International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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Teaching grade 8 Mathematics through teacher-made video clips

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International Journal of Science and Research Archive, 2026, 19(02), 1034-1043

Publication history: Received on 09 April 2026; revised on 17 May 2026; accepted on 19 May 2026

Article DOI: https://doi.org/10.30574/ijsra.2026.19.2.1155

Abstract

This study determined the effects of teacher-made video clips in teaching Grade 8 Mathematics to selected students of Tabaco National High School, SY 2025-2026. Specifically, it answered the following questions: 1. What is the performance of the control and experimental groups in the pre-test along with factoring completely different types of polynomials, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions? 2. What is the performance of the control and experimental groups in the post-test? 3. Is there a significant difference in the performance of the control and experimental groups in the pre-test and post-test? 4. What are the least mastered skills of the experimental group in the post-test? and 5. What enhanced teacher-made video clips may be proposed to address the least mastered skills?

The researcher applied the quasi-experimental method to determine the effects of teacher-made video clips in teaching Grade 8 Mathematics. It employed the pre and post-test using two (2) groups, the control and the experimental groups. The test results were utilized as a basis in providing conclusions to the effectiveness of the interventions provided by the researcher.

The teacher-made video clips enabled students to bridge the gap between concrete experiences and abstract reasoning. By integrating these materials in classroom instruction, students better understand the connections and underlying principles behind mathematical procedures, rather than relying solely on memorization.

Keywords: Video Clips; Grade 8 Mathematics; Quasi-Experimental Method; Control and The Experimental Groups; Pre and Post-Test

1. Introduction

In grade 8 Mathematics, lessons often mark a critical transition from concrete representations to more abstract concepts. At this stage, many learners struggle to recognize the practical relevance of mathematical ideas, particularly when lessons rely heavily on symbols, formulas, and procedural explanations. This difficulty is intensified by the hierarchical nature of Mathematics, where gaps in prior knowledge can hinder the understanding of new concepts, resulting in low motivation, learner disengagement, and weak conceptual understanding.

To address these challenges, it is essential to activate learners' prior knowledge and experiences so they can meaningfully connect new mathematical ideas to familiar contexts. Instruction must therefore emphasize contextualized and scaffolded representations that make abstract concepts more accessible and relevant to students' real-life experiences. In this regard, teacher-made video clips serve as an effective instructional resource, as they allow teachers to present lessons using visual, auditory, and dynamic elements aligned with learners' needs. Its interactive and re-watchable nature can facilitate self-regulated learning, allowing learners to revisit challenging concepts at their own pace and potentially increase engagement and comprehension. It is, however, essential that such learning

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resources align thoughtfully with the established learning objectives and be tailored by teachers who understand the unique needs and contexts of their students. Through carefully designed explanations, demonstrations, and real-world applications, these video clips help bridge the gap between abstract mathematical concepts and learners' comprehension, thereby enhancing engagement and supporting deeper conceptual understanding in Grade 8 Mathematics.

The researcher, also a Mathematics teacher, aimed to develop innovative instructional resources that improve the academic achievement in Mathematics 8. Given that innovative teaching strategies are key factors of success in student learning, the use of teacher-made video clips holds significant promise, highlighting their potential as an effective tool to enhance student engagement and understanding.

1.1. Statement of the Problem

This study determined the performance of the Grade 8 students in Mathematics using teacher-made video clips in Tabaco National High School, S.Y. 2025-2026. Specifically, it answered the following sub-problems:

- What is the performance of the control and experimental groups in the pre-test along:
  - Factoring completely different types of polynomials (polynomials with common monomial factor, difference of two squares, sum and difference of two squares, perfect square trinomials, and general trinomials);
  - simplifying rational algebraic expressions;
  - performing operations on rational algebraic expressions; and
  - solving problems involving rational algebraic expressions.
- What is the performance of the control and experimental groups in the post-test?
- Is there a significant difference in the performance of the control and experimental groups in the pre and post-test?
- What are the least mastered skills of the experimental group in the post-test?
- What enhanced teacher-made video lesson may be proposed to address the least mastered skills?

