pandemic effectively fosters students' mathematical problem-solving abilities. Furthermore, Marbán et al. (2021) suggested that students believe that digital learning will allow them to change from a traditional and rigorous paradigm to an amusing and exciting one, and that digital learning is seen as a constructive response to the school shutdown during the COVID-19 outbreak.

Naidoo and Hajaree (2021) explored the perceptions of grade five pupils about using videos and PowerPoint presentations when learning fractions in mathematics. The employment of technology-based tools during the teaching and learning of fractions was clearly valued by the participants, based on the findings of their study. The use of films and PowerPoint presentations generated an engaging and fun approach of learning fractions, as well as a supportive atmosphere for learning fractions, according to the participants.

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CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the findings of the study, the followings conclusions are drawn:

1. Students from the control and experimental group were comparable in terms of their performance in the pre-test.
2. Students from the experimental group significantly had a better performance in the post-test results as compared to those of the students in the control group.
3. The teacher-made video lessons in Statistics and Probability about finding the mean, variance, and standard deviation of the discrete random variables uploaded on YouTube is an effective intervention in improving the learning performance of the Grade 11 General Academic students of Leyte National High School during the 1st semester of school year 2021-2022.

Recommendations

In the light of the findings, the researchers propose the following recommendations:

1. For teachers to create their own educational videos about their lessons and made it available on YouTube for convenient viewing of the learners. In this way, students will be able to understand the lesson and have a better learning performance.
2. Conduct similar studies focusing on other subject areas to determine if teacher-made video lessons uploaded on YouTube is a good intervention or supplementary instructional materials in subjects other than Mathematics.

Reflections

The COVID-19 pandemic wreaked havoc across the world and like any fundamental sector, education has been hit hard. Learners, schools, colleges, universities, and other educational institutions have all suffered greatly as a result of this global health cataclysm. The closure of schools has prompted the researcher to conduct this study. Being a math and research teacher himself, he felt the need to provide solutions that will help his students learn and cope in the distance learning setup given that the subjects he is teaching are highly technical in nature. During the new normal education, most of the students rely on the use of technology to accomplish their tasks and school requirements. Hence, the researcher utilized technology, particularly video technology, among all its features. He thought of developing teacher-made video lessons instead of using readily available videos on the internet because in most cases, looking for the right video takes time and that it's difficult to find videos with utmost adherence to the learning objectives and competencies of the given topic. The researcher uploaded the videos on YouTube because it is the most popular video-viewing platform. Moreover, it has a feature where students can download the video in the application and view the video anytime and anywhere they want. The findings of the study had proven the researcher's assumption that educational videos made by the teacher uploaded on YouTube is an effective intervention in improving the learning performance of the students. This will definitely help him improve the teaching-learning process in the new normal education.

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