

Original Article

Mathematics Performance and Learning Experiences of Underperforming Grade 7 Learners During a Follow-Up Video Intervention

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Abstract. This action research examined Grade 7 learners' problem-solving performance and experiences during a 10-day follow-up video intervention in Mathematics at Barayong National High School. This study used a mixed-methods approach, combining activity and end-of-class quiz results with post-intervention interviews with ten underperforming learners. Quantitative data were summarized using descriptive statistics, while interview responses were analyzed thematically. Activity performance showed a generally increasing trend, with mean scores rising from 10 out of 20 in the initial session to 16 out of 20 in the final sessions. Learners described the videos as helpful for reviewing difficult concepts, replaying explanations, practicing procedures, and learning at their own pace. The findings indicate progress in mathematics performance during the intervention and suggest that follow-up video lessons may provide flexible opportunities for review, practice, and application.

Keywords: *Follow-up video lessons; Mathematics performance; Problem-solving; Review; Video-based learning.*

Critical thinking and problem-solving are essential skills in Mathematics because they enable learners to analyze information, select appropriate strategies, justify solutions, and apply mathematical concepts to different situations. However, some learners still struggle to move beyond recalling mathematical procedures to understanding how and why these procedures are applied. These difficulties can be particularly challenging for learners who need additional instructional support to understand mathematical concepts, interpret information, and solve problems independently. In classroom settings where instructional time and learning opportunities vary, teachers may also find it challenging to provide differentiated support that meets the needs of learners performing below expectations. At Barayong National High School, these concerns have been observed among selected underperforming Grade 7 learners in Mathematics during the implementation of shifting and blended classes.

Globally, mathematics learning remains a major educational concern. The World Bank (2022) reported that the

global learning crisis has affected learners' acquisition of foundational skills necessary for continued learning and participation in society. Mathematics learning involves more than procedural knowledge; it requires learners to reason, interpret information, analyze situations, and solve problems. Similarly, the OECD (2023) reported substantial challenges in mathematics performance among learners who participated in PISA 2022.

One instructional approach that has gained attention in mathematics education is the flipped classroom. In a flipped classroom, learners access instructional content before or outside regular classroom sessions, often through teacher-prepared videos or other learning materials, while classroom time is used for discussion, guided practice, problem-solving, feedback, and application. Cevikbas and Kaiser (2020) described flipped learning as a reform-oriented approach that can promote active and student-centered mathematics learning. By transferring some content presentation outside the conventional classroom period, teachers can devote more classroom interaction to activities that require learners to apply concepts, discuss mathematical ideas, and engage in higher-order thinking.

Research has shown flipped learning's potential in Mathematics. Cevikbas and Kaiser (2022) found that flipped learning supported student engagement in secondary mathematics classrooms by encouraging learners to participate more actively in the learning process. Güler et al. (2022), through a meta-analysis of flipped classroom studies in mathematics education, reported a positive overall effect of the approach on students' mathematics achievement. Yakar (2021) likewise found a positive effect of flipped learning on mathematics achievement among primary and secondary school learners.

In the Philippines, studies have also demonstrated the potential of flipped classroom approaches in Mathematics. Esperanza et al. (2023) examined the use of a flipped classroom in secondary Mathematics education and highlighted its potential to support learning at students' own pace while providing opportunities for more interactive classroom engagement. Alviar and Solon (2023) reported improved mathematics assessment scores among Grade 10 students after exposure to a flipped classroom approach. Similarly, Baybayan and Cabanes (2024) found improved academic performance among Grade 8 students after implementing a flipped classroom and reported positive learner motivation in activities such as problem-solving and classroom participation. Pimentel et al. (2024) also examined flipped classroom utilization among Philippine senior high school learners and emphasized its potential to address individual learning needs through more personalized classroom activities. More recently, Canonio and Valdez (2025) explored the lived experiences of Grade 8 learners in a flipped mathematics classroom and documented learner experiences related to engagement, attitudes, and learning behaviors.

The Philippine context further underscores the need for such interventions. PISA 2022 results showed that the Philippines scored 355 in mathematics, substantially below the OECD average of 472, with only a small proportion of Filipino learners reaching the minimum proficiency level (OECD, 2023). The results point to continuing difficulties in applying mathematical knowledge to problems and real-life situations. At the local level, studies from Mindanao have likewise examined mathematics learning through alternative instructional approaches. Segumpan and Tan investigated flipped classroom instruction among Grade 7 learners in Bukidnon and examined its relationship with mathematics performance and mathematics anxiety. Batilantes (2022) also implemented online, shareable, and offline video lectures with Grade 7 learners in a flipped classroom context to address untaught mathematics competencies. In Davao Oriental, Canonio and Valdez (2025) examined the lived experiences of Grade 8 learners in a flipped Mathematics classroom, providing local evidence that learner engagement and learning behaviors are important dimensions of flipped learning.

Although existing studies have established the value of flipped classrooms, most interventions position video lessons as the primary way to deliver instructional content before classroom activities. The present intervention, Thought Rewind, extends this idea by emphasizing follow-up video lessons as an additional opportunity for learners to revisit and reinforce mathematical explanations after classroom instruction. The videos are not intended to replace teacher-led instruction or simply transfer the lecture outside the classroom. Instead, they extend the learning process, allowing learners to return to selected explanations, worked examples, and problem-solving procedures when they need further clarification. This feature is especially relevant for underperforming learners who may need repeated exposure to mathematical representations and explanations before they can apply a concept independently.

At Barayong National High School, the researcher observed that selected underperforming Grade 7 learners had difficulty understanding and applying Mathematics concepts during shifting and blended classes. These difficulties were particularly evident when learners were required to interpret mathematical information, determine the appropriate procedure, solve problems, and explain their answers. Some learners also needed additional exposure to worked examples and teacher explanations before they could complete mathematical tasks independently. These observations indicated a need for an intervention that could extend instructional support beyond the immediate classroom interaction without removing the teacher's role in guiding mathematical thinking.

In response, the researcher implemented Thought Rewind, a flipped classroom intervention using follow-up video lessons to support the development of critical thinking and problem-solving skills. The intervention provided teacher-prepared videos containing explanations, worked examples, and problem-solving procedures related to selected Mathematics lessons, particularly measures of central tendency for ungrouped data. After classroom instruction, learners had access to the videos so they could revisit key parts of the lesson, pause explanations, replay examples, and clarify concepts that remained difficult. Subsequent classroom activities focused on guided practice, discussion, problem-solving, feedback, and correction of misconceptions. In this way, the intervention connected individual review through video materials with teacher-guided mathematical engagement in the classroom.

