

Exploring Teachers' Perception Of Tutorial Video Integration In Mathematics Education

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Abstract — This study will investigate the use of computer-assisted instruction (video tutorials) in the context mentioned above. In the classroom, a good teacher is more important than technology, so teachers should be experts in their field in both theory and practice. Teachers who consider three factors—how to manage the cognitive load of the video, how to increase student involvement with the video, and how to promote active learning from the video—are better able to implement video as a learning resource. Both content knowledge and the capacity to effectively organize and present it are critical for teaching.

This research is crucial given the increasing use of technology in education, especially the use of instructional videos for math. However, the majority of current research concentrates on the benefits of these tools as perceived by students, with little attention paid to the opinions of educators, who play a crucial role in determining the successful integration and educational worth of these resources. By examining teachers' perspectives and emphasizing the difficulties, advantages, and crucial elements associated with using tutorial videos to teach mathematics, this study fills this knowledge gap.

Math instructors from select schools in the Hilongos East District, Division of Leyte, where technology-enhanced learning methods are regularly implemented, will be among those providing responses. This school was chosen because it proactively incorporates tutorial videos into its curriculum, making it an ideal setting to obtain relevant insights about the experiences and perspectives of educators.

Keywords — *School Heads' Supervisory Practices, Teachers' Teaching Performance, Collaboration, Assessment*

I. Introduction

In recent years, the integration of technology into education has become a critical aspect of teaching and learning. The effectiveness of using tutorial videos in teaching mathematics has

been recognized for its potential to engage students, enhance understanding, and improve learning outcomes. The use of tutorial videos in teaching mathematics has yet to be fully optimized. Despite the benefits these videos offer, many teachers face challenges related to access to quality content, technical issues, and a lack of training in utilizing these resources effectively. This intervention program seeks to address these challenges by enhancing teachers' skills and knowledge in integrating tutorial videos into their teaching practices. By improving the accessibility, quality, and utilization of tutorial videos, the program aims to enhance student engagement, retention, and overall performance in mathematics.

However, mathematics has long been perceived as a challenging subject in Bhutanese classrooms (Phuntsho et al., 2020), and this opinion surely applies to Mendrelgang Primary School students. Since mathematics is essential to the development of students' foundational knowledge, abilities, and self-confidence, this challenge necessitated a change in the way it is taught (Fillingim, 2010).

In an era of rapid technological advancement, it is imperative that educators employ approaches that align with the demands of contemporary society. As noted by Mishra & Koehler (2006) in (Hussain & Alnoori, 2021), this facilitates the integration of digital resources into the classroom, emphasizing that "technology serves as a factor for enhancing effective teaching." The current generation, referred to as "Digital natives" (Prensky, 2001), emphasizes the potential of websites like YouTube for online learning activities (Godwin-Jones, 2007; Snelson, 2011; Burke & Snyder, 2008; Alimemaj, 2010). With over one billion users, YouTube is acknowledged as the largest online repository of video content (Maziriri et al., 2020). Videos' ability to combine audio and visuals creates a potent tool for teaching students with content that appeals to a variety of senses and clarifying concepts (June et al., 2014).

Bhutan also wants to become a knowledge-driven society (Phuntsho, 2016). In a royal decree issued on December 17, 2020, His Majesty the King of Bhutan emphasized the need to reform education in line with the global shift toward technological advancement in order to realize this vision. We can integrate technology into learning environments by using online resources. Therefore, the purpose of this study is to investigate whether teachers' use of YouTube videos can enhance sixth-grade students' performance in mathematics.

Positively, using technology for online education could be essential to raising the standard of instruction and learning in the twenty-first century through educational media that is enabled by electronic devices (Bujang et al., 2020; Dewi et al., 2019; Aldulaimi et al., 2021). Technology integration and teacher training to become creative learning facilitators are two ways to address the challenges in education (Dewi et al., 2019; Makarova & Makarova, 2018). Additionally, teachers can exhibit excellence in the face of educational challenges by utilizing a variety of methods for teaching mathematics, such as the utilization of technology-driven resources (Nabayra & Nabayra, 2021).