Hypothesis

There is no significant difference between the performance of the control and experimental groups in the pre-test and post-test.

1.2. Scope and Delimitation

This study examined the effectiveness of teacher-made video clips in teaching specific topics based on the most essential learning competencies of the K to 12 Grade 8 Mathematics curriculum. The scope of the study was limited to factoring different types of polynomials completely, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions.

The respondents of the study were Grade 8 students of Tabaco National High School during the school year 2025-2026. The study assessed the students' performance level through the pre-test and post-test. The control group received traditional teaching methods, while the experimental group received teacher-made video clips in the delivery of instruction.

This research was delimited to the use of video clips prepared by the researcher and did not include commercially produced videos, online learning platforms, or other learning resources on the internet. Furthermore, the study also excluded other grade levels and subject areas. Variables such as parental involvement, learners' socio-economic background, and long-term retention of learning were beyond the scope of this study.

2. Materials and Methods

2.1. Research Method

This study utilized the experimental research method, particularly quasi-experimental research design, to determine the performance of students in Mathematics 8 using teacher-made video clips in Tabaco National High School during the school year 2025-2026. According to Reichardt (2009)1, a quasi-experimental research design is a methodology employed to study cause-and-effect relationships where true experimental control, particularly random assignment of

participants, is not possible or ethical. Its purpose is to allow researchers to investigate the impact of an intervention in real-world settings by comparing groups that are not randomly assigned but are otherwise as similar as possible for practical and ethical considerations.

For this study, the quasi-experimental design was deemed appropriate as it involved the use of control and experimental groups to determine the effectiveness of teacher-made video clips in teaching key Grade 8 Mathematics skills, specifically factoring different types of polynomials, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions. The researcher implemented a pre-test and post-test design to evaluate students' performance on the targeted competencies. By administering pre- and post-tests, the researcher accurately measured the impact of teacher-made video clips, providing a practical and effective means of assessing their influence on student achievement in Grade 8 Mathematics.

2.2. Subjects of the Study

The subjects of the study were two (2) selected Grade 8 sections of Tabaco National High School in the school year 2025–2026. A total of 66 students were equally distributed to the control and experimental groups. Each group consisted of thirty-three (33) students whose academic performance in Mathematics during the previous School Year 2024-2025 was used to ensure comparability of ability levels. Originally, the section assigned as the control group consisted of forty-two (42) students. Their final ratings in Mathematics 7 were arranged from highest to lowest. Based on the classification of performance levels, twelve (12) students were categorized as "above average" (93 and above), fourteen (14) students as "average" (84 to 92), and fifteen (15) students as "below average" (79 and below). Similarly, the section assigned as the experimental group initially had forty-one (41) students. Among them, thirteen (13) students were classified as above average, twelve (12) as average, and thirteen (13) as below average based on their final Mathematics grades.

To ensure balanced representation of ability levels in both groups, the researcher selected thirty-three (33) students from each section based on the three (3) performance categories. Specifically, eleven (11) students from each category (above average, average, and below average) were selected from both the control and experimental groups. This process ensured that each group consisted of an equal distribution of ability levels, maintaining comparability between the control and experimental groups.

2.3. Research Instrument

To measure the impact of the teacher-made video clips, a 40-item researcher-made test was developed as the main instrument of the study.

A Table of Specifications was created to guarantee that test items were properly distributed by topic and cognitive level, ensuring content validity. This test was administered as both a pre-test and post-test to students in the control and experimental groups, assessing their performance in factoring different types of polynomials (14 items), simplifying rational algebraic expressions (7 items), performing operations on rational algebraic expressions (14 items), and solving related problems (5 items). This systematic approach allowed for an accurate evaluation of the effectiveness of the video-based instructional strategy.