Thought Rewind was designed to help learners not only remember mathematical procedures but also apply them to mathematical situations. Through classroom activities connected to the video lessons, learners were encouraged to identify relevant information, determine what a problem required, select appropriate strategies, explain their reasoning, and evaluate their solutions. The intervention therefore provided two complementary sources of evidence of learning: learners' performance in mathematical activities and quizzes, and their experiences of using the follow-up video lessons. Examining both dimensions was important because improved performance alone may not fully explain how learners responded to or benefited from the intervention.

The intervention was also aligned with Sustainable Development Goal 4 (SDG 4), which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations, 2024). Providing learning resources that learners can access based on their individual learning needs can support more flexible and inclusive learning opportunities. Thought Rewind therefore sought to provide an accessible classroom-based intervention that responded to the needs of underperforming learners while supporting broader efforts to improve the quality of Mathematics education.

Despite the growing body of research supporting flipped learning, a gap remains in understanding how follow-up video lessons, specifically designed as an extension of classroom instruction, can support underperforming Grade 7 learners in developing critical thinking and problem-solving skills. Existing Philippine studies have largely examined flipped classrooms in relation to mathematics achievement, motivation, engagement, or learner experiences, while fewer classroom-based action research studies have examined the combined evidence of learners' task performance, quiz performance, and experiences within an intervention specifically designed for underperforming junior high school learners. Furthermore, we need to understand how quantitative evidence of learning performance and qualitative evidence of learner experiences can be integrated to explain the intervention's contribution.

Therefore, this action research implemented Thought Rewind, a flipped classroom intervention using follow-up video lessons, to enhance the critical thinking and problem-solving skills of selected underperforming Grade 7 learners in Mathematics at Barayong National High School. Specifically, the study sought to answer the following questions: 1.) What was the performance of the learners in the mathematics activities before, during, and after the implementation of Thought Rewind? 2.) What was the performance of the learners in the mathematics quizzes before and after the implementation of Thought Rewind? 3.) What were the learners' experiences in using Thought Rewind, particularly in terms of their engagement, understanding of Mathematics concepts, and development of critical thinking and problem-solving skills? 4.) How did the learners' activity performance, quiz performance, and reported experiences collectively explain the contribution of Thought Rewind in enhancing their critical thinking and problem-solving skills in Mathematics?

Methodology

Research Design

This study employed an action research design using a convergent mixed-methods approach to examine the implementation of Thought Rewind, a flipped classroom intervention using follow-up video lessons, among selected underperforming Grade 7 learners in Mathematics at Barayong National High School. The convergent mixed-methods approach was used because quantitative and qualitative data were collected within the same intervention period, analyzed separately, and integrated during interpretation to provide a more comprehensive understanding of learners' performance and experiences.

The quantitative strand focused on the learners' performance in Mathematics learning activities and end-of-class quizzes. The rubric assessed activity performance using separate dimensions for mathematical understanding and application, reasoning, problem-solving, and explanation of solutions. The qualitative strand explored learners' experiences with Thought Rewind, particularly their experiences in viewing, replaying, and using the follow-up video lessons and applying the concepts during classroom activities. The quantitative and qualitative findings were integrated through a joint display to determine areas of convergence, complementarity, and discrepancy.

The study followed the action research cycle of planning, action, observation, and reflection. During the planning phase, the researcher identified the learning concern, determined the participants based on established criteria, identified the mathematics competencies requiring additional support, prepared the follow-up video lessons and learning activities, and developed and validated the research instruments. During the action phase, the researcher implemented Thought Rewind through follow-up video lessons and corresponding classroom activities. During the observation phase, the researcher documented learners' activity performance, quiz performance, participation, video-use experiences, and implementation fidelity. During the reflection phase, the researcher reviewed quantitative and qualitative evidence to determine progress during the intervention, identify learner experiences and implementation issues, and determine possible refinements to the intervention.

The action research cycle was organized into three operational stages: pre-implementation, implementation, and post-implementation. The pre-implementation stage represented planning, the implementation stage represented action and observation, and the post-implementation stage represented reflection and interpretation of the evidence. This structure allowed the intervention to be systematically planned, implemented, monitored, and reflected upon.

Participants and Sampling Technique

The participants were 10 selected underperforming Grade 7 learners in Mathematics from Barayong National High School. The study employed purposive sampling because it targeted learners who needed additional instructional support in Mathematics. In this study, underperforming learners were operationally defined as Grade 7 learners who obtained a Mathematics performance score below 75% during the preceding grading period and demonstrated difficulty in completing Mathematics activities involving the identified competencies. The selection also considered teacher observations of learners' difficulty in interpreting mathematical information, selecting appropriate procedures, solving mathematical problems independently, and explaining solutions.

The participants were 12 to 13 years old, consisting of six male and four female learners. Their attendance during the intervention was monitored through the daily class attendance record. All 10 participants attended at least 90% of the intervention sessions, and all participants completed the scheduled Mathematics activities and end-of-class quizzes. All 10 participants also participated in the post-intervention interviews. No participant withdrew from the study, and no participant was excluded after the intervention had begun. The learners' prior Mathematics performance was established using their Mathematics grades from the preceding grading period. The participants had a mean prior Mathematics grade of 72.80, with scores ranging from 68 to 74.

Before implementation, the researcher also determined the participants' access to digital learning resources. Eight learners had regular access to smartphones, while two learners shared a smartphone with a family member. Seven learners reported relatively stable internet access, while three experienced intermittent connectivity. To address these differences, the researcher provided downloadable or offline copies of the video lessons to learners who experienced connectivity difficulties. Learners could also access the videos using school-provided devices when necessary.

Learners were included if they were officially enrolled in Grade 7, obtained a Mathematics grade below 75% during the preceding grading period, demonstrated difficulty in the target competencies, and obtained the required parental consent and learner assent. The study excluded learners who did not meet the performance criterion or whose parents or guardians did not provide consent.

Research Instruments and Intervention Materials

The study used the following sources of data: (1) Thought Rewind follow-up video lessons, (2) Mathematics activity sheets, (3) an activity-performance rubric, (4) end-of-class quizzes, (5) a semi-structured interview guide, and (6) an implementation monitoring form.