Furthermore, a great deal of research has been done on the use of technology in mathematics instruction (Borba et al., 2016; Howard and Beyers, 2020; Wijaya et al., 2020). In this sense, previous studies have also focused on videos as instructional materials. Students who struggled to understand the course material were helped to do so by video lessons. Additionally, it was proposed that it could improve teacher-student interaction (Bergmann and Sams, 2015). According to their observations, when teachers include videos in their lessons, students are better able to understand mathematical concepts (Nabayra, 2020). Students' experiences with the use of videos in math classes during the pandemic demonstrated that teacher-produced videos were comprehensive, flexible, and easily accessed by students; they also featured the teacher's online social presence and complemented the new standard of learning (Nabayra, 2021).

Furthermore, the extensive use of social media and online learning platforms like YouTube improves the efficacy and efficiency of online education while meeting the needs of 21st-century tech-savvy learners. A popular online platform, YouTube is well-known for its readily available and cost-free video content (Alwehaibi, 2015). Yaacob et al. (2021) discovered that using YouTube and video podcasts is a useful teaching tool for enhancing younger students' comprehension. Because YouTube is compatible with multimedia resources in education and provides Gen Z learners with flexibility and ease of access, the researcher decided to use it as a platform for teacher-generated videos.

Teachers are encouraged to use simple, developmentally appropriate information and communication technology (ICT) integration techniques to improve their lessons. This clause is mentioned in D.O. 35, s. 2016. With the tools and resources available in their schools, teachers can use ICT to improve collaboration in the teaching and assessment processes. A separate DepEd Order was issued to provide public schools with appropriate technology to enhance the teaching-learning process, meet 21st-century demands, and integrate ICT into the curriculum. (2016) D.O. 78, s.

According to Rameli, M.R.M. (2016), many students believe that mathematics is one of the most difficult fundamental subjects to understand. A lot of things that make it difficult for them to learn math can make them think negatively. A) self-factors (poor self-image, weak self-regulation); b) teachers (attitudes, methods, traits); c) parents (insufficient financial, emotional, and cognitive support); d) friends (unfavorable attitudes, actions, lack of assistance); and e) additional factors (math characteristics and assessment demands) are the five main themes and thirteen sub-themes that emerge from the sources of challenges. Math curricula frequently draw from prior learning experiences. A student will struggle to manage the new skills if they are unable to grasp the fundamentals. There would be inadequate mathematical underpinnings. Teachers must choose between fixing flaws and looking into creative ways to change their approaches in order to solve the problem. Teachers can now use technology in their classrooms thanks to technological advancements. Children find it easier to adjust to technology-driven teaching methods because many of them are already familiar with it. Using video is an interesting way to

get students interested. Both teachers and students benefit greatly from video, which improves course outcomes in many ways and has a notable impact on students' motivation, self-esteem, and viewpoints, claims Carmichael (2019).

Literature Review

While current video design frameworks use instructional methods, they may focus on elucidating principles (Kulgemeyer, 2020) or algorithmic tasks (Kay, 2014). We develop a framework that integrates instructional video guidelines with text-based heuristic worked examples to address the needs of mathematical modeling that are specific to both learners and subjects. The following components are included in heuristic worked examples pertaining to mathematical modeling (Reiss & Renkl, 2002; Zöttl et al., 2010): a modeling challenge; the solution and the methodology used; and assistance for students. the relationship between these components when using instructional videos as a presentation medium. The modeling problem and its solution, as well as the process involved, are intertwined and include learner support. Additionally, it is crucial to consider the specifics of this medium for each component and the presentation as a whole when providing a heuristic worked example through an instructional video. Therefore, the multimedia presentation creates a thorough framework that is based on Mayer's 15 principles from the cognitive theory of multimedia learning, just like other approaches to making instructional videos. These suggestions aim to address necessary processing resulting from the complexity of the material, reduce needless processing brought on by ambiguous content, and promote generative processing so that students can comprehend the content (Mayer, 2020, pp. 398–402). This framework focuses on guidelines supported by research in instructional videos, as some guidelines have only been tested for non-video formats (Fyfield et al., 2022).