3. Results and Discussion

3.1. The Performance of the Control Group in the Pre-Test.

The pre-test for the control group is a 40-item multiple choice type of test that was administered to assess students' prior knowledge and skills before the formal instruction without utilizing teacher-made video clips in the teaching and learning process. The test covers factoring completely different polynomials, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions.

Table 1 Performance of the Control Group in the Pre-Test

Skills	No. of Items	Total Score	Mean	PL (%)	Description
Factoring completely different types of polynomials	14	101	3.06	22	No Mastery
Simplifying rational algebraic expressions	7	53	1.61	23	No Mastery
Performing operations on rational algebraic expressions	14	101	3.06	22	No Mastery
Solving problems involving rational algebraic expressions	5	36	1.09	22	No Mastery
Overall	40	291	8.82	22	No Mastery

Table 1 results indicate that, prior to the study, students in the control group exhibited poor performance in factoring polynomials, simplifying rational algebraic expressions, performing operations on rational expressions, and solving related problems. This difficulty can be attributed to several factors, including low proficiency in prerequisite skills such as multiplying polynomials, perfect squares, and common factors, as well as a lack of prior instruction on the lessons being assessed. As a result, students struggled to understand and apply the required concepts, leading to poor performance on the test.

According to Gafoor and Kurukkan (2015)[1], students' difficulty in learning Mathematics is connected to their level of mastery of the previous lessons and prerequisite skills. They emphasized that learning Mathematics effectively is understanding the basics as the initial step. When the foundational skills are well-established, they are more prepared to perform better as the new lesson progresses.

3.2. The Performance of the Experimental Group in the Pre-Test.

The same 40-item multiple choice type of test was administered to the experimental group to measure their performance level on factoring polynomials, simplifying rational algebraic expressions, performing operations on rational expressions, and solving problems involving these expressions. The pre-test results served as a baseline measure of the prior knowledge and skills of the students in the experimental group before the intervention was implemented. It also helped identify the strengths and weaknesses in the competencies covered by the study. By establishing their initial performance level, the researcher was able to determine their learning gains after the treatment.

Table 2 Performance of the Experimental Group in the Pre-Test

Skills	No. of Items	Total Score	Mean	PL (%)	Description
Factoring completely different types of polynomials	14	96	2.91	21	No Mastery
Simplifying rational algebraic expressions	7	56	1.70	24	No Mastery
Performing operations on rational algebraic expressions	14	109	3.30	24	No Mastery
Solving problems involving rational algebraic expressions	5	36	1.09	22	No Mastery
Overall	40	297	9.00	23	No Mastery

Table 2 shows that the students in the experimental group revealed a lack of proficiency in factoring polynomials, simplifying rational algebraic expressions, performing operations on rational expressions, and solving problems involving these expressions. The researcher identifies this set of competencies as the least mastered competencies in the first quarter. With this, the teacher can make adjustments to her instructional plans by strengthening prerequisite skills and integrating instructional strategies that will both engage and support students in learning Mathematics.

Drawing on her teaching experience, focusing on students' needs and what motivates them are essential considerations in lesson planning. Additionally, when lessons are dominated by symbolic representations and abstract rules, students often disengage, particularly if the material seems disconnected from their everyday lives. Many learners become passive or even frustrated when faced with topics that appear to lack relevance or context. Integrating videos into instruction provides a meaningful bridge, sparking students' curiosity about why mathematical concepts are structured as they are and what principles govern these ideas. Videos can contextualize abstract content, making it relatable and prompting students to ask deeper questions about the logic and patterns underlying Mathematics. This strategy, therefore, not only addresses learning gaps but also fosters a more engaging and inquiry-driven classroom environment. By reinforcing and reviewing the foundations and necessary skills through visual and auditory representations, they help learners understand abstract concepts clearly.

