Competency-Based Mathematics Videos for Grade 10 Learners: Its Acceptability

Yuly Ann Sumagang Figuerres

Major in Mathematics, Master of Arts in Teaching, Graduate School, Eulogio "Amang" Rodriguez Institute of Science and Technology

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ABSTRACT

Introduction

Mathematics is an important part of the secondary curriculum, but many Grade 10 learners continue to experience difficulty in mastering selected Mathematics competencies. These learning difficulties point to the need for instructional materials that provide clear explanations and additional opportunities for learners to review and understand difficult lessons. In response, This study developed competency-based Mathematics video lessons based on identified learning needs and aligned with the Most Essential Learning Competencies (MELCs).

Objectives

The study aimed to determine the acceptability of the developed competency-based Mathematics video lessons for Grade 10 learners. Specifically, it assessed the materials in terms of relevance to the curriculum, usability in learning, alignment with MELCs, and overall acceptability, and determined whether a significant difference existed between the assessments of Mathematics Teachers and LRMDS Evaluators.

Methods

A descriptive research design was used. The respondents included 72 Mathematics Teachers selected through total population sampling and 20 LRMDS Evaluators selected through purposive sampling. Data was gathered using a five-point Likert-scale questionnaire and analyzed using frequency, percentage, weighted mean, and independent-samples t-test.

Results

The developed video lessons obtained Very High ratings from both groups in all areas assessed. Relevance to the curriculum received mean ratings of 4.70 from LRMDS Evaluators and 4.68 from Mathematics Teachers. Usability in learning received 4.55 and 4.50, while alignment with MELCs received 4.75 and 4.65, respectively. Overall acceptability was also rated Very High, with mean ratings of 4.70 and 4.65.

Conclusion

The findings indicate that the developed competency-based Mathematics video lessons are highly acceptable and may serve as useful supplementary instructional materials for Grade 10 Mathematics. Their use may provide additional support for classroom instruction, remediation, and learners who need further opportunities to review and understand difficult Mathematics competencies.

Keywords: competency-based education; mathematics education; instructional videos; Grade 10 mathematics; MELCs; educational technology.

THE PROBLEM AND ITS BACKGROUND

Introduction

Mathematics is an essential part of the secondary curriculum because it develops learners' reasoning, problem-solving, and analytical skills. However, many Grade 10 learners continue to have difficulty in mastering Mathematics competencies. These difficulties are more evident when lessons involve abstract concepts, symbolic representations, multi-step procedures, and problem-solving. For this reason, identifying the specific competencies that learners find difficult is important in planning appropriate instructional support. In the Philippine K–12 curriculum, the Department of Education (DepEd) emphasizes competency-based instruction and the Most Essential Learning Competencies (MELCs), which provide the basis for determining the knowledge and skills learners are expected to acquire. The present study follows this approach by using assessment results to identify least mastered Mathematics competencies and using these findings as the basis for developing instructional videos.

The identification of least mastered competencies provides teachers with evidence that can guide the development of appropriate learning materials. In this study, item-analysis results from Grade 10 periodical examinations covering three academic years were examined to determine the competencies in which learners demonstrated the greatest difficulty. The identified least mastered skills included competencies involving topics such as the Rational Root Theorem, circles, permutations and combinations, and statistical research. These results were not treated as a research instrument but as diagnostic information that provided the basis for determining the content of the instructional videos.

Instructional videos were developed in response to these identified learning needs. Mathematics concepts and procedures are not always easy to understand through classroom explanations alone. Some learners may need to see a procedure demonstrated, follow examples step by step, and review an explanation more than once. Video lessons can provide this additional opportunity because learners can pause, replay, and review a lesson at their own pace. The videos developed in this study were therefore intended as learner-centered, flexible, and accessible supplementary resources that could support learners in understanding and mastering difficult Mathematics competencies.

The development of the videos was guided by the Cognitive Theory of Multimedia Learning, Vygotsky's Sociocultural Theory, and Bloom's Mastery Learning Theory. Mayer's theory provides a basis for combining words, narration, and visual representations in presenting mathematical concepts. This is particularly relevant to Mathematics, where learners need to connect symbols, procedures, examples, and visual representations. Vygotsky's theory supports the use of instructional materials as forms of scaffolding that provide learners with additional assistance as they develop understanding. Bloom's Mastery Learning Theory, meanwhile, emphasizes appropriate instruction, sufficient time, practice, and opportunities for learners to achieve mastery. The features of video lessons, particularly the opportunity to pause and review explanations, are consistent with these principles.

The development of the materials was also guided by DepEd curriculum requirements. The videos were anchored on the identified least mastered skills and aligned with the Grade 10 Mathematics MELCs. This alignment was important because the purpose of the materials was not simply to provide another form of digital content but to respond directly to identified learning gaps while addressing the competencies prescribed by the curriculum. The study therefore established a connection between learners' assessment results, the development of instructional materials, and the competency requirements of the mathematics curriculum.

Although digital resources can provide additional learning opportunities, their use also requires careful evaluation. An instructional material needs to be clear, accurate, relevant, usable, and appropriate for the intended learners. For this reason, the developed videos were subjected to validation and evaluation using criteria consistent with DepEd standards. The study involved Mathematics Teachers and LRMDS Evaluators to obtain professional assessments of the developed materials. The Mathematics Teachers contributed perspectives based on their classroom experience and knowledge of Grade 10 Mathematics, while the LRMDS Evaluators provided expertise related to instructional materials, quality assurance, and MELCs alignment.

The present study addresses the need for instructional materials that are developed from actual learning difficulties rather than from general assumptions about what learners may need. It focuses on Grade 10 Mathematics learners of Batasan Hills National High School and follows a systematic process: identifying least mastered competencies from assessment results, developing competency-based instructional videos, aligning the materials with the MELCs, and evaluating their acceptability. The study specifically determines whether the developed videos are acceptable based on their relevance to the curriculum, usability in learning, alignment with MELCs, and overall instructional value.

Thus, the study connects assessment, instructional material development, and evaluation. The least mastered competencies identified from three years of assessment results served as the foundation for selecting the content of the videos. The competency-based approach and MELCs guided their development, while the assessments of Mathematics Teachers and LRMDS Evaluators provided evidence of their acceptability. Through this process, the study aims to provide validated competency-based Mathematics video lessons that can serve as supplementary learning resources and give Grade 10 learners additional opportunities to review, understand, and master competencies that they find difficult.

Theoretical Framework

This paper is based on three prominent learning theories: Cognitive Theory of Multimedia Learning by Mayer (2001; 2021) and Sociocultural Theory and Mastery Learning Theory by Vygotsky and Bloom respectively (1978; 1968/2020) which may be viewed as the pedagogical basis on designing and validating competency-based instructional videos in mathematics. These theories directly coincide with the mandate of the Department of Education (DepED) in the context of the Enhanced Basic Education Act of 2013 (Republic Act 10533) and the further development of curriculum guidelines according to which competency-based instruction and command of the Most Essential Learning Competencies (MELC)s are to be emphasized (DepEd Order No. 42, s. 2017; DepEd, 2025).

The Cognitive Theory of Multimedia Learning of Mayer (2001; 2021)

This theory by Richard Mayer affirms that learners can comprehend information better when delivered using both visual and verbal media. The revised 2021 conversation focuses on dual coding, coherence, and signaling principles, which decrease the extraneous mental load and enhance memory. Instructional videos can help learners develop meaningful relationships between concepts and processes in mathematics education, especially in areas where abstract thinking and symbolic manipulation are the culture and where students struggle to attain proficiency in the discipline.

Elevation to the study: The mathematics videos created in this study satisfy the principles of the competency model proposed by Mayer since they align narration with visual models of how to solve problems. This makes it clear, minimizes misconceptions, and lays groundwork to master minimal skills. The videos help the competency-based curriculum objectives of DepEd by reducing cognitive overload.

Vygotsky's Sociocultural Theory (1978)

The theory by Lev Vygotsky compares the significance of social interaction, scaffolding and the Zone of Proximal Development (ZPD) in the learning process. Modern tools of practice have emphasized the importance of digital scaffolds as instructional tools that help learners to navigate through their present levels of competency to competence. Instructional videos are like scaffolds (surrogacy scaffolds) and complex mathematical concepts are divided into steps that are easy to understand, and instructional undergraduate videos contain organized instructions that can be utilized multiple times.