Thought Rewind Follow-Up Video Lessons

Thought Rewind consisted of five teacher-prepared follow-up video lessons covering selected Mathematics competencies related to measures of central tendency for ungrouped data. Each video lasted approximately 6 to 10 minutes, with an average duration of about eight minutes. The videos contained teacher explanations, worked examples, mathematical representations, step-by-step procedures, and guided problem-solving examples. The lessons used simple language and examples appropriate for Grade 7 learners.

Thought Rewind's distinguishing feature was that the videos served as follow-up learning materials rather than replacements for initial teacher-led instruction. The researcher first introduced and discussed the mathematics concepts during the regular classroom session. The follow-up videos then extended the lesson. Learners could revisit explanations and worked examples after classroom instruction and could pause, replay, or review portions that they found difficult.

The videos were distributed through Facebook Messenger and downloadable MP4 files. Learners could view the videos at home or, when necessary, at school using available smartphones or school devices. Learners with limited connectivity received offline copies so internet access would not be a prerequisite for participation. The researcher monitored video viewing through a combination of teacher viewing logs, learner viewing checklists, and brief follow-up questions during classroom sessions. Learners recorded whether they had watched the assigned video and whether they had replayed any portion. During the following classroom session, the researcher also asked learners to identify the portions they reviewed or found difficult. These records monitored implementation rather than if access to a video automatically meant it had been viewed. The video-content matrix contained the competency, learning objective, video topic, duration, key explanation, worked example, problem-solving component, and corresponding classroom activity for each of the five videos.

Mathematics Learning Activities

I prepared five Mathematics learning activities to correspond with the five follow-up video lessons. Learners completed each activity during the classroom session following the assigned video. The activities required learners to interpret information, identify the appropriate mathematical procedure, perform calculations, solve problems, explain their reasoning, and evaluate their answers. The activities generally contained 10 task items and were designed to address the same target competencies while varying the mathematical situations and examples. The researcher maintained a similar level of cognitive demand, number of items, and scoring procedure across the activities to support meaningful comparison. Each activity was scored out of 20 points using the activity-performance rubric. The rubric assigned 2 points to each of the 10 task items based on the quality and completeness of the learners' responses.

Activity-Performance Rubric

The researcher used a 20-point activity-performance rubric to assess the learners' Mathematics activities. The rubric consisted of four dimensions: mathematical understanding and application (5 points); reasoning and justification (5 points); problem-solving process and strategy selection (5 points); and Explanation and evaluation of solutions (5 points). Each dimension was scored using a four-level descriptive scale. A score of 4 indicated exemplary performance, 3 indicated satisfactory performance, 2 indicated developing performance, and 1 indicated beginning performance. The rubric was converted to the required 20-point scoring system for each activity. The rubric was specifically designed so that the activity score would not automatically be treated as a direct measure of critical thinking or problem-solving. Evidence for these constructs was derived from specific task requirements involving analysis of information, selection and justification of strategies, problem-solving,

explanation of reasoning, and evaluation of solutions.

Three validators reviewed the rubric: a Mathematics Master Teacher, a Mathematics school head/coordinator, and a secondary Mathematics teacher with assessment experience. The validators reviewed the rubric's alignment with the mathematics competencies and intended skills. The team revised the rubric to clarify the descriptors for reasoning, strategy selection, and explanation of solutions. A pilot scoring exercise using sample learner outputs yielded an inter-rater agreement of 0.87, indicating acceptable consistency in rubric use.

End-of-Class Quizzes

We administered five end-of-class quizzes after the corresponding Mathematics learning activities. Each quiz contained 10 items and had a maximum score of 10 points. The quizzes assessed the learners' understanding and application of the Mathematics concepts addressed in the corresponding session. The quizzes were administered immediately after the relevant classroom activity and were completed independently. Items included computation, interpretation, identification of appropriate procedures, and short problem-solving situations. The quizzes were aligned with the daily competencies and classroom activities. The same three Mathematics validators who examined the activity rubric reviewed the quizzes. Their comments led to revisions to ambiguous wording and to the alignment of several items with the intended competency. A pilot administration with a comparable group of Grade 7 learners produced an estimated KR-20 reliability coefficient of 0.82, indicating acceptable internal consistency.

Semi-Structured Interview Guide

A semi-structured interview guide was used after the intervention to explore learners' experiences with Thought Rewind. The interview guide contained 10 main questions with six optional probing questions. The questions focused on the follow-up video intervention, including learners' experiences with video viewing, pacing, replaying and pausing, clarification of difficult concepts, worked examples, access and connectivity, engagement, and applying video-supported learning during classroom Mathematics activities. Three validators with backgrounds in Mathematics education and qualitative research reviewed the interview guide. The team revised the guide to remove leading questions, simplify the language, and ensure questions directly addressed the Thought Rewind intervention.

Implementation Monitoring Form

An implementation monitoring form documented whether the planned components of Thought Rewind were delivered consistently. The form included indicators such as: a follow-up video was provided; learners were given access to the video; learners viewed the assigned video; learners were able to pause or replay the video; classroom clarification was provided; corresponding Mathematics activity was completed; teacher feedback was provided; and an end-of-class quiz was administered. The researcher completed the monitoring form after every intervention session. Overall implementation fidelity was 92%, based on the proportion of planned intervention components that were completed across the five sessions.

Data Gathering Procedure

The data gathering procedure followed the action research cycle of planning, action, observation, and reflection and was implemented through pre-implementation, implementation, and post-implementation stages.

Pre-Implementation Stage: Planning

During the planning stage, the researcher identified the learning concern based on learners' Mathematics performance during the preceding grading period and classroom observations. The researcher identified the 10 participants using the established operational definition of underperforming learners. The researchers secured permission to conduct the study from the school head and appropriate school authorities. The researcher informed parents or legal guardians about the purpose, procedures, possible risks, and voluntary nature of the study. The researcher obtained written parental or guardian consent. Because the participants were minors, the researcher also obtained learner assent before participation.

The researcher identified the Mathematics competencies requiring additional support and prepared five follow-up videos, five corresponding activity sheets, five end-of-class quizzes, the activity-performance rubric, interview guide, and implementation monitoring form. Three validators reviewed the videos and instruments before implementation. The researcher revised the materials based on their comments. The researcher also assessed

participants' access to smartphones and internet connectivity. The researcher provided learners with unreliable internet access with offline copies of the videos or access to available school devices.

