

# Improving Students' Mathematical Achievement through Teacher-made Video-based Instruction

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**Abstract** - This study sought to examine the efficacy of the teacher-made video-based instruction at a public technical vocational high school. It used a posttest only design. Seventy (70) ninth-grade students who are the respondents of the study were divided into two – control and experimental groups. Both groups employed the same self-learning modules however the experimental group utilized the teacher-made videos. Each week for eight weeks, individual scores were collected and analyzed using a paired sample t-test. The findings revealed that the experimental group had higher posttest scores compared to the control group. Consequently, the experimental group performed better than the control group. It is concluded that the teacher-made video-based instruction improved the students' mathematical achievement. It is recommended that more studies be conducted to measure students' level of retention and engagement on video-based instruction using analytics.

**Keywords:** mathematical achievement, teacher-made, video-based instruction

## Introduction

On the onset of COVID 19 pandemic, printed modular distance learning became one of the most prevalent modalities adopted among the Philippines' public secondary schools. Without the teacher's active instructional intervention, understanding mathematical ideas in this modality may be difficult. However, pre-recorded videos of mathematical concepts can supplement to enhance students' mathematical success. The contextualization, indigenization, and precise alignment to the most essential learning competencies of the teacher-made videos are advantageous to students. While preparing for summative assessments and performance-based activities, students may repeat video lessons indefinitely for study and improvement.

Niess and Walker (2010) realized the potential of videos in building a solid cognitive foundation of mathematics. Math videos can aid students improve mathematical thinking abilities, such as visualizing math topics, engaging in critical interpretation, and providing as a venue for debate and deductive reasoning. Ramkalawon and Bhoola (2014), on the other hand, explored the use of videos as an instructional tool while teaching mathematics to 15–16-year-old students. Students said that the videos helped them retain material and better comprehend concepts. More so, according to Gil and Williams (2017), students react more favorably to concise yet quality videos.

Regarding instructional videos, however, Dart (2020) argued that technological quality is irrelevant. Khan Academy and Eddie Woo of WooTube both used simple production methods. Learners primarily valued the ease and usability of the video lectures. In addition, teachers must use a conversational tone while delivering video lessons (Papova et al. 2014 as cited in Larkin, 2017). Students demand video recordings that link the step-by-step explanation of the lesson to the appropriate assessment proper. The visibility of the teacher into the recordings is a crucial element of video creation. Students wanted to see their teachers virtually teaching in the video lessons. According to the students, seeing the instructor's face helped them concentrate and focus (Larkin, 2017).

The literatures above anchored on the production and use of math videos from non-profit educational organizations designed for universal learners as its audience. Thus, a study of teacher-made video-based instruction is of interest considering realistic factors on the alignment to the localized self-learning modules and most essential learning competencies among public school learners in the present printed modular modality. During face-to-face



classes, public school teachers can directly observe the learners' behaviors and reactions inside the classroom. Consequently, they can directly gauge the students' mathematical achievement. However, in the current remote learning set-up, these tasks are challenging. Now, mathematics teachers are continuously modifying their pedagogical practices that conform to the recent learning scenario.

This study's interest is to improve the students' mathematical achievement through teacher-made video-based instruction.

### Methods and Materials

A total of seventy (70) ninth-grade students from Biking Technical Vocational High School, Dausi, Bohol, participated in the posttest-only design research. Purposive sampling was utilized by the researcher. The experimental group consists of thirty-five (35) people, whereas the control group consists of fifty (50) individuals. Groupings of the participants are heterogeneous in nature. In the experimental group, the researcher employed teacher-made video-based instruction. On the other hand, the researcher maintained the printed modular modality for the control group. Eight teacher-made videos were created with an average duration of five minutes. Each video is given per week for the entire 8-week learning quarter of the participants. The content of the video is a concise MELC-aligned discussion of the learning competency for that week. The researcher uploaded the videos on the Facebook messenger group chat of the experimental group.

These are the processes of how the researcher gathered the data. First, asking permission from the school principal to conduct the study. Next, communicating with the respondents through messenger, text, and phone calls and asking for consent to participate in the study. Also, the researcher prepared the videos and asked the junior high school mathematics coordinator for quality assurance and validity. Then, administration of the teacher-made video-based instruction to the experimental group. The researcher gathered the participants' weekly scores. Lastly, comparison, interpretation, and analysis of the data were made through SPSS version 25.

### Ethical Consideration

The ethical issues of this research investigation are based on the 1974 Belmont report authored by the National Commission for the Protection of Human Subjects in Biomedical and Behavioral Research. It offers essential ethical principles and conventions that handle ethical issues arising from human research. Its major objective is to safeguard the safety of clinical trial and research inquiry participants.