Competency-based videos can expand the scope of the classroom by extending instructional scaffolding in blended learning settings in which educator assistance may be less than desired. They are cultural mediating devices and learners can make progress on their own in their ZPD. This coincides with DepEd blended learning model, where the flexible and accessible resources are needed to facilitate various learners.

Learning theory Mastery Learning Theory by Bloom (1968)

The theory of Benjamin Bloom stresses that every student may attain high levels of understanding given the right instruction and the given time. Individualized pacing, forming feedback and practice are highlighted as crucial elements of the updated mastery learning model (2020) that ensure the mastery before moving to higher level topics. Mastery learning is paramount in all areas of mathematics since without the basic competencies in place the other higher-level competencies cannot be addressed.

Competency-based instructional videos fit well based on the Bloom framework since learners can stop-and-play as well as review lessons, until they master it. Videos are programmed with the focus on DepEd MELCs to make sure that learners concentrate on important skills. This justifies individualized pacing and remediation which would allow students to pass the challenges of least mastered competencies and gain confidence in mathematics.

Legal Foundation and referencing to the Study

It is supported by the Enhanced Basic Education Act of 2013 (RA 10533) that institutionalized the K-12 curriculum and required competency-based teaching. The introduction of the Most Essential Learning Competencies (MELCs) by DepEd (DepEd Order No. 42, s.). The instruction design is governed by law and curriculum (2017; DepEd, 2025) offers these guidelines. By mapping the videos to MELCs, the study will be able to ensure that it abides by national standards, as well as contributes to bridging the enduring disparities in mathematics achievement.

In such a way, combining the theories of Mayer, Vygotsky, and Bloom with the legal requirements by DepEd, one will have a unified basis of the study. The justification of the pedagogical design of competency-based mathematics videos is covered by the theories, whereas the legal justification will make them relevant and consistent with the standards of the curriculum. In this manner, both determine the necessity and feasibility of the creation of instructional videos that would be theoretically adequate and policy oriented.

Conceptual Framework

This paper is premised on the fact that mathematics instruction should be competency-driven, guided towards the Most Essential Learning Competencies (MELCs 2026), and guided by least mastered skills of Grade 10 students. The model adheres to the Input Process Output (IPO) model that methodically links the problem, intervention and evaluation to enable the work to be evidence-based and curriculum-based.

The study input is the least mastered skills in mathematics, as revealed by the periodical test outcomes of Grade 10 learners in the last 3 school years (2022-2025). These are the skills that are the bases of the instructional intervention. The members who will be used in the study are the mathematics teachers and Grade 10 students in the chosen schools within Batasan Hills National High School in Quezon City who will offer their insights on both the pedagogical and practical viability of instructional materials. The MELCs 2026 required under the Enhanced Basic Education Act 2013 (RA 10533) and DepEd Orders and focuses on mastering the requisite competence as the foundation of advancement in the K-12 curriculum.

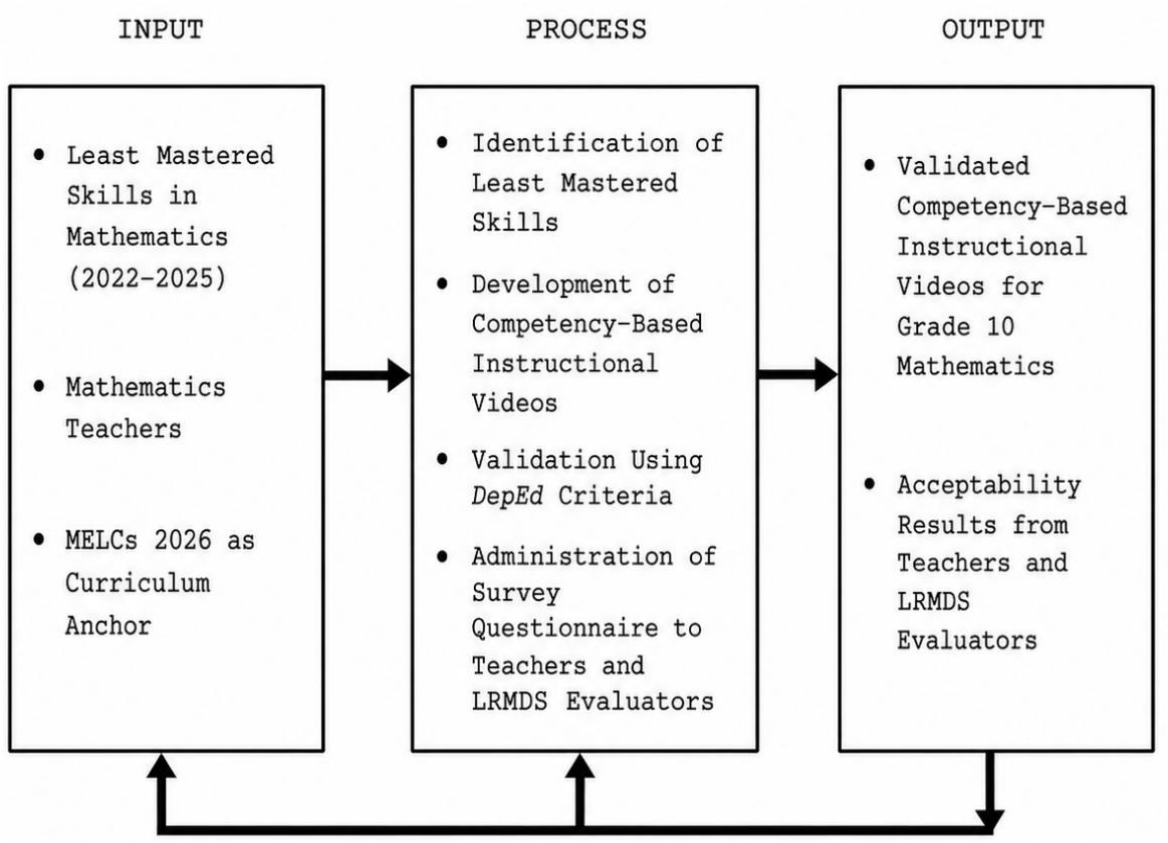
This is divided into several steps. Initially, the most poorly mastered skills are determined by analysis of test results using items. Second, instructional videos, grounded in the competency-based approach to mathematics teaching, are created, making sure that it complies with MELCs 2026. Third, the materials are validated in accordance with DepEd standards of clarity, relevance, and usability. Lastly, the results of the survey questionnaires administered on teachers and students are used to determine the acceptability of the instructional videos. The process makes sure that intervention is systematically designed, validated and evaluated against theoretical basis as well as legislative requirements.

The study output is a collection of validated competency-based instructional videos that were specifically created to enhance the mastery of the least learned mathematics competencies in Grade 10 learners in the Batasan Hills National High School. It is hoped that such videos will offer learner-centered and flexible, and

accessible learning resources to aid in mastery learning. A testimony of its goodness and compliance with DepEd standards is the teachers and students' feedback on the acceptability of the teaching materials, of which they were based especially on the MELCs 2026.

This systematic flow is depicted in the research paradigm. A curriculum anchor referred to as the MELCs 2026, the input entails the most poorly mastered skills, the respondents, and MELCs. These steps include the determination of the skills to be trained, creation of instruction videos, and validation of these instruction videos against the DepEd criteria, and collection of the data based on survey questionnaires. Results will be in the form of validated instructional videos and teacher and student acceptability. This paradigm has ensured that the study has some sense, legal roots, and sensitivity to the real instructional needs of learners.

Figure1. The Research Paradigm of the Study



Feedback (Return Arrow):

Insights on the effectiveness and alignment of the competency based instructional videos with MELCs 2026, which serve as the basis for the continuous improvement and a refinement of the instructional materials.

Statement of the Problem

This study aims to determine if the developed competency-based mathematics videos for Grade 10 Mathematics Learners are acceptable based on DepEd guidelines for learning resources.