Implementation Stage: Action and Observation

The Thought Rewind intervention was implemented over five Mathematics sessions across five consecutive instructional days, with each classroom session lasting approximately 60 minutes. Each intervention session followed a consistent sequence. The teacher first conducted the regular Mathematics lesson and introduced the target competency. After the classroom lesson, learners watched the corresponding follow-up video. The videos lasted approximately 6 to 10 minutes and contained explanations, worked examples, and problem-solving procedures.

Learners were instructed to view the assigned video before the succeeding classroom activity. They could pause, replay, and revisit portions of the video as needed. Learners who had limited internet access used offline copies of the videos. During the succeeding classroom session, the teacher briefly clarified concepts addressed in the video and answered learners' questions. Learners then completed guided and independent Mathematics activities. The classroom tasks required them to interpret mathematical information, select appropriate strategies, solve problems, explain their reasoning, and evaluate their answers. The five sessions addressed the competencies in Table 1.

Table 1. *Sessions, Target Competency, Video Focus, and Classroom Activity*

Session	Target Competency	Video Focus	Classroom Activity
1	Identify and describe measures of central tendency	Meaning of mean, median, and mode	Identification and basic computation
2	Calculate the mean of ungrouped data	Step-by-step computation of the mean	Computation and interpretation tasks
3	Determine the median of ungrouped data	Arranging data and determining the median	Median problem-solving activities
4	Determine the mode of ungrouped data	Identifying and interpreting the mode	Mode and frequency tasks
5	Solve problems involving measures of central tendency	Choosing the appropriate measure and interpreting results	Integrated problem-solving activity

The learners' activity outputs were assessed using the 20-point rubric. We administered end-of-class quizzes after each activity. The researcher recorded activity and quiz scores individually. The researcher monitored implementation fidelity using the implementation checklist. The researcher monitored video viewing using learner viewing logs, teacher observations, and brief verbal checks during the following classroom session. The researcher did not equate video access with actual viewing and therefore used multiple indicators to document participation.

Post-Implementation Stage: Reflection

After the fifth intervention session, the researcher compiled the learners' activity and quiz scores and reviewed the implementation monitoring records. The researcher then conducted individual interviews with all 10 participants. The interviews lasted approximately 15 to 20 minutes per participant and were conducted in a quiet area within the school. Interviews were conducted in English and Filipino, with occasional use of the local language when necessary for learner comfort and clarity. With permission from the learners and their parents or guardians, the interviews were audio-recorded. The recordings were transcribed verbatim. Responses in Filipino or the local language were translated into English for analysis, while original-language transcripts were retained for reference. The researcher used participant codes instead of names.

During the reflection stage, the researcher reviewed the quantitative and qualitative findings to identify patterns in learner performance, learner experiences, implementation strengths, and challenges. The findings were then integrated to determine how the learners' reported experiences corresponded with observed patterns in their activity and quiz performance.

Data Analysis

The quantitative and qualitative data were analyzed separately and subsequently integrated in accordance with the convergent mixed-methods design.

Mathematics Activity Performance

The learners' activity outputs were assessed using the 20-point evaluation rubric. For every learner and session, the researcher recorded the raw score, percentage score, rubric-dimension scores, and valid observations. Descriptive statistics included the percentage scores, mean, standard deviation, minimum score, maximum score, range, and number of valid observations. Individual learner scores were retained to examine performance differences and patterns across sessions. Both raw scores and percentage scores were retained in the dataset to maintain consistency with the 20-point scoring system while also allowing performance to be interpreted on a common percentage scale. Because the first activity was administered during the intervention and was not a true pretest, the results were interpreted as progress observed across intervention sessions rather than as evidence of improvement from a pre-intervention baseline.

A line graph displayed the pattern of activity performance across the five sessions. Interpretation considered possible alternative explanations, including repeated practice, teacher feedback, familiarity with the task format, differences in task difficulty, maturation, and regression to the mean. The rubric dimensions were also examined separately. Critical thinking and problem-solving were discussed only in relation to task components explicitly requiring analysis, strategy selection, reasoning, problem-solving, explanation, and evaluation. A general increase in total activity scores was not treated as conclusive evidence of improvement in critical thinking or problem-solving as independent psychological constructs.

Quiz Performance

The five end-of-class quizzes were analyzed using raw scores and percentage scores. Each quiz had a maximum score of 10 points. For each quiz, the researcher calculated the mean, standard deviation, minimum score, maximum score, range, and percentage score. The researcher also recorded the number of valid and missing responses. Quiz results were presented by session using a table to show the pattern of performance across the intervention. The quizzes were interpreted as evidence of learners' understanding and application of the specific Mathematics competencies assessed during each session. Because the quizzes addressed different competencies, their results were not interpreted as a single standardized achievement measure. Rather, each quiz was examined according to the competency and content addressed during that session.

Qualitative Data Analysis

The researcher analyzed the interview data using thematic analysis. The researcher conducted individual interviews with all 10 participants. Each interview lasted approximately 15 to 20 minutes and was audio-recorded with appropriate permission. The researcher transcribed the interviews verbatim and reviewed each transcript several times to become familiar with the data. The researcher identified significant statements related to Thought Rewind and assigned initial codes. The initial codes included concepts such as video replay, pacing, clarification, worked examples, independent review, access difficulty, connectivity, understanding of Mathematics concepts, classroom application, engagement, and perceived usefulness, when supported by participants' actual responses. The researcher grouped related codes into categories and developed broader themes from the categories. The researcher repeatedly compared the themes with the original transcripts to ensure they accurately represented participants' experiences.

Negative or contradictory cases were also examined. The researcher retained and considered statements that did not support the perceived usefulness of the intervention during interpretation, rather than excluding them. The codebook included the code name, operational definition, inclusion criteria, exclusion criteria, and a representative example. The researcher served as the primary coder, while a Mathematics teacher with experience in qualitative research independently reviewed a sample of 30% of the transcripts and the preliminary codes. The researcher discussed and resolved coding differences through consensus.

To address researcher reflexivity, the researcher maintained reflective notes throughout the intervention. These notes documented observations about the teacher-researcher role, assumptions regarding the intervention, learner responses, and potential influences on interpretation. Credibility was strengthened through peer review of the coding process, comparison of interview findings with implementation records, examination of negative cases, and participant reflection on selected interpretations. Quotations presented in the results were verbatim translations of the participants' responses, with participant codes used to protect identity.