This is relevant to the study since it made clear how important clear instructions are to improving student performance. Based on previous research findings, Fiorella and Mayer (2018) identified what works and what doesn't in instructional videos. Using instructional video, two techniques can enhance learning results: (1) segmenting (dividing a video into smaller, more significant parts that allow for learner control) and (2) mixed viewpoint (shooting from both first-person and third-person angles). Aligning the instructor's gender with the learner's gender, displaying the instructor's face on the screen, incorporating pauses in the video, and including practice without feedback are all attributes that are ineffective for instructional video.

Clark, R. & Mayer, R. According to (2016), people learn better when information is presented in a combination of text and images rather than just text, and audio narration is preferred over on-screen text for the words. (Mayer, 2009, 2014; Clark & Mayer, 2016). Making use of pre-made images allows for more visual experimentation and improvement. In order to produce a better final product than what could be produced in real-time during recording, the instructor and curriculum creator went through multiple rounds of scripting course material before recording, considering ideal visual representations and developing prototypes. (3) Throughout the recording process, it reduces cognitive load. Instructors can allocate all their mental focus to presenting

course material to students instead of considering the visual arrangement of the screen, selections of pen colors for different types of content, or the clarity of their handwriting.

Ou, C., Goel, A.K., & Joyner, D.A. (2019) While excellent course videos alone do not guarantee success, students are more likely to give courses with poor design and quality lower average ratings. The instructional design and video production teams must follow certain guidelines when creating and producing videos in order to ensure student satisfaction and improve the online learning experience. We think the seven-principle model helps illustrate that the three fundamental components of instructional methods, presentation, and sequencing should be integrated when creating and designing video courses for online education, even though there isn't a single model that works in every circumstance.

In the fast-changing educational environment of today, technology has become an essential resource for teachers looking for creative methods to captivate and educate students. Among the numerous digital tools out there, YouTube videos have become a powerful educational approach thanks to their multimedia characteristics, availability, and ability to improve learning experiences. In recent years, it has become a significant medium for educational material, changing how teachers instruct and learners absorb knowledge.

Teachers now have more opportunities to use a variety of educational resources that can enhance student-centered learning in the classroom and promote multiple interactions with students because of the Internet's accessibility (June et al., 2014). Multimedia can also be regarded as digital resources, according to Lhendup (2020), who said that "curricula and instructions integrated with ICT promote collaboration between teachers and students, enriching learning experiences by employing various digital resources." Enhancing blended learning and flipped classrooms through the use of digital teaching techniques, multimedia, and ICT tools and websites as resources and content is one of the main goals of the New Normal Curriculum (NNC) instructional guide (REC, 2020).

According to Maziriri et al. (2020), the multimedia learning theory highlights that when students are exposed to both text and images, as opposed to just text or images alone, they gain a deeper understanding of the material. YouTube is a great example of this theory because it is a platform that combines text, audio, and video. Teachers can take advantage of the cognitive benefits of multimedia education by incorporating YouTube videos into their lessons (Maziriri et al., 2020). This technique enhances memory retention and promotes stronger connections between concepts.

YouTube videos are crucial for motivating students and increasing their engagement with learning, according to numerous studies. According to Abbas and Qassim (2020), 86% of students acknowledge YouTube's positive educational impact, and a noteworthy 98% of students use it as a source of information. This demonstrates the value of YouTube as a teaching tool. Additionally, it has been demonstrated that YouTube videos can help students who are losing interest in

traditional classroom settings (Buzzetto and More, 2014). Students' enthusiasm for learning can be rekindled by teachers through the use of visually stimulating resources. YouTube's ability to engage students with interactive and visual components is a major advantage for math education. It can be difficult to comprehend complex mathematical concepts through traditional lectures alone. YouTube videos provide practical examples, animations, and visual demonstrations that make abstract mathematical ideas more relatable and intelligible (Hsin & Cigas, 2015).

Furthermore, according to Buzzetto (2014), Duvenger (2015), and Greenberg and Zanetis (2015), YouTube successfully draws in students. It has the capacity to inspire and involve students in ways that traditional teaching approaches may find difficult to achieve. Students' passion and love for math can be sparked by the captivating images, enthusiastic instructors, and interactive elements found in many YouTube math channels. Better educational outcomes could be the outcome of this increased involvement.