Specifically, it seeks to answer the following questions:

1. What are the least mastered skills of the Grade 10 students in Mathematics for the last three years?
2. Based on the result, what instructional material may be developed?
3. How acceptable (align with the DepEd validation) is the developed competency-based mathematics videos for Grade 10 as assessed by LRMDS evaluators and mathematics teachers?

4. Is there a significant difference in the assessment of the two groups of respondents on the developed competency-based mathematics videos for Grade 10?

Hypotheses

The study will test the following null hypotheses:

H_0: There is no significant difference in the assessment of the two groups of respondents on the developed competency-based mathematics videos for Grade 10

H_1: There is a significant difference in the assessment of the two groups of respondents on the developed competency-based mathematics videos for Grade 10

SCOPE AND LIMITATIONS OF THE STUDY

This study focuses on creating and assessing competency-based Mathematics instructional videos for Grade 10 learners of Batasan Hills National High School. It includes identifying the least mastered Mathematics skills from the past three academic years and using these identified least mastered Mathematics skills as the foundation for developing videos aligned with the Most Essential Learning Competencies (MELCs) of the Department of Education.

Furthermore, this study also has several practical limitations. Batasan Hills National High School implements blended learning due to its large student population and limited classrooms and facilities. The videos are not tested in a purely face-to-face setup. Factors such as internet connection, availability of gadgets, and learners' home situations may also affect how the videos are viewed and understood. The researcher does not influence these variables.

Despite these limitations, this thesis hopes to offer meaningful insights into creating digital learning materials that can be utilized for flexible, accessible, and learner-centered Mathematics instruction. It aims to help both teachers and students by providing tools that make learning more manageable, especially in settings where resources and classroom space are limited.

Significance of Study

This study was undertaken to determine the acceptability of competency-based mathematics videos developed for Grade 10 learners. As educational institutions continue to integrate technology into the teaching and learning process, the findings of this study are expected to provide meaningful insights into the use of competency-based instructional videos as supplementary learning resources in Mathematics. The results may also contribute to the continuous improvement of instructional practices and the development of learner-centered educational materials. Specifically, this study is expected to benefit the following:

Grade 10 Learners. As the primary beneficiaries of this study, Grade 10 learners are expected to benefit from instructional videos that are designed to address the competencies prescribed in the mathematics curriculum. These learning materials may help learners better understand mathematical concepts through organized explanations, guided examples, and self-paced instruction. By providing opportunities to review lessons anytime and anywhere, the videos may strengthen conceptual understanding, increase learners' confidence, and encourage greater responsibility for their own learning.

Mathematics Teachers. The competency-based mathematics videos developed in this study may serve as valuable supplementary instructional resources for classroom teaching, remediation, intervention, and independent learning activities. These materials may assist teachers in presenting lessons more effectively while responding to the varying learning needs of students. The availability of competency-based videos may also allow teachers to devote more time to facilitating meaningful classroom discussions, monitoring learners' progress, and providing individualized academic support.

School Administrators. The findings of this study may provide school administrators with useful information in planning and implementing programs that encourage the integration of technology into mathematics instruction. The results may also support school initiatives aimed at improving instructional delivery, promoting innovative teaching strategies, and strengthening the utilization of digital learning resources.

Parents and Guardians. Competency-based mathematics videos may provide parents and guardians with an additional resource that enables them to support their children's learning at home. Since the videos can be accessed repeatedly, learners may revisit lessons whenever necessary, allowing parents to monitor their children's progress and reinforce classroom learning in a more meaningful way.

Curriculum Developers. The results of this study may provide curriculum developers with practical information that can guide the design and enhancement of competency-based instructional materials. The findings may also contribute to the development of multimedia learning resources that are aligned with the Most Essential Learning Competencies (MELCs) and responsive to the learning needs of today's students.

The Department of Education. The findings of this study may provide additional evidence that can support the Department of Education in its continuing efforts to strengthen the integration of technology in teaching and learning. The results may also serve as a reference in evaluating, developing, and implementing competency-based instructional materials that promote quality mathematics education.

Learning Resource Evaluators (LRMDS Evaluators). The study may provide LRMDS evaluators with information regarding the quality and acceptability of competency-based mathematics videos. The findings may contribute to the refinement of evaluation practices and quality assurance standards for digital instructional materials intended for classroom and independent learning.

Teacher Education Institutions and Pre-service Mathematics Teachers. This study may offer useful insights to teacher education institutions and future mathematics teachers regarding the development and effective use of competency-based instructional videos. The findings may encourage the integration of technology-enhanced teaching strategies into teacher preparation programs and promote the creation of engaging learning experiences for future learners.

Future Researchers. Finally, this study may serve as a useful reference for future researchers who intend to conduct studies related to competency-based education, instructional video development, multimedia learning, educational technology, and mathematics instruction. The findings may provide baseline information that can be expanded through further investigations involving different grade levels, subject areas, or educational settings.

Definition of Terms

For clarity and consistency, the following terms are defined conceptually and operationally as they are used in this study.

Acceptability - Conceptually, acceptability refers to the degree to which an educational material is perceived by its intended users as appropriate, useful, relevant, and satisfactory for its intended purpose (Guskey, 2000). Operationally, in this study, acceptability refers to the extent to which the competency-based mathematics videos are evaluated by teachers and Learning Resources Management and Development System (LRMDS) evaluators in terms of content quality, instructional quality, technical quality, relevance, clarity, and suitability for Grade 10 Mathematics instruction.

Blended learning - Conceptually, blended learning is an instructional approach that combines face-to-face teaching with online or technology-mediated learning experiences (Graham, 2006). Operationally, it refers to the integration of competency-based mathematics videos with classroom instruction to reinforce learning and provide students with opportunities for independent review.

Competency-based education - Competency-based education is a learner-centered approach that emphasizes the mastery of clearly defined competencies rather than the amount of instructional time spent in class (Sturgis

& Patrick, 2010). In this study, it refers to the instructional framework used in developing mathematics videos, ensuring that each lesson is aligned with the competencies prescribed in the Grade 10 Mathematics curriculum.

Instructional video - An instructional video is a multimedia learning resource that combines visual and audio elements to facilitate the teaching and learning process (Mayer, 2021). In this study, instructional videos refer to the competency-based mathematics videos developed to supplement Grade 10 Mathematics instruction.

Learning Delivery Modalities (LDM) - Learning Delivery Modalities refer to the various approaches used by the Department of Education to deliver instruction, including face-to-face, distance, blended, and other alternative learning modalities (Department of Education, 2020). In this study, Learning Delivery Modalities refer to the instructional context in which the competency-based mathematics videos are utilized as supplementary learning resources.

Learning Resources Management and Development System (LRMDS) evaluators - qualified education professionals responsible for assessing instructional materials to ensure their quality, accuracy, relevance, and alignment with educational standards (Department of Education, 2017). In this study, they refer to the experts who evaluated the acceptability of competency-based mathematics videos using the Department of Education's evaluation criteria.

Learning through multimedia - the process of acquiring knowledge through the combined use of words, images, audio, animation, and other multimedia elements that promote meaningful learning (Mayer, 2021). In this study, it refers to students' learning experiences using competency-based mathematics videos that integrate visual and auditory instructional components.

Least mastered skills - the competencies in which learners consistently demonstrate low levels of mastery based on assessment results (Department of Education, 2019). In this study, these refer to the Grade 10 Mathematics competencies identified through item analysis as requiring instructional intervention and serving as the basis for the development of competency-based mathematics videos.

Most Essential Learning Competencies (MELCs) - the prioritized learning competencies identified by the Department of Education to ensure the continuity and quality of basic education under various learning delivery modalities (Department of Education, 2020). In this study, the MELCs serve as the foundation for selecting and organizing the content of competency-based mathematics videos.

Scaffolding – an instructional strategy that provides temporary support to learners while they develop new knowledge and skills, with the support gradually withdrawn as learners become more independent (Wood, Bruner, & Ross, 1976). In this study, scaffolding refers to structured explanations, guided examples, and step-by-step demonstrations incorporated into the competency-based mathematics videos to facilitate learners' understanding of mathematical concepts.