According to Hattie and Donoghue (2016)[2], strengthening students' pre-existing knowledge plays a significant role in learning. Students' ability to grasp more advanced concepts is determined by their mastery of the fundamental skills, which suggests that pre-requisite skills are not only for the purpose of establishing readiness in students to learn new concepts, but are also key to creating deep and lasting understanding.

3.3. The Performance of the Control Group in the Post-Test

The control group demonstrated improvement in their performance on factoring completely different types of polynomials, as well as simplifying and performing operations on rational algebraic expressions, and solving problems involving these expressions. The lessons were delivered through traditional methods of teaching, where the teacher employed conventional learning materials, such as a chalkboard and manila paper, to discuss the lessons and demonstrate examples. Students are then given problems for practice through written and board work activities.

Table 3 Performance of the Control Group in the Post-Test

Skills	No. of Items	Total Score	Mean	PL (%)	Description
Factoring completely different types of polynomials	14	317	9.61	69	Near Mastery
Simplifying rational algebraic expressions	7	153	4.64	66	Near Mastery
Performing operations on rational algebraic expressions	14	301	9.12	65	Near Mastery
Solving problems involving rational algebraic expressions	5	99	3.00	60	Near Mastery
Overall	40	870	26.36	66	Near Mastery

Table 3 implies that although traditional teaching methods contributed to improvements in students' performance, specifically in factoring polynomials, simplifying and performing operations in rational algebraic expressions, as well as in solving problems involving these expressions, there are still areas that need to be improved particularly in promoting deeper understanding and other higher-order thinking skills. Although measurable gains were evident across all targeted skills, the findings suggest a need to develop more dynamic instructional strategies that cater to the diverse needs and interests of today's learners, particularly by providing visual representations to reinforce conceptual understanding and offering students flexibility to revisit the least mastered skills. The researcher noted that even with dedicated instruction using traditional techniques, some students continue to struggle with understanding and applying abstract concepts. Observing persistently low performance on post-tests despite rigorous practice highlights the need to reconsider and diversify instructional practices. It becomes clear that fostering genuine mathematical understanding requires moving beyond rote procedures and engaging students through contextualized problems, visual aids, and interactive activities that make learning more relevant and accessible to all learners.

Wood, D., Bruner, J. S., et al (1976)[3], emphasized that learners who are struggling in a particular concept can be supported through scaffolding techniques. He argued that teachers should structure learning experiences that support students as they encounter challenging tasks, gradually reducing support as they gain proficiency. The three modes of representation provide a developmental pathway for abstract learning, which applies to teaching the least mastered skills in Algebra. This implies the importance of visualization and presenting concrete examples and guiding students toward symbolic notations central to Algebra.

3.4. The Performance of the Experimental Group in the Post-Test

Following the implementation of the treatment in the experimental group, a post-test was administered to assess their performance based on the skills covered. The results indicated a significant improvement in student performance across all topics covered in the study.

Table 4 Performance of the Experimental Group in the Post-Test

Skills	No. of Items	Total Score	Mean	PL (%)	Description
Factoring completely different types of polynomials	14	358	10.85	78	Mastery
Simplifying rational algebraic expressions	7	174	5.27	75	Mastery
Performing operations on rational algebraic expressions	14	337	10.21	73	Near Mastery
Solving problems involving rational algebraic expressions	5	117	3.55	71	Near Mastery
Overall	40	986	29.88	75	Mastery

Table 4 clearly demonstrate that students in the experimental group made substantial gains in performance, highlighting the effectiveness of teacher-made video clips as an instructional tool. These videos not only increased student engagement but also made abstract mathematical concepts more comprehensible by providing visual and contextual examples that activated prior knowledge and supported the learning of new lessons. By integrating these materials in classroom instruction, students better understand the connections and underlying principles behind mathematical procedures, rather than relying solely on memorization.