Respect for humans, beneficence, and justice are the three ideas that govern this research. Individuals, considered as autonomous actors, had the right to self-determination. Participants were given informed permission, which included information about the goal of the study, possible risks and benefits, the degree to which the data would be kept secret, and a declaration saying that they had voluntarily participated in the research. All collected data were utilized only for scholarly reasons.

### Results

The results revealed a statistically significant difference between the experimental group and control group on the posttest. The p value of 0.009 is lower than the 0.05 significance level at the degrees of freedom of 34 (Table 1).

Paired sample t-test was used in the data analysis. Moreover, descriptive statistics such as mean and standard deviation differences were reported to understand the respondents' mathematical achievement.

Table 1. T-test: Paired samples for significant difference

	Paired Differences		t	df	Sig. (2-tailed)	Decision	Interpretation
	Mean	Std. Deviation					
Experimental Group - Control Group	27.83	59.69	2.76	34	0.009	Reject H <sub>0</sub>	Significant Difference

The findings indicated that learners in the experimental group had higher posttest scores than those in the control group. It meant that the teacher-made video-based instruction helped the students in the experimental group perform better academically than those in the control group.

### Discussion

The results showed that there was improvement in the students' mathematical achievement through teacher-made video-based instruction. The teacher-made video lessons augmented the printed modular learning delivery to enhance one's mathematical achievement. The research demonstrates that teacher-made video lessons increase students' comprehension of mathematics concepts via repeated viewing (Insorio and Macandog, 2022).

There was a statistically significant difference between the experimental group and control group on the posttest. One explanation to it could be seeing the teacher explaining in the video encourages the students to watch the video and sustain their motivation. Several students admitted that whenever feasible, it would be preferable to watch the teacher on the video (Jaurige, 2021). Virtual inclusion of the teacher in video recordings is key.

Furthermore, the teacher's discussion in the video improved the understanding of the students on mathematical topics. Consistent with the results of Muniyandy et al. (2015) since the teacher explained the lesson in the video, the students demonstrated considerable test-result-based learning improvement. This improvement is attributable to the fact that teacher-made videos provide students with more targeted instruction from a reputable resource (Riddle, 2021). This was reflected in the performance of the students on the posttest. The increase in students' mathematical performance is supported by a positive mean difference and a considerable amount of standard deviation.

Another contributing factor to the effectiveness of the teacher-made video instruction in learning mathematics is the format. Format pertains to the length and the presentation of the videos. The majority of the students said that the video should be brief (Jaurige, 2021). The average duration of the video utilized in this study is five minutes. This was supported by a study of Gil and Williams (2017) that learners better respond to short videos of good quality.

Similarly, style is just as essential as the video format. Style refers to how the lesson is delivered. Regarding the presentation and explanation of ideas, students want the pre-recorded videos to be concise and on point (Jaurige, 2021). The teacher's discussion in the videos revolved directly to the gist of the lesson which is somehow easy to follow.

Surprisingly, even though the employed teacher-made videos are non-interactive and asynchronous in nature, they have a favorable effect on the students' mathematical achievement. This study seems consistent with previous researches that the shift in video-based learning research is geared more towards asynchronism and non interactivity (Giannakos, 2013).

Teachers and students utilized Facebook Messenger as their primary messaging platform throughout the pandemic to communicate lesson objectives. Teachers and students have persisted in using online facilities and other accessible resources, as well as group messaging, to achieve optimum learning via the use of remote education (Razaque, 2010; UNESCO, 2020). However, it offers a video posting capability that mathematics teachers may utilize to deliver content lessons to their students and make learning at home easy.



However, there are drawbacks to using Facebook Messenger as a learning tool, such as the inability to post long videos and poor analytics tracking. The number of views, the number of views per student, the average percentage watched, and audience retention may be analyzed to understand insights of how students use the videos, their level of engagement, and the complexity of the lesson. Likewise, viewing and studying patterns of the students in the remote learning can be further explored. Nonetheless, the study suggested that social media platform can be harnessed as an educational delivery platform that empowers the students to learn at their own pace.

### Conclusion

Alongside the printed modular learning modality, teacher-made video-based instruction enhances the students' mathematical achievement. In the midst of a pandemic, the combination of video courses and modular learning results in an effective method of teaching students. Teacher-made videos as supplementary instructional materials heighten the students' learning experience. Teacher's inclusion, format, style, and learning platforms are all compounding factors for a quality video lesson. Through the video-assisted modular learning, students achieve the minimum expected competency even without the physical presence of the teacher.

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