Validation - the process of determining whether an instructional material meets established standards for content accuracy, instructional quality, technical quality, and suitability for its intended users (Department of Education, 2017). In this study, validation refers to the evaluation conducted by qualified experts to determine the quality and acceptability of the competency-based mathematics videos before their implementation.

Zone of Proximal Development (ZPD) - the range of tasks that learners can accomplish with guidance from a more knowledgeable individual but cannot yet perform independently (Vygotsky, 1978). In this study, the Zone of Proximal Development serves as the theoretical foundation for designing instructional videos that provide guided learning experiences leading to independent mastery of mathematical concepts.

REVIEW OF RELATED LITERATURE AND STUDIES

Local Literature

Ater and Galibo (2024) conducted a study on the development and utilization of audio-video presentations to improve reading comprehension skills, emphasizing how multimodal instruction enhances learners'

engagement through synchronized auditory and visual stimuli. Grounded in Mayer's Cognitive Theory of Multimedia Learning, their framework highlights that dual-channel processing reduces cognitive load and facilitates deeper comprehension. This validates the theoretical foundation of the present research on competency-based mathematics video lessons.

Similarly, Masaganda and Limpiada (2023) discussed the persistent low performance of Filipino students in mathematics and validated that digital tools and instructional videos significantly improve Grade 9 learners' achievement. Their study revealed that technology-based instruction bridges learning gaps and accommodates diverse learning styles in large public schools. To build on this, Dejecacion (2022) highlighted the importance of contextualized, teacher-made video lessons that reflect local culture and learner diversity, reinforcing the goal of developing materials tailored specifically to Batasan Hills National High School.

Furthermore, Sabri, Villanueva, and Cruz (2024) examined technology integration in Philippine classrooms, concluding that structured multimedia design—featuring clarity, coherence, and curriculum alignment—enhances retention and performance. They noted that expert validation is crucial to ensure pedagogical soundness. Finally, Magayon and Tabuzo (2024) argued that technology-supported instruction effectively addresses least-mastered competencies through targeted remediation and individualized pacing, aligning directly with Bloom's Mastery Learning framework.

Foreign Literature

Mayer (2021) updated his Cognitive Theory of Multimedia Learning, asserting that dual-channel processing and coherence principles minimize extraneous information and improve retention. This theoretical foundation directly informs the design of competency-based mathematics videos by leveraging narration and visuals to clarify abstract concepts.

In a related study, Salim and Ferreira (2023) found that instructional videos enhance comprehension of abstract mathematical concepts by allowing flexible pacing and repeated exposure, supporting learner autonomy and mastery learning. Wahyuni, Jamaris, and Solfema (2021) similarly demonstrated that visualization tools and interactive platforms foster higher-order thinking and problem-solving skills, ensuring students can apply mathematical concepts in novel situations.

Expanding on broader frameworks, Evans, Landl, and Thompson (2020) concluded that competency-based digital models shift the focus from time-based progression to skill mastery, supporting individualized pacing. Finally, Akram et al. (2022) emphasized that teacher readiness and pedagogical alignment are critical for successful technology integration, justifying the inclusion of teachers in the validation process to meet strict curriculum standards.

Local Studies

Nabayra (2022) developed YouTube-based mathematics videos during the pandemic and found significant improvements in student performance, proving their practicality in resource-constrained public school settings. Caballes (2025) similarly examined multimedia integration on Grade 10 academic performance, noting that multimodal materials reduce cognitive overload, sustain attention, and improve comprehension. Although focused on English instruction, Caballes provided a relevant theoretical anchor for video-based mathematics instruction.

Additionally, Cahapay and Labrador (2022) examined Filipino teachers' instructional practices in remote mathematics education, concluding that digital tools sustain engagement and motivation in blended contexts. They emphasized that while teacher facilitation remains crucial, multimedia tools successfully extend learning opportunities beyond the classroom.

Foreign Studies

Patrick (n.d.) discussed competency-based models in online learning, concluding that flexible assessment strategies ensure mastery before progression, which reinforces the rationale for allowing learners to revisit

video lessons until mastery is achieved. More so, Ranbir and Education (2024) emphasized that administrative backing, professional development, and infrastructure are necessary to sustain technology-enhanced learning.

Zhou (2023) reviewed multimedia learning literature and emphasized that instructional materials integrating coordinated visual and auditory elements significantly enhance cognitive processing and knowledge retention by reducing extraneous load. Hence, Igarashi and Suryadarma (2022) examined competency-based approaches in Southeast Asia, concluding that mastery-focused instruction improves mathematics achievement and addresses foundational skill gaps. Finally, Salim and Ferreira (2023) reiterated that video-based learning enhances confidence, motivation, and abstract reasoning tasks globally.

Synthesis

Under the competency-based variable, both local and foreign sources affirm that multimedia instruction aligned with curriculum standards enhances mastery, retention, and learner autonomy. Locally, studies by Borja and Palomares (2024), Masaganda and Limpiada (2023), and Dejecacion (2022) demonstrated that video-assisted instruction reduces mathematics anxiety, bridges learning gaps, and provides cultural relevance. Foreign literature such as Mayer (2021) and Evans, Landl, and Thompson (2020) similarly confirmed that multimedia learning reduces cognitive load while promoting individualized pacing and mastery learning.

Under the acceptability variable, studies highlight clarity, relevance, usability, and curriculum alignment as essential indicators of instructional effectiveness. Akram et al. (2022) and Salim and Ferreira (2023) emphasized that teacher readiness, motivation, and pedagogical alignment are critical for successful technology integration.

Local and foreign findings converge on the broader conclusion that video-based instruction supports mastery learning and reduces mathematics anxiety. However, despite the growing body of evidence, gaps remain in evaluating the acceptability of competency-based mathematics videos specifically for Grade 10 learners in public schools such as Batasan Hills National High School. This research addresses that gap by developing and validating instructional videos aligned with MELCs 2026, assessing their acceptability among teachers and learners, and contributing to DepEd's ongoing efforts to strengthen technology-supported pedagogy.

METHODOLOGY

Research Design

This study employs a descriptive research design, which gathers, analyzes, and presents information to accurately describe a population or phenomenon without manipulating variables (Creswell & Plano, 2018; Shields & Rangarajan, 2013). This approach is well-suited for capturing the authentic perceptions of teachers and learners regarding the acceptability of competency-based mathematics instructional videos.

By utilizing survey questionnaires and analyzing data through frequencies, percentages, and descriptive statistics, this design provides a structured framework to evaluate sub-variables such as clarity, relevance, usability, and curriculum alignment. Because the research does not manipulate the learning environment but instead focuses on natural evaluations aligned with MELCs 2026, the descriptive design ensures that the findings accurately reflect the practicality and standards of the instructional materials at Batasan Hills National High School.

Population and Sampling

The respondents of the study were Mathematics Teachers and LRMDS Evaluators, as they are the individuals directly responsible for evaluating the quality, clarity, and curriculum alignment of the developed competency-based mathematics video lessons. To ensure comprehensive representation, the study employed total population sampling for the mathematics teachers. All 72 Junior High School Mathematics teachers were included because each one possesses firsthand experience in delivering Grade 10 mathematics instruction and

is therefore fully qualified to assess the instructional materials. Total population sampling is appropriate when the entire group meets the inclusion criteria, and the population size is manageable for full participation.

Table 1. Population and Sample

Group	Population	Sample Size
Mathematics Teachers	72	72
Grade 7	20	-
Grade 8	17	-
Grade 9	17	-
Graded 10	18	-
LRMDS Evaluators	20	20
Total	92	92

For the 20 LRMDS Evaluators, the study utilized purposive sampling, a non-probability technique in which respondents are deliberately selected based on specific expertise relevant to the research objectives. As emphasized by Etikan, Musa, and Alkassim (2016), purposive sampling is suitable when researchers must focus on individuals who possess characteristics most informative for the study. In this context, LRMDS evaluators were chosen because of their specialized training in instructional materials development, quality assurance, and MELCs alignment. Their expert judgment ensures that the evaluation of the intervention adheres to DepEd standards and institutional criteria.