Integration of Quantitative and Qualitative Findings

The quantitative and qualitative findings were integrated through a joint display. The joint display linked patterns in learners' activity and quiz performance with their reported experiences of Thought Rewind. The integration specifically examined whether changes or fluctuations in performance corresponded with experiences related to replaying videos, pacing of explanations, clarification of difficult concepts, access or connectivity, use of worked examples, engagement, and application of video-supported learning during classroom activities. The integrated interpretation classified findings as convergent. Convergent findings occurred when quantitative and qualitative evidence pointed in a similar direction. The integrated evidence addressed how learners' activity performance, quiz performance, and experiences collectively described their progress during the implementation of Thought Rewind. The findings were interpreted cautiously because the study did not use a randomized control group or a true pretest. Thus, the results were not interpreted as definitive evidence that Thought Rewind alone caused the observed changes.

Ethical Considerations

The researchers observed ethical principles throughout the study. The school head granted permission to conduct the study. Because the participants were Grade 7 learners and minors, the researchers obtained written parental or legal guardian consent and learner assent before participation. The assent process explained the study using age-appropriate language, including its purpose, procedures, voluntary nature, possible inconveniences, confidentiality measures, and the participants' right to withdraw.

The teacher-researcher relationship was carefully considered because the researcher also served as the teacher implementing the intervention. To minimize perceived pressure, learners were informed that participation in the research component was voluntary and that their decision would not affect their grades, access to learning materials, classroom treatment, or relationship with the teacher. The research data were also kept separate from learners' regular academic grading records.

Where feasible, the school research coordinator facilitated the consent and assent process and was not directly responsible for assigning learners' Mathematics grades. This arrangement helped reduce the possibility that learners would feel compelled to participate. Participants could withdraw from the study at any point without academic penalty. If a learner withdrew, the researcher would stop collecting new research data and follow the participant's and guardian's stated preference regarding the retention or deletion of previously collected identifiable research data, consistent with the approved research protocol.

For interviews, we obtained separate permission for audio recording. Participants and their parents or guardians were informed that the recordings would be used only for transcription and analysis and would not be publicly shared. The study maintained confidentiality and anonymity throughout. The study replaced participant names with codes such as P1, P2, P3, and so forth. The research report excluded identifying information. The report presented interview quotations using participant codes.

Electronic research files, including video-viewing records, activity scores, quiz scores, interview recordings, and transcripts, were stored in a password-protected researcher account and an encrypted external storage device. The researcher stored printed documents in a locked cabinet accessible only to the researcher. The research team will retain research data for three years after the study's completion, then securely delete or destroy it in accordance with the approved research protocol and applicable institutional requirements.

The digital intervention was designed to minimize privacy and access risks. Learners received the required learning materials without being required to post personal information publicly. Offline copies of the videos were provided when necessary to reduce the disadvantage associated with unreliable internet connectivity. The researcher also avoided collecting unnecessary personal information from learners through digital platforms.

The intervention did not involve monetary compensation or financial incentives. The activities were aligned with the learners' regular Mathematics competencies and were designed as additional instructional support. The researcher monitored learners' participation and classroom responses throughout the intervention to ensure that the activities did not intentionally expose them to physical, emotional, social, or academic harm.

Results and Discussion

Learners' Mathematics Activity Performance During the Intervention

The learners' Mathematics activity performance was examined across the five intervention sessions. Each activity had a maximum score of 20 points and was assessed using the activity-performance rubric covering mathematical understanding and application, reasoning and justification, problem-solving process and strategy selection, and explanation and evaluation of solutions. All 10 participants completed the five activities; therefore, each session had 10 valid observations and no missing activity scores.

Table 2 presents the individual scores, group means, standard deviation, range, minimum, and maximum scores across the five intervention sessions.

Table 2. Learners' Mathematics Activity Scores Across the Five Intervention Sessions					
Participant	Session 1	Session 2	Session 3	Session 4	Session 5
P1	8	10	12	14	15
P2	9	11	12	14	16
P3	11	12	14	15	17
P4	10	12	13	15	16
P5	9	11	13	14	16
P6	12	13	14	16	17
P7	10	12	13	15	16
P8	11	13	14	16	17
P9	9	11	12	14	16
P10	11	15	13	17	18
Mean	10.00	12.00	13.00	15.00	16.40
SD	1.25	1.49	0.82	1.05	0.97
Minimum	8	10	12	14	15
Maximum	12	15	14	17	18
Range	4	5	2	3	3
Valid n	10	10	10	10	10
Missing	0	0	0	0	0

As shown in Table 1, the group mean increased from 10.00 out of 20 (50.00%) in Session 1 to 12.00 (60.00%) in Session 2, 13.00 (65.00%) in Session 3, 15.00 (75.00%) in Session 4, and 16.40 (82.00%) in Session 5. The overall difference between the first and fifth intervention activities was 6.40 points, equivalent to a 32-percentage-point difference when expressed as percentage scores. The standard deviation ranged from 0.82 to 1.49, indicating that the learners' scores were relatively close to the group mean within each session. The widest range occurred in Session 2, with scores from 10 to 15, while the narrowest range occurred in Session 3, with scores from 12 to 14. By Session 5, the scores ranged from 15 to 18, indicating that all learners obtained at least 75% of the available points on the final activity.

The results indicate a generally upward pattern in Mathematics activity performance during the five intervention sessions. However, the first-session activity was conducted as part of the intervention and was not a true pretest. Therefore, the observed difference between Session 1 and Session 5 was not interpreted as a controlled pretest-posttest gain attributable solely to Thought Rewind. Other factors, including repeated practice, teacher feedback, increasing familiarity with the content, differences in task difficulty, and learners' continued exposure to the mathematics concepts, may also have contributed to the observed pattern.

The results also show that the increase was not identical for every learner. For example, P1 increased from 8 points in Session 1 to 15 points in Session 5, while P10 increased from 11 to 18 points. This pattern suggests that learners generally demonstrated higher activity scores as the intervention progressed, although individual rates of progress varied.

Figure 1 presents the mean percentage scores across the five intervention sessions.