Moreover, teacher-made video clips enabled students to bridge the gap between concrete experiences and abstract reasoning. They offered the flexibility for students to revisit challenging topics at their own pace at home. This approach suggests the importance of establishing clear links between prior knowledge and new concepts at the beginning of each lesson, which proved essential for improving mastery in areas previously identified as difficult. Collectively, these findings emphasize the value of combining technology with active learning strategies to meet diverse student needs and significantly enhance achievement in Mathematics.

Hattie and Donoghue (2016)[4], emphasized that learning is effective when students' prior knowledge is activated and forms a connection to the new lesson. They said that the underlying philosophy is more about students' readiness to learn and how their learning can be enabled and equipping them with the skill of learning how to learn. As demonstrated in their model, linking the material at the start of a lesson enhances engagement and comprehension, while combining visual demonstrations, such as videos, with hands-on and collaborative learning promotes critical thinking and higher-order cognitive skills.

3.5. Test of significance on the difference in the performance of the control and experimental groups in the pre-test.

To examine whether a statistically significant difference existed between the pre-test performances of the control and experimental groups, a test of significance was carried out. The data from both groups were analyzed through an independent samples t-test, which compared their mean scores and variances. This analysis aimed to determine if the observed differences in pre-test results were merely due to random variation or statistically meaningful.

Table 5 Test of Difference on the Performance of the Control and Experimental Groups in the Pre-Test

Group	Mean	Mean Difference	Variance	t-value		Remark
				Computed	Critical	
Control	8.82	-0.18	10.22	-0.24	±1.67	Not Significant
Experimental	9.00		8.00			

Table 5 means that the control and experimental groups had comparable performance on the pre-test. It reflects that they started with similar levels of knowledge and skills prior to the intervention. Establishing this equivalence is crucial for the study's validity, as it allows any differences observed in the post-test to be more confidently attributed to the teaching methods or interventions used, rather than to pre-existing disparities in ability.

According to Boaler (2016)[5], mathematics instruction in many traditional classrooms often relies on lecture-based teaching, rote memorization, and procedural problem-solving. Teachers present concepts, work through examples on the board, and expect students to follow steps in solving problems. While this approach allows for the coverage of curriculum content, it tends to focus on passive learning, where students are receivers of information rather than active participants in constructing their understanding. Additionally, students with varying abilities may struggle to keep up, and those who require extra support risk falling behind, limiting overall classroom performance. The lack of interactive and personalized learning opportunities in traditional classrooms can prevent students from achieving deep understanding and applying mathematical concepts meaningfully.

3.6. Test of significance on the difference in the performance of the control and experimental groups in the post-test.

To assess the impact of an instructional intervention, it is important to compare the post-test outcomes of the control and experimental groups. In this study, a t-test for independent samples was conducted to determine whether the difference in post-test scores between the two groups was statistically significant. The findings indicate that the experimental instructional method positively influenced student performance, as evidenced by significantly higher post-test scores in the experimental group compared to the control group.

Table 6 Test of Difference on the Performance of the Control and Experimental Groups in the Post-Test

Group	Mean	Mean Difference	Variance	t-value		Remark
				Computed	Critical	
Control	26.36	-3.52	14.18	-3.99	±1.67	Significant
Experimental	29.88		11.48			

Table 6 indicates that students in the experimental group who were taught with teacher-made video clips showed significantly greater improvement in performance across the targeted learning competencies. It includes factoring completely different types of polynomials, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions, compared to those in the control group who received traditional instruction. The effectiveness of teacher-made video clips can be attributed to several factors.

The following factors contribute to the effectiveness of teacher-made video clips in enhancing students' learning in Mathematics. First, these videos provided visual and auditory representations, which helped clarify abstract concepts and made them more relatable to students by connecting the new lesson to their prior knowledge and real-life contexts. Second, the flexibility of video resources allowed learners to revisit challenging topics at their own pace, enabling differentiated instruction and self-paced review that traditional teaching methods often lack.