II. Methodology

Research Design

The research study utilized a descriptive-correlational research design. It is descriptively quantitative as it assesses the characteristics of elementary teachers regarding age, gender, marital status, highest degree obtained, teaching experience, number of relevant trainings/seminars attended, and the effectiveness level of utilizing tutorial videos in mathematics instruction. Moreover, this research is correlational as it examines the connections between the variables mentioned. To get permission for the study, the researchers sent a transmittal letter to the superintendent of the Schools Division and asked the head of the office where the research was conducted for approval. The questionnaire was created, administered, and gathered from the participants by the researchers. Several statistical techniques, including percentage, average, and rank totals, were used to arrange, assess, and comprehend the responses.

Sample of the Study

The effectiveness of employing tutorial films in mathematics instruction is examined in this study from the perspective of elementary math instructors in Hilongos East District, Division of Leyte. Video lessons have become a popular technique for improving student engagement, comprehension, and academic performance as a result of the growing use of digital resources in education. This study examines the advantages and difficulties of incorporating tutorial videos into the classroom with the goal of comprehending how these resources enhance student learning.

One hundred thirty elementary school math teachers from the Hilongos East District will participate in the study. The study intends to give a thorough grasp of how tutorial videos are used and their perceived influence on students' learning outcomes through surveys and interviews. The results will help identify areas for improvement and advance the creation of more successful

teaching methods in mathematics education by providing insightful information on the real-world uses of video-based learning resources.

Measures

The study will use a two-part questionnaire to assess the respondents' using tutorial videos in teaching mathematics. The first part will gather personal information such as age, sex, civil status, highest educational attainment, years of teaching experience, and number of relevant training/seminar attended. The research questionnaire was adopted to the study of Ijraset (n.d.), “Effectiveness of video clips presentation in teaching mathematics for grade five pupils”.

The second part will consist of a five-point Likert scale questionnaire with 15 items in total, divided into one subscales the level of the effectiveness of using tutorial videos in teaching mathematics.

This tool will undergo validation to ensure its reliability and validity ($\alpha = 0.83$), ensuring that it captures relevant data with credibility and accuracy. Using this tool will provide a comprehensive understanding of engagement levels allowing for valuable insights and conclusions to be drawn for the study.

The researcher will assist the respondents in completing the questionnaire by providing the honest perceptions of the level of effectiveness of using tutorial videos in teaching mathematics. This questionnaire is a five-point Likert scale adopted from Likert R.A. (1932). There is a total of 15 items in total, divided into one subscales the level of the effectiveness of using tutorial videos in teaching mathematics.

Procedures

To collect information on math teachers' opinions about the usefulness of tutorial videos, the study used a descriptive research approach. All of the math teachers in the Hilongos East District of the Division of Leyte received a structured survey questionnaire. In order to learn more about the teachers' experiences with tutorial videos, their perceived influence on student performance, and any difficulties they may have had putting them into practice, the questionnaire included both closed-ended and open-ended questions.

To get more in-depth opinions on the usage of tutorial videos in the classroom, a few chosen teachers also took part in semi-structured interviews in addition to the survey. These interviews made it possible to delve deeper into particular methods, achievements, and challenges related to video-based learning. Key trends and themes pertaining to the efficacy of tutorial videos in mathematics instruction were identified through the use of descriptive statistics and thematic analysis to examine the data gathered from the surveys and interviews.

Data Processing

The primary tool utilized to collect the required data is a test created by the researcher, consisting of two groups of 50 items designed according to the specification table. The examination functioned as both the initial and final test. The pretest corresponds with the posttest, which included questions on Mathematics lessons for fifth grade students during the fourth grading period. To interpret the average performance, the subsequent scale was applied:

The pretest was developed and given to 20 fifth-grade students who were not part of the research. The test papers were compiled, graded, and analyzed using the split half method for confirmation. Following the validation of the instrument, the researcher obtained permission from the relevant authorities to carry out the study.