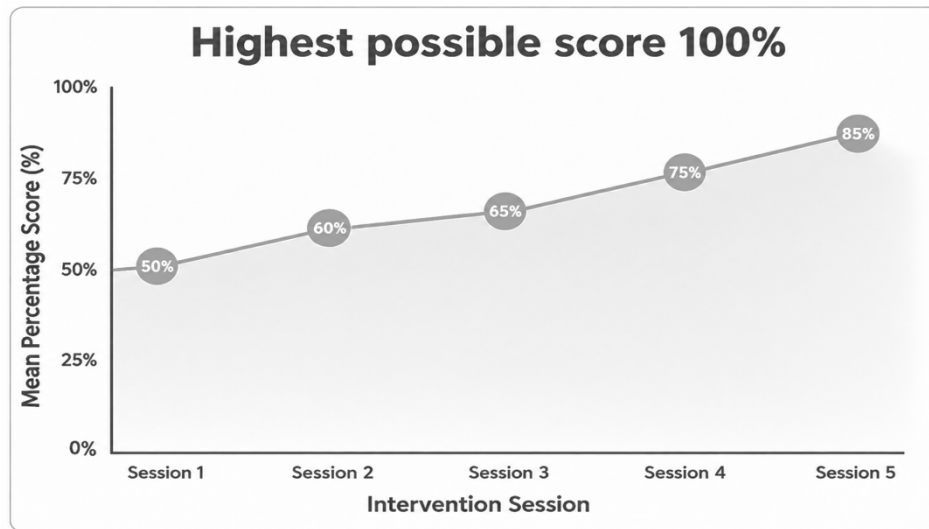


Figure 1. Mean Percentage Scores of Learners' Mathematics Activities Across the Five Intervention Sessions

The observed increase was associated with the combination of follow-up video lessons and classroom activities. The videos gave learners an opportunity to revisit explanations and worked examples, while classroom activities provided opportunities to apply the concepts with teacher guidance and feedback.

This pattern aligns with Batilantes (2022), who examined video-supported flipped learning among Grade 7 learners and emphasized the value of giving learners additional access to Mathematics instruction. The present findings also correspond with Baybayan and Cabanes (2024), whose study of Grade 8 learners reported improved mathematics performance following a flipped classroom intervention. The similarity is particularly relevant because both studies involved junior high school Mathematics learners. Nevertheless, the present findings should be interpreted within the specific context of the five-session intervention and the absence of a separate control group.

The rubric dimensions provide additional information regarding the nature of the learners' performance. The activities required learners to interpret mathematical information, select procedures, solve problems, and explain their answers. Thus, the increasing activity scores provide evidence of improved performance on these specific classroom tasks.

Learners' End-of-Class Quiz Performance

We administered five end-of-class quizzes after each corresponding Mathematics learning activity. Each quiz contained 10 items and had a maximum score of 10 points. All 10 participants completed all five quizzes, resulting in 10 valid observations for each quiz and no missing quiz data. Table 2 presents the individual quiz scores and descriptive statistics for each intervention session. The mean quiz score increased from 5.40 out of 10 (54.00%) in Quiz 1 to 6.70 (67.00%) in Quiz 2, 7.10 (71.00%) in Quiz 3, 7.70 (77.00%) in Quiz 4, and 8.40 (84.00%) in Quiz 5. The difference between the first and fifth quiz means was 3.00 points, or 30 percentage points. The standard deviation ranged from 0.52 to 0.74, indicating relatively limited variation around the group means. The first quiz scores ranged from 5 to 6, while the final quiz scores ranged from 8 to 9. Thus, the distribution of scores became concentrated at a higher level by the final intervention session.

Table 2. *Learners' End-of-Class Quiz Scores Across the Five Intervention Sessions*

Participant	Quiz 1	Quiz 2	Quiz 3	Quiz 4	Quiz 5
P1	5	6	6	7	8
P2	5	6	7	7	8
P3	6	7	7	8	9
P4	5	7	7	8	8
P5	5	6	7	7	8
P6	6	7	8	8	9
P7	5	7	7	8	8
P8	6	7	8	8	9
P9	5	6	7	7	8
P10	6	8	7	9	9
Mean	5.40	6.70	7.10	7.70	8.40
SD	0.52	0.67	0.74	0.67	0.52
Minimum	5	6	6	7	8
Maximum	6	8	8	9	9
Range	1	2	2	2	1
Valid n	10	10	10	10	10
Missing	0	0	0	0	0

The increase in quiz scores occurred alongside the follow-up video lessons, classroom discussion, guided practice, and feedback. The pattern is therefore compatible with the possibility that repeated access to explanations and opportunities to apply the concepts supported learners' developing understanding. Nevertheless, the design does not permit the conclusion that the video lessons alone produced the observed changes. Familiarity with the mathematical content, repeated exposure to similar problem types, teacher assistance, and progression through the lessons may also have influenced performance.

The results are consistent with Batilantes (2022), who reported using video-supported instruction to address Mathematics competencies among Grade 7 learners. They are also broadly comparable with Baybayan and Cabanes (2024), who reported positive mathematics performance outcomes among Grade 8 learners following flipped classroom implementation. These Grade 7 and Grade 8 contexts are more comparable to the present study than research conducted among university students or learners in other subject areas. Cortez et al. (2023) also reported positive learning outcomes from a cooperative flipped classroom involving pre-recorded videos and student-centered activities.

Learners' Experiences with the Thought Rewind Intervention

The qualitative findings were based on individual post-intervention interviews with all 10 participants. The interviews focused specifically on the learners' experiences with Thought Rewind and the follow-up video lessons. Questions examined their experiences with video viewing, replaying and pausing, pacing of explanations, clarification of difficult Mathematics concepts, access and connectivity, use of worked examples, engagement, and application of the videos during classroom activities.

Thematic analysis generated four major themes: 1.) Replaying and Reviewing Difficult Concepts; 2.) Clearer Understanding Through Pacing and Worked Examples; 3.) Flexible Learning Despite Access and Connectivity Challenges; 4.) Using Video-Supported Learning During Classroom Problem-Solving

Table 3. Emergent Themes on Learners' Experiences with the Thought Rewind Intervention

Emergent Theme	Codes	Core Ideas
Replaying and Reviewing Difficult Concepts	Replay; pause; repeated viewing; reviewing difficult portions; independent review	Learners valued the ability to revisit portions of the video that they did not understand during the first viewing.
Clearer Understanding Through Pacing and Worked Examples	Step-by-step explanation; video pacing; worked examples; clarification; easier understanding	Learners described the videos as useful for following mathematical procedures and reviewing worked examples at a manageable pace.
Flexible Learning Despite Access and Connectivity Challenges	Internet difficulty; offline access; device sharing; accessibility; viewing location	Learners experienced some access difficulties, but offline copies and alternative access arrangements helped them participate.
Using Video-Supported Learning During Classroom Problem-Solving	Application of procedures; classroom practice; teacher clarification; solving problems; checking answers	Learners connected the video explanations with classroom activities and used reviewed procedures when solving Mathematics problems.