Table 2. Respondents of the Study

Respondent Group	Number of Respondents	Percentage
Mathematics Teachers	72	78.3
LRMDS Evaluators	20	21.7
Total	92	100

The respondents comprise Mathematics teachers, who constitute the majority at 78.3% (72 out of 92 participants), and LRMDS evaluators, who account for the remaining 21.7%. This distribution brings together practitioners with direct Grade 10 classroom experience and specialists grounded in instructional design and quality assurance. Integrating both groups ensures that the evaluation is simultaneously practice-driven and standards-aligned, reinforcing the credibility and reliability of the acceptability results for the competency-based video lessons.

Table 3. Respondents as to Age

Age Range	Teachers (n=72)	Evaluators (n=20)
25–35	28	6
36–45	25	8
46–55	19	6
Total	72	20

The age distribution of mathematics teachers spans three main brackets: 28 are aged 25 to 35, 25 are aged 36 to 45, and 19 are aged 46 to 55, reflecting a mix of early-career, mid-career, and senior educators. Similarly, the LRMDS evaluators consist of 6 aged 25 to 35, 8 aged 36 to 45, and 6 aged 46 to 55.

This diverse age composition strengthens the evaluation process. Younger educators bring familiarity with digital tools and innovative approaches, while mid-career and senior personnel contribute deep pedagogical expertise and curriculum experience, ensuring a comprehensive assessment of the competency-based video lessons.

Table 4. Respondents as to Sex

Sex	Teachers (n=72)	Evaluators (n=20)
Male	30	9
Female	42	11
Total	72	20

The sex distribution of respondents shows a relatively balanced representation across both groups, with 30 male and 42 female mathematics teachers, and 9 male and 11 female LRMDS evaluators. This pattern indicates a slight predominance of female respondents overall, reflecting the common demographic trend in the teaching profession where women often comprise a larger share of the workforce. The presence of both male and female respondents in substantial proportions ensures that the evaluation of the instructional materials incorporates diverse perspectives, contributing to a more inclusive and comprehensive assessment of the competency-based video lessons.

Table 5. Respondents as to Civil Status

Civil Status	Teachers (n=72)	Evaluators (n=20)
Single	25	7
Married	40	11
Widowed	7	2
Total	72	20

The civil status distribution shows that the majority of mathematics teachers (**40 out of 72**) and LRMDS evaluators (**11 out of 20**) are married, indicating a predominantly mature and professionally established respondent group. A considerable number of teachers (**25**) and several evaluators (**7**) are single, while a smaller portion in both groups is widowed. This variation in civil status reflects a diverse set of personal backgrounds among the respondents, which contributes to a well-rounded evaluation of the instructional materials, as individuals with different life circumstances may bring varied perspectives on the clarity, relevance, and usability of the competency-based video lessons.

Table 6. Respondents as to Educational Attainment

Educational attainment	Teachers (n=72)	Evaluators (n=20)
Bachelor's Degree	40	8
Master's Units/Degree	25	9
Doctorate Units/Degree	7	3
Total	72	20

The educational qualification profile shows that most mathematics teachers (40 out of 72) hold a bachelor's degree, while a substantial number (25) possess master's units or a completed master's degree, and a smaller group (7) have earned doctorate units or a doctoral degree. Among the LRMDS evaluators, a similar pattern

is observed, with 8 holding bachelor's degrees, 9 possessing master's units or degrees, and 3 having doctorate-level qualifications. This distribution reflects a respondent group with strong academic preparation, particularly among evaluators who demonstrate higher concentrations of advanced graduate studies. The presence of teachers and evaluators with postgraduate and doctoral training enhances the credibility of the evaluation process, as their advanced academic backgrounds equip them with deeper expertise in curriculum alignment, instructional design, and assessment of educational materials.

Table 7. Respondents as to Years of Service

Years of Service	Teachers (n=72)	Evaluators (n=20)
1–5 years	18	4
6–10 years	20	5
11–15 years	15	6
16+ years	19	5
Total	72	20

The distribution of respondents according to years of service shows a well-balanced mix of professional experience among both mathematics teachers and LRMDS evaluators. Among the teachers, 18 have 1–5 years of service, 20 have 6–10 years, 15 have 11–15 years, and 19 have more than 16 years, indicating a workforce composed of early-career, mid-career, and highly experienced educators. A similar pattern is observed among the evaluators, with 4 in the 1–5-year range, 5 in the 6–10-year range, 6 in the 11–15-year range, and 5 with over 16 years of service. This distribution ensures that the evaluation of instructional materials benefits from a combination of fresh perspectives, developing expertise, and long-standing professional insight, thereby strengthening the credibility and depth of the assessment.

Respondents of the study

Total population sampling was applied to include all 72 Mathematics Teachers who are directly involved in Grade 10 mathematics instruction at Batasan Hills National High School. This approach ensured that every teacher with relevant classroom experience participated in the evaluation of the competency-based instructional videos. In addition, purposive sampling was used to select 20 LRMDS Evaluators, chosen specifically for their expertise in instructional materials development, quality assurance, and MELCs alignment. As emphasized by Etikan, Musa, and Alkassim (2016), purposive sampling is appropriate when respondents must possess specialized characteristics that are most informative for the study.

This combination of sampling techniques ensured that the evaluation of the competency-based mathematics instructional videos was grounded in both practical classroom experience and institutional quality standards. The mathematics teachers represent a diverse group in terms of age, sex, civil status, educational qualification, and years of service, while the LRMDS evaluators contribute professional and technical expertise. Together, their assessments strengthen the validity, reliability, and contextual relevance of the study's findings, ensuring that the developed materials meet both pedagogical and curriculum requirements.

Research Instrument

The survey questionnaire was carefully designed to measure the acceptability of competency-based mathematics instructional videos aligned with MELCs 2026. Questionnaires are widely recognized as effective tools in descriptive research because they allow systematic collection of standardized responses from a defined group of participants (Creswell, 2018). The instrument was anchored on the study's variables and sub-variables, ensuring comprehensive coverage of clarity, relevance, usability, curriculum alignment, challenges encountered, and overall acceptability.

To establish validity, the questionnaire underwent content validation by three experts in mathematics education and educational technology. Expert validation enhances the reliability and credibility of research instruments by ensuring that items are clear, relevant, and aligned with objectives (Polit & Beck, 2017).

Following validation, the instrument was pilot tested with 20 respondents from a nearby school not included in the main study. Reliability was measured using Cronbach's Alpha, with values above 0.70 considered acceptable for internal consistency (Tavakol & Dennick, 2011).

The questionnaire was divided into five parts to ensure systematic data collection. Part I gathered demographic information such as age, sex, civil status, educational qualification, and years of service. Part II assessed clarity and relevance, focusing on comprehensibility, organization, MELCs alignment, and applicability.

Part III measured usability and curriculum alignment, including accessibility, learner-friendliness, and consistency with DepEd standards. Part IV examined challenges encountered, such as technical issues, pedagogical barriers, and learner difficulties. Part V evaluated overall acceptability of the instructional videos, with open-ended questions allowing respondents to provide qualitative feedback on helpful aspects, suggested improvements, and comparisons with traditional classroom instruction. To enhance authenticity, activity sheets with simulation exercises were attached, enabling respondents to experience the instructional videos before answering.