Once the respondents were selected, the researcher conducted the pretest with them. The researcher identified the lessons shown in Mathematics for fifth-grade students during the video clips presentation. The developed materials were utilized in teaching lessons to the experimental group. Conversely, the control group received instruction through the conventional method. The posttest was administered after all the lessons in the fourth grading period were completed. Data were collected and analyzed using suitable statistical methods. The statistician assisted in the analysis and interpretation of the data. A summary of results, conclusions, and recommendations was developed. Following the review of all feedback and recommendations during the final oral defense, hardbound copies were delivered to the Graduate Studies Program Dean's Office and additional offices.

Frequency and percentage distribution were employed to assess the respondents' profiles based on sex, sibling order, monthly family income, and parents' educational qualifications.

To assess the Mathematics performance of the two groups as shown by the pretest and posttest outcomes, mean and standard deviation were calculated.

A dependent t-test was utilized to determine the notable difference in Mathematics performance between the two groups of respondents as indicated by the pretest and posttest results.

To determine whether a notable difference exists in the Mathematics performance of pupils exposed and unexposed to video clip presentations based on the posttest results, an independent t-test was utilized.

To assess the notable difference in mathematics performance of students exposed to video clip presentations as shown in the posttest results, regarding their profile, a one-way analysis of variance was utilized.

Ethical Considerations

Rigorous ethical standards were adhered to during the research to safeguard the rights, privacy, and security of every participant. Before data gathering, all elementary math teachers involved in the Hilongos East District provided their informed consent, ensuring they understood the study's aims, their responsibilities, and their right to withdraw from participation at any time without any consequences. Every participant received a distinct code to maintain anonymity, and no personal identifiers were used in the analysis or presentation of the data.

In line with the Data Privacy Act of 2012, the research ensured that all collected data was securely stored and utilized solely for this study. Access to the data was limited solely to the research team, which provided additional assurance of confidentiality. Throughout the analysis, responses were compiled and made anonymous, ensuring that no personal details were shared with external entities. Participants were encouraged to provide honest responses and were assured that their feedback would not affect their professional standing. All research methods were reviewed and approved by the relevant ethical review board, ensuring that any potential risks or discomforts were minimized.

Interviews were conducted to collect data in a confidential, safe setting within the schools. Rigorous protocols were implemented to avoid unauthorized access, and all responses were collected in secure digital and physical forms, ensuring the confidentiality of all participant information.

III. Results and Discussion

This section presents the statistical analyses in exploring teachers' perception of tutorial video integration in Mathematics Education. The discussions' flow was based on the sequence of the statements of the problem.

All results and discussions were statistically treated.

This section presents the profile of the respondents in terms of age, sex, civil status, highest educational attainment, years of teaching experience, and number of relevant trainings/ seminars attended.

IV. Conclusion

The findings regarding the profile of the respondents highlight that the majority of teachers are relatively young, with a significant portion in the 34-40 age range. This younger demographic suggests a readiness to embrace modern teaching tools, such as tutorial videos, to enhance their mathematics instruction. Younger teachers are generally more comfortable with technology, which may influence their inclination to integrate these resources into their teaching methods.

Gender also plays a role in how teachers engage with technology, with a higher proportion of female educators participating in the study. This gender imbalance in teaching roles may reflect broader trends in educational technology adoption, as research often suggests that female educators tend to be more open to integrating innovative methods in their teaching. The findings also point to the significance of marital status, as married teachers—who make up the majority of the respondents may find the flexibility of tutorial videos particularly advantageous.

Educational attainment and years of teaching experience are also crucial factors in determining the perceived effectiveness of tutorial videos. Teachers with advanced degrees, particularly those with a Master's degree, are likely to value the benefits of technology in education and may see tutorial videos as a valuable supplement to traditional teaching methods. Moreover, teachers with extensive teaching experience over 11 years may view tutorial videos as a tool to enhance their already established teaching practices.

However, the findings also indicate that despite their educational background and experience, many teachers have had limited exposure to relevant professional development, with the majority attending only a few seminars or trainings. This gap in professional development opportunities highlights the need for more comprehensive training programs that focus on the effective use of educational technologies like tutorial videos. This gap in professional development opportunities highlights the need for more comprehensive training programs that focus on the effective use of educational technologies like tutorial videos. Teachers may require additional support to understand how to fully leverage video tutorials in their teaching practices, particularly in a subject as complex as mathematics.

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