Theme 1. Replaying and Reviewing Difficult Concepts

A prominent theme in the interviews was the learners' use of the videos to revisit difficult portions of the mathematics lessons. Unlike a conventional classroom explanation that occurs at a particular time, the follow-up videos gave learners an opportunity to return to explanations after the classroom lesson.

One participant explained:

"When I did not understand the example, I watched that part again until I could follow the steps." (P1)

Another participant stated:

"I liked that I could pause the video and play it again because sometimes I could not understand it the first time." (P4)

Similarly, P7 reported:

"I replayed the part about finding the median because I forgot the steps."

These responses indicate that replay and pause functions were meaningful features of the intervention for learners who needed additional exposure to specific explanations. The findings align with Thought Rewind's purpose as a follow-up resource rather than a replacement for classroom teaching. This experience aligns with Batilantes (2022), whose Grade 7 Mathematics study highlighted the potential of video-based materials to provide additional access to instruction. It also aligns with flipped-classroom literature, where learners can engage with recorded instructional materials at their own pace.

Theme 2. Clearer Understanding Through Pacing and Worked Examples

The second theme concerned learners' experiences with the pacing and presentation of mathematical explanations. Participants frequently referred to the step-by-step demonstrations and worked examples as useful when they were trying to understand how to calculate or interpret measures of central tendency.

P3 explained:

"The video showed the solution step by step, so I could follow what I needed to do."

P5 similarly stated:

"I could stop when the example was difficult and continue when I was ready."

Another participant noted:

"The examples helped me understand where to put the numbers and how to get the answer." (P8)

These statements suggest that the combination of step-by-step explanations and worked examples helped learners understand mathematical procedures. The ability to control the pace of viewing was particularly relevant because learners could spend more time on portions they found difficult.

This finding is related to Baybayan and Cabanes (2024), who reported positive learner responses to flipped classroom learning among Grade 8 Mathematics learners. This similarity matters because both studies involved junior high school learners and used video-supported learning in Mathematics instruction. The present study, however, focused specifically on follow-up videos that extended classroom instruction rather than using video as the sole mechanism for initial content delivery.

Theme 3. Flexible Learning Despite Access and Connectivity Challenges

The third theme reflected both the benefits and challenges associated with accessing the video lessons. Most participants described the videos as convenient because they could be viewed outside the immediate classroom period. However, some learners experienced intermittent internet connectivity or had to share devices with family members.

P2 stated:

"Sometimes our internet was slow, so I watched the video later when the connection was better."

P6 explained:

"I shared the phone with my sibling, so I could not always watch immediately."

In contrast, P9 reported:

"The downloaded video helped me because I did not need to use the internet every time."

These responses show that not all participants experienced flexible access uniformly. While the follow-up format allowed learners to choose when to view the videos, device availability and connectivity remained practical considerations. Providing offline copies helped reduce, but did not eliminate, these barriers. This finding is important because the usefulness of video-based interventions depends not only on instructional design but also on learners' ability to access the materials. The qualitative evidence therefore adds an important contextual explanation to the quantitative results.

Theme 4. Using Video-Supported Learning During Classroom Problem-Solving

The fourth theme involved the connection between the follow-up videos and subsequent classroom activities. Participants reported using the explanations and worked examples from the videos when completing Mathematics activities.

P3 stated:

"After watching the example, I remembered the steps when we solved the activity in class."

P8 explained:

"When I forgot the procedure, I remembered what I saw in the video and tried to use it in the problem."

P10 added:

"The video helped me review the steps, and then the teacher helped us when we had questions in the activity."

These responses indicate that learners perceived a connection between the video content and classroom problem-solving. The video served as an additional reference, while the teacher remained an important source of clarification and feedback during classroom activities. This finding aligns with the central principle of flipped learning described by Cevikbas and Kaiser (2020), in which instructional resources create opportunities for more active classroom engagement. It also aligns with the Grade 7 Mathematics context reported by Batilantes (2022), where video-supported instruction provided learners with additional access to Mathematics content.

The present findings further suggest that Thought Rewind differed from a conventional flipped classroom implementation because the videos were intentionally positioned as follow-up resources after classroom instruction. Rather than requiring learners to learn the entire lesson independently before entering class, Thought Rewind allowed learners to return to teacher-prepared explanations after the initial classroom encounter and then apply those explanations during subsequent classroom tasks.

Integration of Quantitative and Qualitative Findings

The quantitative and qualitative findings were integrated through a joint display consistent with the convergent mixed-methods design. The purpose of the integration was not to establish a causal effect of Thought Rewind but to determine how the learners' performance patterns and reported experiences complemented or differed from one another.

Table 4. *Joint Display of Quantitative Performance and Qualitative Experiences*

Quantitative Pattern	Qualitative Evidence	Integrated Interpretation
Activity mean increased from 10.00/20 (50%) in Session 1 to 16.40/20 (82%) in Session 5.	Learners reported replaying difficult explanations and reviewing worked examples.	The upward activity pattern was accompanied by learner reports that repeated access to explanations was useful for reviewing difficult procedures.
Quiz mean increased from 5.40/10 (54%) in Quiz 1 to 8.40/10 (84%) in Quiz 5.	Learners described a clearer understanding of procedures after viewing step-by-step explanations.	The increasing quiz pattern was complementary to learners' reports of improved understanding of the specific Mathematics content addressed in the sessions.
Activity scores increased across sessions, although individual rates varied.	Learners reported differences in their need for replay and additional explanation.	Individual differences in performance were consistent with differences in learners' reported learning needs and use of the videos.
Higher performance was observed in later sessions.	Learners reported applying video-reviewed procedures during classroom activities.	The quantitative and qualitative strands jointly suggest that video-supported review and classroom application occurred together during the later intervention sessions.
No missing activity or quiz data were recorded.	All 10 learners reported experiences with the videos.	Complete participation allowed the quantitative and qualitative evidence to be examined across all participants.
Some performance variation remained across sessions.	Some learners reported connectivity and device-sharing difficulties.	Access issues may have contributed to differences in learners' experiences and should be considered when interpreting performance patterns.