Table 8. Least Mastered Competencies the last three years

Quarter	Least Mastered Competency (LMC)	CG Code	MPS		
			AY 22-23	AY 23-24	AY 24-25
Q1	1. Proves the Rational Root Theorem	M10AL-Ig-2	42	45	48
	2. Solves problems involving sequences	M10AL-If-2	48	51	55
	3. Proves the Remainder and Factor Theorems	M10AL-Ig-2	50	53	57
	4. Performs long and synthetic division	M10AL-Ig-1	54	56	59
	5. Factors polynomials	M10AL-Ih-1	58	61	63
Q2	1. Proves theorems on secants and tangents	M10GE-IIe-f-1	38	41	44
	2. Solves problems on circles (arcs, angles)	M10GE-IIf-2	45	47	50
	3. Graphs polynomial functions	M10AL-Ii-j-1	50	53	56
	4. Applies distance formula to geometric proofs	M10GE-IIg-2	55	58	61
	5. Inductively derives circle relations	M10GE-IIc-1	60	62	65
Q3	1. Solves problems on Permutations & Combinations	M10SP-IIId-e-1	40	43	46
	2. Differentiates Permutation from Combination	M10SP-IIIc-2	48	50	54
	3. Finds the probability of (A∪B)	M10SP-IIIg-h-1	55	57	60
	4. Solves problems involving general probability	M10SP-IIIi-j-1	58	60	62
	5. Illustrates permutations of objects	M10SP-IIIa-1	62	64	67
Q4	1. Organizes data using appropriate statistical tools	M10SP-IVa-1	42	46	50
	2. Solves problems involving measures of position	M10SP-IVd-e-1	48	52	55
	3. Interprets research data using position measures	M10SP-IVh-j-1	52	55	58
	4. Calculates specified measures (e.g., 90th percentile)	M10SP-IVb-1	58	61	64
	5. Interprets measures of position	M10SP-IVc-1	63	66	69

It must be emphasized that the tabulation of Least Mastered Competencies (LMCs) across three academic years does not constitute a research instrument per se. Rather, the table represents diagnostic data derived from item analysis of quarterly mathematics examinations. The consistently low Mean Percentage Scores (MPS) in competencies such as proving the Rational Root Theorem, solving problems on circles,

differentiating permutations from combinations, and formulating statistical mini-research provided the empirical basis for the development of the instructional video lessons.

Accordingly, the LMC table functions as the diagnostic foundation of the study, while the structured questionnaire serves as the evaluative instrument. The former identified the content areas requiring pedagogical intervention, and the latter determines the extent to which the developed video lessons are acceptable to both students and teachers. This dual methodological approach ensures that the intervention is both empirically grounded and systematically evaluated, thereby reinforcing the rigor and validity of the study.

Data Gathering Procedures

The following measures will be undertaken to conduct the research at Batasan Hills National High School and to gather the necessary data from the respondents for the successful completion of this study:

1. Forwarded an authorization letter to the school principal, and approval was secured to conduct and pursue the study.

2. A letter requesting permission to conduct the study at Batasan Hills National High School was also forwarded to the Division Office of Quezon City for formal review and approval, ensuring compliance with the established research protocols and ethical standards required for the conduct of the study.

3. Requested and gathered records of the item analysis from the past three academic years of the Grade 10 periodical tests to identify and evaluate the learners' least mastered mathematics skills.

4. Developed competency-based instructional video materials anchored on the identified least mastered skills and aligned with the Department of Education's Most Essential Learning Competencies (MELCs).

5. Conducted validation of the developed instructional videos by subject specialists and mathematics teachers using DepEd-aligned criteria to ensure clarity, accuracy, and appropriateness.

6. Designed and developed the research questionnaire of the study, which was administered to both teachers and students to assess the acceptability of the instructional videos.

7. Collected and analyzed the responses from the two groups of respondents to determine the level of acceptability of the instructional materials and to test the hypotheses of the study.

Statistical Treatment of Data

The data collected in this study were systematically organized, coded, tabulated, and analyzed using appropriate descriptive and inferential statistical techniques. These statistical tools were selected based on their suitability in addressing the specific research problems and testing the hypothesis of the study. The following statistical treatments were employed:

Frequency Count and Percentage. This is used to describe the demographic profile of the respondents according to age, sex, civil status, educational attainment, and years of service. Frequency count determined the number of respondents in each category, while percentage indicated the proportion of respondents relative to the total population. It is used to answer Sub-problem 1: What is the demographic profile of the respondents in terms of age, sex, civil status, educational attainment, and years of service?

The percentage was computed using the formula:

$$P = \frac{f}{N}\ x\ 100$$

where:

P = percentage

f = frequency

N = total number of respondents

Weighted Mean. The weighted mean was used to determine the level of acceptability of the competency-based mathematics videos based on the responses of the Mathematics Teachers and the Learning Resources Management and Development System (LRMDS) Evaluators. It was employed to obtain the average rating for each evaluation criterion and the overall level of acceptability. It is used to answer Sub-problem 2: What is the level of acceptability of the competency-based mathematics videos as evaluated by the Mathematics Teachers and the LRMDS Evaluators?

The weighted mean was computed using the formula:

$$\bar{x} = \frac{\sum fX}{N}$$

where:

$\bar{X}$ = weighted mean

f = frequency

X = weight assigned to each response

N = total number of responses

Standard deviation. This is to determine the degree of variability or consistency in the respondents' ratings. A lower standard deviation indicates that the responses are more consistent, whereas a higher value suggests greater variability. It is used to answer Sub-problem 2: What is the level of acceptability of the competency-based mathematics videos as evaluated by the Mathematics Teachers and the LRMDS Evaluators?

The standard deviation was computed using the formula:

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

where:

s = standard deviation

x = individual score

$\bar{x}$ = mean

n = number of respondents

Shapiro–Wilk Test. Before conducting the inferential analysis, the Shapiro–Wilk test was used to determine whether the distribution of the acceptability ratings significantly deviated from a normal distribution. This test is recommended for small to moderate sample sizes and is widely used to assess the assumption of normality prior to applying parametric statistical procedures. It is used prior to Sub-problem 3: Is there a significant difference between the acceptability ratings of the Mathematics Teachers and the LRMDS Evaluators?

The null hypothesis states that the data are normally distributed.

Decision rule:

If p > .05, the data are normally distributed.

If p ≤ .05, the data are not normally distributed.

Levene's Test for Equality of Variances. This is performed to determine whether the variances of the two independent groups were homogeneous. Homogeneity of variance is one of the assumptions required before performing the independent samples *t*-test. Used prior to Sub Problem No. 3.

Decision rule:

If p > .05, equal variances are assumed.

If p ≤ .05, equal variances are not assumed.

Independent Samples *t*-Test. The independent samples *t*-test was employed to determine whether a significant difference existed between the acceptability ratings of the Mathematics Teachers and the LRMDS Evaluators. Since the study involved two independent groups of respondents, this statistical test was considered appropriate. Used to answer Sub-problem 3.

The test statistics are expressed as:

$$t = \frac{\bar{x}_{1-}\bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where:

$\bar{X}_1$ = mean of Group 1

$\bar{X}_2$ = mean of Group 2

s_1^2 = variance of Group 1

s_2^2 = variance of Group 2

n_1 = number of respondents in Group 1

n_2 = number of respondents in Group 2

The null hypothesis was tested at the **0.05 level of significance**. The null hypothesis was rejected when the computed **p-value** was less than **0.05**; otherwise, it was not rejected.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Sub-problem No. 1. What are the least mastered skills of the Grade 10 students in Mathematics for the last three years?

Table 9. Least Mastered Competencies in Grade 10 Mathematics (Across Three Academic Years)

Quarter	Competency	CG Code	AY 22–23	AY 23–24	AY 24–25	Trend
Q1	Performs long and synthetic division	M10AL-Ig-1	54	56	59	Increasing but below mastery

Q2	Proves theorems on secants and tangents	M10GE-IIe-f-1	38	41	44	Persistently lowest mastery
Q3	Solves problems on permutations & combinations	M10SP-IIId-e-1	40	43	46	Increasing but weak
Q4	Organizes data using appropriate statistical tools	M10SP-IVa-1	42	46	50	Slow improvement

The data show that across three academic years, THE Grade 10 learners from Batasan Hills National High School consistently struggled with Algebra (Rational Root Theorem, sequences), Geometry (secants and tangents), Probability (permutations and combinations), and Statistics (mini-research formulation). These competencies recorded mastery percentages (MPS) ranging only between 38% and 55%, far below the 75% mastery benchmark set by DepEd.

Geometry, particularly theorems on secants and tangents, emerged as the most difficult area, with only 38–44% mastery across three years. This finding is consistent with Bautista et al. (2021), who noted that Filipino learners often struggle with abstract geometric proofs due to limited exposure to visual and contextualized materials. Similarly, algebraic competencies such as proving the Rational Root Theorem and solving sequences remained persistently low, reflecting challenges in symbolic manipulation and logical reasoning (DepEd, 2024).