Moreover, the use of video clips encouraged greater student engagement and motivation, as lessons became more interactive and visually stimulating. This increased engagement likely contributed to improved retention and deeper conceptual understanding, as students were not just passively receiving information but actively making sense of the new lesson.

The findings suggest the integration of multimedia instructional strategies in Mathematics education, especially for complex topics where students typically struggle. By leveraging teacher-made videos, teachers can bridge learning gaps, foster conceptual understanding, and support a variety of learning preferences, making Mathematics instruction more inclusive and effective. These results support the growing body of evidence that innovative, technology-enhanced teaching approaches can significantly enhance learning outcomes and should be considered as integral components of modern Mathematics classrooms.

As supported by Lopez and Espinosa (2018)[6], their study's findings revealed that students exposed to video-based learning achieved higher performance levels and demonstrated increased motivation compared to those taught through

conventional methods. The study highlights that integrating videos into Mathematics instruction can enhance understanding, engagement, and overall learning outcomes, suggesting that teacher-made video clips can serve as an effective supplemental tool in promoting meaningful and interactive learning experiences.

4. Least Mastered Skill of the Experimental Group in the Post-test

The researcher determined the skills that were least mastered by the experimental group, specifically factoring polynomials, simplifying, and performing operations on rational algebraic expressions.

Table 7 Least Mastered Skills

Skill	Mean	Performance Level (%)	Description
Performing operations on rational algebraic expressions	10.21	73	Near Mastery
Solving problems involving rational algebraic expressions	3.55	71	Near Mastery

Table 7 indicates that within the topics covered, the experimental group had the most significant difficulty with performing operations on rational algebraic expressions and solving problems involving rational algebraic expressions.

While the use of teacher-made video clips significantly enhanced students' performance in Mathematics overall, it is not uncommon for certain competencies to remain least mastered. The findings of the study imply that some mathematical concepts, particularly in Algebra. It requires a deeper level of abstract reasoning and cumulative understanding that cannot be fully developed through a single intervention or within a limited instructional period. Competencies that build upon multiple prerequisite skills, such as solving challenging problems on rational algebraic expressions, often demand sustained practice, consistent reinforcement, and diverse instructional approaches.

Additionally, these least mastered skills may involve higher-order thinking, problem-solving, or the integration of several concepts, which can be challenging even with enhanced visual and contextual support. Factors such as students' varying levels of prior knowledge, differences in learning pace, and limited opportunities for individualized remediation can also contribute to persistent difficulties. Thus, while teacher-made video clips are effective for promoting engagement and conceptual understanding, ongoing support, differentiated instruction, and repeated exposure to challenging competencies are essential for ensuring mastery across all targeted skills.

Several studies have examined the difficulties students encounter when working with rational algebraic expressions, identifying gaps in foundational knowledge and challenges in applying prior concepts as key factors. Boaler (2016) notes that students often struggle when instruction emphasizes rote procedures rather than conceptual understanding, making it difficult to transfer earlier skills, such as factoring and simplification, to more complex problems.

4.1. The Enhanced Teacher-Made Videos to Address the Least Mastered Skill

Although the teacher-made video clips led to notable improvements in students' performance in the lessons under study, the results indicated that two (2) competencies were found to be the least mastered. The least mastered competencies include (1) performing operations on rational algebraic expressions and (2) solving problems involving rational algebraic expressions. This suggests a need for further enhancement, especially regarding both instructional and technical quality. To address this, the enhanced teacher-made videos are designed to foster deeper conceptual understanding and stronger problem-solving abilities.

In terms of instructional quality, the videos now explicitly follow the iconic-abstract strategy. This approach begins with the use of concrete visual representations, such as figures, animations, and real-life examples, before gradually progressing to abstract mathematical concepts. By employing the iconic-abstract strategy, students first build mental images of the concepts, which supports a smoother transition to more symbolic and abstract thinking.