Integrating the quantitative and qualitative findings shows that the two strands provided complementary evidence on the implementation of Thought Rewind. The quantitative results demonstrated a generally increasing pattern in learners' Mathematics activity and quiz performance across the five intervention sessions, with activity mean scores increasing from 10.00 out of 20 (50%) in Session 1 to 16.40 out of 20 (82%) in Session 5, while quiz mean scores increased from 5.40 out of 10 (54%) in Quiz 1 to 8.40 out of 10 (84%) in Quiz 5. Alongside these patterns, learners reported replaying difficult explanations, reviewing worked examples, and using step-by-step explanations to clarify mathematical procedures. These findings align with Batilantes (2022), who highlighted the value of accessible video lectures in giving learners additional opportunities to engage with mathematics content, and with Cevikbas and Kaiser (2020), who described flipped classroom approaches as providing opportunities for learners to access instructional content beyond conventional classroom instruction. Similarly, Güler et al. (2023) and Yıldırım Yakar (2021) reported generally positive associations between flipped learning approaches and mathematics achievement. However, they interpreted the findings as complementary evidence of learner progress and learning experiences rather than as evidence that the follow-up videos alone caused the observed improvement.

The qualitative findings also explained differences in learners' experiences that were not directly reflected in the numerical scores. Learners reported different needs for replay and additional explanations, suggesting that the opportunity to control the pace of reviewing instructional materials was useful for some learners. This observation corresponds with Cevikbas and Kaiser (2022), who examined student engagement in a flipped secondary mathematics classroom and emphasized learners' active engagement with instructional materials. Learners' reports of applying video-reviewed procedures during classroom activities also suggest that the videos served as supplementary resources alongside classroom practice, discussion, and problem-solving. This pattern aligns with Baybayan and Cabanes (2024), who examined the use of a flipped classroom approach in mathematics and reported its relationship to students' academic performance and motivation. Likewise, Mardiyah and Sunarsi (2024) examined the combination of problem-based learning and flipped classroom approaches, highlighting the role of active learning activities in supporting student achievement.

Overall, the quantitative and qualitative findings converge on learners' progress in Mathematics activities and quizzes, while also showing that they used follow-up videos to review difficult concepts, control their learning pace, examine worked examples, and support classroom application. The qualitative findings also revealed connectivity and device-sharing difficulties, indicating that access to digital learning resources was not uniform among the participants. This contextual evidence is important in interpreting the intervention because the learners' experiences were influenced not only by the instructional materials but also by their available learning resources. Thus, Thought Rewind may be considered a feasible supplementary learning support strategy for the participating underperforming Grade 7 learners, particularly when video review is combined with teacher guidance, classroom practice, collaboration, and problem-solving activities.

Conclusion

The findings indicate that Thought Rewind, implemented through follow-up video lessons with classroom practice, discussion, and problem-solving activities, was associated with improved performance among the participating Grade 7 learners in Mathematics. Across the 10-day intervention, learners showed a generally increasing pattern of performance, with average activity scores rising from 10 out of 20 in the initial session to 16 out of 20 by the final sessions. The results indicate that learners made progress in completing the Mathematics activities throughout the intervention. The qualitative findings also provided insights into learners' experiences during the intervention, particularly their understanding of mathematical concepts, engagement and participation, and approaches to problem-solving and collaborative learning. These qualitative results complement the quantitative findings by describing how learners experienced and participated in the learning activities, but they should not be interpreted as direct evidence that the follow-up videos alone caused the observed changes.

Follow-up video lessons gave learners opportunities to revisit mathematical explanations and review lesson content beyond the initial classroom presentation. Features such as pause, replay, and repeated viewing may have supported learners who needed additional exposure to concepts and procedures. However, because the intervention involved several interconnected components—including video lessons, classroom discussions, guided practice, collaborative activities, and problem-solving tasks—learners' improved performance cannot be attributed to the follow-up videos alone. Rather, the findings suggest that Thought Rewind, as an integrated learning support strategy, may provide useful opportunities for reinforcement and continued engagement for learners who struggle in Mathematics.

Based on these findings, Mathematics teachers may consider using follow-up video lessons as supplementary learning materials rather than replacing classroom instruction. Videos may be combined with guided practice, questioning, collaborative learning, discussion, and problem-solving activities to provide learners with opportunities to review concepts and apply their understanding. Teachers may also develop short, curriculum-aligned videos that focus on difficult concepts and procedures, allowing learners to revisit lessons according to their learning needs. School administrators may support such practices by providing access to appropriate digital learning resources and opportunities for teachers to develop and use supplementary instructional materials.

For future action research, similar interventions may be implemented with larger groups of learners, longer intervention periods, and more rigorous research designs. Future studies may include pretest and posttest measures, a comparison or control group, validated assessment instruments, and measures of whether learning gained during the intervention transfers to new or unfamiliar mathematical tasks. Such improvements may provide stronger evidence regarding the effectiveness of video-supported instructional interventions.

The study's findings should be interpreted in light of several limitations. First, the study involved only 10 Grade 7 learners who were purposively selected because they had trouble in Mathematics. The small, purposive sample limits how far the findings can be generalized to other Grade 7 learners or school settings. Second, the study did not employ a pretest or a separate comparison group. Consequently, although learners' activity scores increased during the intervention, the study cannot determine with certainty whether the improvement resulted from Thought Rewind or from other factors such as regular classroom instruction, repeated exposure to the lessons, practice effects, or learners' natural progress over time.

Third, the study used researcher-made measures, which may have limitations in validity and reliability despite

being aligned with the learning activities. Fourth, the teacher-researcher's involvement in implementing the intervention and monitoring learners' performance may have introduced researcher or teacher effects. Fifth, the intervention was conducted over a relatively short period of 10 days, limiting conclusions about the sustainability of the observed improvement. Sixth, differences in task difficulty across intervention sessions may have contributed to variations in learners' scores, making direct comparisons across sessions more difficult. Seventh, qualitative information based on learners' self-reports may have been influenced by recall, response, or social desirability biases. Finally, the findings are context-specific and have limited transferability because the study involved a small group of purposively selected learners in a particular instructional setting.

Given these limitations, the findings should be understood primarily as evidence of learners' progress during the implementation of Thought Rewind rather than as definitive evidence of its causal effectiveness. Nevertheless, the results provide a useful basis for further investigation of follow-up video lessons as a supplementary component of Mathematics instruction, particularly when integrated with teacher guidance, classroom practice, collaborative learning, and problem-solving activities.

Contributions of Author

The author was responsible for conceptualizing the study, data gathering, data analysis, manuscript writing, supervision, editing, and revision of the final manuscript.

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