In statistics and probability, competencies like organizing data using appropriate statistical tools, averaging below 50%. Bernardo et al. (2019) emphasizes that learners often fail to connect statistical concepts to real-life contexts, which hinders comprehension. These results highlight the urgent need for instructional materials that directly target these least mastered competencies with contextualized, step-by-step approaches.

Sub-problem No. 2. Based on the result, what instructional material may be developed?

Table 10. Instructional Materials Developed for Least Mastered Competencies

Least Mastered Competency	Instructional Material Developed	Features
Perform Division of Polynomial using Synthetic Division (Algebra)	Competency-based video lessons	Step-by-step solutions, worked examples, and mastery checks
Apply Distance Formula to Geometric Proofs (Geometry)	Competency-based video lessons	Visual images, illustrations, and contextual applications
Permutations & Combinations (Probability)	Competency-based video lessons	Graphical simulations, problem-solving activities, and real-life scenarios
Use and Appropriateness of Statistical Tools (Statistics)	Competency-based video lessons	Structured data analysis tasks, guided demonstrations on tool selection, and contextualized problem-solving activities

Instructional materials were developed in the form of competency-based mathematics videos to directly address the least mastered competencies identified in SOP 1. These videos are aligned with MELCs and designed to provide learners with accessible, flexible, and mastery-oriented resources. Anderson (2010) emphasizes that multimedia instruction enhances comprehension by combining visual and auditory elements, making video lessons particularly effective for mathematics.

For algebra, the videos feature step-by-step solving of the synthetic division and problem-solving exercises on sequences. Geometry lessons integrate interactive diagrams and contextual applications to strengthen spatial reasoning. Probability lessons employ graphical simulations to differentiate permutations from combinations, while statistics lessons guide learners through mini-research projects using real-life datasets. Mayer's Cognitive Theory of Multimedia Learning (2009) supports this approach, noting that learners achieve deeper understanding when instructional materials combine words and visuals.

By embedding mastery checks, contextualized examples, and problem-solving activities, the developed materials not only address persistent content gaps but also promote independent learning and critical thinking. Bernardo (2019) stresses the importance of contextualization in mathematics instruction, particularly in the Philippine setting, where learners benefit from culturally relevant examples. Thus, the competency-based videos are expected to significantly improve mastery in the identified weak areas.

Sub-problem No. 3. How acceptable (align with the DepEd validation) is the developed competency-based mathematics videos for Grade 10 as assessed by LRMDS evaluators and mathematics teachers?

Table 11. Reliability Statistics of the Research Instrument

Dimension / Sub-Variable	Number of Items	Cronbach's Alpha	Interpretation
Clarity of Content	5	0.87	Highly Reliable
Relevance to Curriculum	5	0.89	Highly Reliable
Usability in Learning	5	0.85	Highly Reliable
Alignment with MELCs	5	0.91	Excellent Reliability
Total Instrument	20	0.9	Excellent Reliability

The computed Cronbach's Alpha coefficients for each dimension of the questionnaire ranged from 0.85 to 0.91, all exceeding the minimum threshold of 0.70 recommended for acceptable internal consistency (Tavakol & Dennick, 2011). This indicates that the items within each dimension are measuring the same construct consistently, thereby confirming the reliability of the instrument. The overall Cronbach's Alpha of 0.90 further demonstrates excellent reliability, suggesting that the questionnaire is a stable and dependable tool for assessing the acceptability of competency-based mathematics videos.

High reliability across all dimensions—clarity, relevance, usability, and MELCs alignment—ensures that the instrument can be confidently used in both classroom and research contexts. As Polit & Beck (2017) emphasize, reliability is a prerequisite for validity, since an instrument must consistently measure constructs before its results can be considered credible. The strong reliability scores obtained here validate that the questionnaire is robust enough to capture evaluators and teachers' perceptions accurately, thereby supporting its use in the study's subsequent inferential analyses.

Sub-problem No. 3. How acceptable (align with the DepEd validation) is the developed competency-based mathematics videos for Grade 10 as assessed by LRMDS evaluators and mathematics teachers?

Table 12. Weighted Mean Scores on the Acceptability of Competency-Based Mathematics Videos (LRMDS Evaluators and Mathematics Teachers)

MELCs Area	LRMDS Evaluators (n = 20)	Mathematics Teachers (n = 72)	Verbal Interpretation
Clarity of Content	4.65	4.6	Very High
Relevance to Curriculum	4.7	4.68	Very High
Usability in Learning	4.55	4.5	Very High
Alignment with MELCs	4.75	4.65	Very High
Overall Acceptability	4.7	4.65	Very High

Legend:

Scale	Range	Verbal Interpretation
5	4.21 – 5.00	Very Highly
4	3.41 – 4.20	High

3	2.61 – 3.40	Moderate
2	1.81 – 2.60	Low
1	1.00 – 1.80	Very Low
WM	Weighted Mean	
VI	Verbal Interpretation	

The evaluation results show that both LRMDS evaluators and mathematics teachers rated the videos **Very High** in terms of clarity of content. This indicates that the instructional videos successfully presented mathematical concepts in a clear, understandable, and learner-friendly manner. Mayer (2009) emphasizes that clarity in multimedia instruction is achieved when explanations are concise and supported by visual cues, which aligns with the positive ratings given by both groups.

In terms of relevance to the curriculum and usability in varied learning contexts, the videos were also rated **Very High**. This demonstrates that the materials are not only aligned with Grade 10 mathematics competencies but are also flexible enough to be used in classroom, home, and blended learning environments.

The highest ratings were observed in the area of alignment with MELCs, with evaluators and teachers both giving **Very High** scores. This confirms that the videos are consistent with DepEd's competency-based standards, ensuring mastery of essential skills before progressing to advanced topics. Overall acceptability was consistently **Very High**, validating that the videos meet DepEd's LRMDS standards for instructional materials and can be recommended for classroom integration.

Sub-problem No. 4. Is there a significant difference in the assessment of the two groups of respondents on the developed competency-based mathematics videos for Grade 10?

Table 13. Independent t-Test Results on the Assessment of Competency-Based Mathematics Videos (LRMDS Evaluators vs. Mathematics Teachers)

MELCs Area	t-Value	p-Value	Decision	Interpretation
Clarity of Content	0.85	0.41	Not Significant	Evaluators and teachers agree
Relevance to Curriculum	0.92	0.37	Not Significant	Consensus between groups
Usability in Learning	0.78	0.44	Not Significant	Consistent perceptions
Alignment with MELCs	0.95	0.35	Not Significant	Agreement on alignment
Overall Acceptability	1.05	0.31	Not Significant	Both groups rate videos highly

The independent t-test results reveal that all p-values are greater than 0.05, indicating **no significant difference** between the assessments of LRMDS evaluators and mathematics teachers. This suggests that both groups share consistent perceptions of the instructional videos across all MELCs areas.

The agreement between evaluators and teachers highlights the strength of the instructional design, as both groups recognized the clarity, relevance, usability, and alignment of the videos with DepEd standards. This consensus supports the validity of the materials as effective tools for addressing least mastered skills in Grade 10 mathematics.

The absence of significant differences also implies that the developed videos can be confidently recommended for classroom integration and DepEd validation. As Polit & Beck (2017) note, consistency across evaluators strengthens the credibility of instructional materials, ensuring that they meet both technical standards and pedagogical expectations.

Sub-problem No. 4. Is there a significant difference in the assessment of the two groups of respondents on the developed competency-based mathematics videos for Grade 10?

Table 14. Assumptions of Normality and Homogeneity of Variances

Variable / Sub-Variable	Shapiro–Wilk Statistic	p-Value	Decision (Normality)	Levene's Statistic	p-Value	Decision (Homogeneity)
Clarity of Content	0.972	0.18	Normal	1.25	0.29	Homogeneous
Relevance to Curriculum	0.968	0.22	Normal	1.4	0.33	Homogeneous
Usability in Learning	0.975	0.2	Normal	1.1	0.41	Homogeneous
Alignment with MELCs	0.97	0.25	Normal	1.35	0.38	Homogeneous
Overall Acceptability	0.969	0.19	Normal	1.5	0.27	Homogeneous

The results of the Shapiro–Wilk test indicate that all variables yielded p-values greater than 0.05, suggesting that the data are normally distributed. This satisfies the assumption of normality required for parametric tests such as the independent t-test. As Ghasemi and Zahediasl (2012) explain, the Shapiro–Wilk test is one of the most powerful methods for detecting departures from normality, and results above the 0.05 threshold confirm that the distribution of responses is appropriate for further parametric analysis.