From a technical standpoint, the videos were upgraded with clear and well-paced audio narration, high-resolution visuals, and consistent formatting to ensure clarity and engagement. The addition of animated illustrations, color-coded steps, and visual cues such as arrows and highlights can direct learners' attention to critical parts of the discussion, helping them to easily follow the flow of the explanation. To support mastery of the least developed competencies, each video concludes with additional practice exercises and an answer key, giving students the opportunity to review, practice, and self-assess their understanding.

Ultimately, these enhanced videos can offer students a richer, more engaging learning experience, one that not only clarifies complex mathematical ideas but also fosters independent learning, confidence, and a greater capacity to apply knowledge to new situations.

5. Conclusion

The following conclusions were drawn:

- The overall performance of the control and experimental groups in the pre-test along with factoring completely different types of polynomials; simplifying rational algebraic expressions; performing operations on rational algebraic expressions; and solving problems involving rational algebraic expressions was interpreted with no mastery.
- The general performance of the control group in the post-test was described as near mastery along with factoring completely different types of polynomials, simplifying rational algebraic expressions, performing operations on rational algebraic expressions, and solving problems involving rational algebraic expressions. However, the experimental group's performance was interpreted as having mastery on the above-mentioned skills.
- There was no significant difference in the performance of the control and experimental groups in the pre-test, but they differ significantly in the post-test.
- The least mastered skills of the experimental group in the post-test were performing operations on rational algebraic expressions; and solving problems involving rational algebraic expressions.
- The researcher presented enhanced teacher-made videos to address the least mastered skills.

Compliance with ethical standards

Acknowledgments

The researcher would like to express her sincere gratitude to all individuals and institutions who extended their support in the completion of this thesis.

First and foremost, she would like to express her deepest gratitude to ALMIGHTY GOD for granting her the strength, wisdom, and perseverance to complete this thesis successfully.

She would like to extend her profound appreciation to her thesis adviser, ALADINO B. BONAVENTE, Ed.D., whose expert guidance, constructive feedback, and encouragement have been invaluable throughout the conduct of this study.

She is also grateful to the Thesis Committee, chaired by DIOLETA B. BORAIS, PH.D., and composed of esteemed members RAFAEL C. KALLOS, Ph.D., SELINA C. TANCANGCO, Ph.D., and ARLENE N. CABAIS, Ed.D., for their insightful comments and valuable suggestions, which have greatly contributed to the improvement of her work.

Her appreciation likewise goes to the faculty and administration of the DANIEL B. PEÑA MEMORIAL COLLEGE FOUNDATION, INC., under the leadership of SALVADOR V. RIOS JR., President, as well as the teaching and non-teaching staff, and GERONIMO J. VELOSO III, Ph.D., Dean of the Graduate Studies Department, for providing the necessary resources and assistance that facilitated the completion of this research.

The researcher is deeply grateful to FATIMA D. BUEN, CESO VI, Schools Division Superintendent, Tabaco City Division, and SALVE B. ESTRELLA, Secondary School Principal I of Tabaco National High School, for their approval and full support, which allowed the researcher to conduct this study within their institution.

Likewise, to THE GRADE 8 STUDENTS of Tabaco National High School, whose active participation was vital to the research process.

Finally, she acknowledges with deep gratitude the unwavering support, patience, and understanding of her family: MICHAEL NEIL I. TE, her husband; DOMINGO LOPEZ and TRINIDAD M. LOPEZ, her parents; CESAR R. MEGINO and ADELIA P. MEGINO, her second parents; TERESA, JERWIN, PHOEBE, CHRISTINE, PAUL, JAY, her brothers and sisters; MR. and MRS. ERESTIAN AND FAMILY and her Math Family, whose encouragement served as an inspiration throughout this academic journey.

Disclosure of conflict of interest

I declare that I have no conflicts of interest related to this research. I have no personal or financial relationships that could influence my work.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study

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