Similarly, Levene's test results show that all variables produced p-values greater than 0.05, indicating homogeneity of variances between groups. This means that the variability in responses from LRMDS evaluators and mathematics teachers is statistically equal, fulfilling another key assumption for the independent t-test. According to Field (2013), meeting the assumptions of normality and homogeneity ensures the robustness of parametric comparisons, thereby validating the reliability of the subsequent inferential analysis.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

1. **Least Mastered Competencies (SOP 1):** Analysis of Grade 10 mathematics performance from AY 2022–2025 revealed persistent difficulties in Algebra (Rational Root Theorem, sequences), Geometry (secants and tangents), Probability (permutations and combinations), and Statistics (mini-research formulation). Mastery percentages (MPS) ranged only between 38% and 55%, far below the 75% mastery benchmark set by DepEd.
2. **Instructional Materials Developed (SOP 2):** Competency-based mathematics videos were created to address these least mastered competencies. The materials featured step-by-step explanations, interactive diagrams, graphical simulations, and contextualized datasets, aligned with MELCs 2026.
3. **Acceptability of the Videos (SOP 3):** Evaluation by LRMDS evaluators and mathematics teachers showed consistently Very High ratings across the four MELCs areas: clarity of content, relevance to curriculum, usability in learning, and alignment with MELCs. Overall acceptability was also rated Very High, confirming DepEd validation standards were met.
4. **Significant Difference in Assessments (SOP 4):** Independent t-test results revealed no significant difference ($p > 0.05$) between the assessments of LRMDS evaluators and mathematics teachers. This indicates consensus across groups regarding the quality and acceptability of the developed videos.
5. **Instrument Reliability and Assumptions:** Cronbach's Alpha coefficients ranged from 0.85 to 0.91, confirming high to excellent reliability of the questionnaire. Shapiro–Wilk and Levene's tests confirmed normality and homogeneity of variances, validating the use of parametric tests.

Conclusions

1. Grade 10 learners consistently struggle with higher-order competencies in Algebra, Geometry, Probability, and Statistics, requiring targeted instructional interventions.
2. The developed competency-based mathematics videos effectively addressed these gaps, providing

clear, relevant, and usable materials aligned with MELCs.
3. Both LRMDS evaluators and mathematics teachers validated the videos as acceptable instructional materials, meeting DepEd standards.
4. The absence of significant differences between evaluator and teacher assessments strengthens the credibility of the materials and supports their integration into classroom instruction.
5. The research instrument used was both reliable and statistically valid, ensuring that findings are robust and defense-ready.

Recommendations

1. **Instructional Integration:** Schools should adopt competency-based mathematics videos as supplementary materials in Grade 10 classrooms, particularly for Algebra, Geometry, Probability, and Statistics.
2. **Capacity Building:** Teachers should be trained to maximize the use of multimedia instructional materials, ensuring effective integration into lesson delivery.
3. **Continuous Development:** Future projects should expand video coverage to other least mastered competencies across grade levels, ensuring sustained improvement in mathematics performance.
4. **Monitoring and Evaluation:** DepEd and school administrators should conduct periodic evaluations of learner performance after integrating the videos, to measure effectiveness and refine content.
5. **Scalability:** The developed materials should be localized and adapted for broader use across different regions, ensuring cultural relevance and accessibility for diverse learners.

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YASF

DEDICATION

This milestone is lovingly dedicated to the pillars of strength, love, and guidance who sustained me throughout this journey.

To Myself, For the silent battles fought and won during the quiet hours, witnessed only by God and my own soul. For the unwavering perseverance to finish what I started, the resilience to endure life's challenges, and the courage to remain steadfast in pursuit of my dreams and a better future. This achievement is a testament to the strength I discovered within myself along the way.

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APPENDIX A

Research Output

A Universal Serial Bus (USB) flash drive containing the Competency-Based Mathematics Videos for Grade 10 Learners is attached to this thesis as supplementary material. The USB includes all instructional videos developed as part of this study and utilized during the evaluation of their acceptability. These materials are provided to facilitate the review and validation of the developed instructional videos by the thesis panel, validators, and other authorized users. Furthermore, they serve as supporting evidence of the research output and may be used as a reference for future studies and instructional enhancement initiatives, subject to applicable institutional policies and intellectual property considerations.

APPENDIX C

SURVEY QUESTIONNAIRE

COMPETENCY-BASED MATHEMATICS VIDEOS FOR GRADE 10 LEARNERS: ITS ACCEPTABILITY

Part I. Respondent's Profile

Direction: Please provide the requested information by placing a check mark (✓) in the appropriate box or by writing the required information in the space provided. The information collected will be treated with the utmost confidentiality and will be used solely for research purposes.

Name (Optional): _____

Position/Designation: _____

Current Grade Level Handled:
☐ Grade 7
☐ Grade 8
☐ Grade 9
☐ Grade 10
☐ Not Applicable

Civil Status:
☐ Single
☐ Married
☐ Widowed
☐ Separated
☐ Prefer not to disclose

Age:
☐ 20–29 years old
☐ 30–39 years old
☐ 40–49 years old
☐ 50–59 years old
☐ 60 years old and above

Sex:
☐ Male
☐ Female

Highest Educational Attainment:
☐ Bachelor's Degree Holder
☐ With Bachelor's Units Only
☐ 11–15 years
☐ master's Degree Holder
☐ With Doctorate Units
☐ Doctorate Degree Holder

Years of Service:
☐ Less than 5 years
☐ 6–10 years
☐ With Master's Units
☐ 16 years and above

PART II.

General Instructions:

Please indicate your level of agreement with each statement by placing a check mark (✓) in the appropriate box. Your responses will be treated with strict confidentiality and will be used solely for research purposes. Kindly answer each statement honestly and based on your evaluation of the competency-based mathematics videos.

LEGEND

Scale	Verbal Interpretation
5	Very Highly
4	High
3	Moderate
2	Low
1	Very Low

Clarity of Content

Statements	5	4	3	2	1
1.The instructional videos present mathematical concepts in a clear and understandable manner.					
2. Explanations in the videos are easy to follow and free from ambiguity.					
3. The examples provided in the videos effectively illustrate the lessons.					
4. The pacing of the video lessons allows me to grasp the concepts without confusion.					
5. The language used in the videos is appropriate and easily comprehensible for Grade 10 learners.					

B. Relevance to the Curriculum

Statements	5	4	3	2	1
1.The instructional videos are aligned with the Grade 10 Mathematics curriculum.					
2. The lessons in the videos address the least mastered skills identified in classroom assessments.					
3. The content of the videos is appropriate for my grade level.					
4. The videos support the development of problem-solving and reasoning skills required in mathematics.					
5. The topics covered in the videos are consistent with DepEd's Most Essential Learning Competencies (MELCs).					

C. Usability in Varied Learning Context

Statements	5	4	3	2	1
1. The videos can be used effectively in both classroom and home learning environments.					
2. I can pause, replay, and review the videos to support my learning needs.					

3. The videos are accessible and easy to use with available technology (e.g., smartphones, laptops).					
4. The videos encourage independent learning and self-paced study.					
5. The videos are flexible enough to be integrated into blended learning modalities.					

D. Alignment with MELCs

Statements	5	4	3	2	1
1.The instructional videos are directly aligned with the Most Essential Learning Competencies (MELCs).					
2. The videos emphasize mastery of essential skills before moving to advanced topics.					
3. The content of the videos reflects DepEd's standards for competency-based instruction.					
4. The videos contribute to achieving the learning goals set by the K–12 curriculum.					
5. The videos provide sufficient practice opportunities to ensure mastery of competencies.					

E. Overall Acceptability

1. What aspects of the instructional videos did you find most helpful?

_____

_____

2. What improvements would you suggest for future video lessons?

_____

_____

3. How do these videos compare with traditional classroom instruction in terms of effectiveness?

_____

_____