

Retention And Independent Performance On Spiral Review Strategies In Mathematics Among Grade 9 Students In Princeton Science School

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Abstract

Mathematics learning requires continuous reinforcement for students to retain and apply previously learned concepts effectively. However, many Grade 9 students experience difficulties in recalling lessons and independently solving mathematical problems, resulting in low academic performance in Mathematics.

This study aimed to determine the effectiveness of spiral review strategies in improving the retention and independent performance of Grade 9 students in Mathematics at Princeton Science School during the School Year 2025–2026.

The study utilized a descriptive-quantitative research design involving 45 Grade 9 students and 10 teacher-respondents. Data were gathered through teacher-made tests, exit quizzes, written works, summative assessments, and validated survey questionnaires. Statistical tools such as frequency, percentage, weighted mean, and ranking were used to analyze the collected data.

Findings revealed that students initially demonstrated low retention and independent performance, with a composite mean percentage score of 57.11%, interpreted as “Needs Improvement.” After the implementation of spiral review strategies and exit quizzes, students showed improvement in retention and independent learning. Composite weighted means of 3.03, 3.27, 3.26, and 3.32 were obtained in retention, daily quizzes, written works, and summative tests, respectively, all verbally interpreted as “Effective.” Teachers also assessed the strategies to have a “Very Great Extent” in enhancing students’ problem-solving skills and independent performance.

The study concluded that spiral review strategies and exit quizzes are effective instructional interventions in improving students’ retention, confidence, and independent performance in Mathematics. Continuous implementation of these strategies may help strengthen learners’ long-term understanding and academic achievement in Mathematics.

Keywords: *spiral review, retention, independent performance, Mathematics education, exit quizzes*

Introduction

Mathematics education plays an essential role in the development of learners' critical thinking, logical reasoning, and problem-solving skills. In Junior High School, Mathematics serves as a foundation for higher-level mathematical learning and application. However, students' success in Mathematics does not depend only on their understanding of lessons during classroom discussions, but also on their ability to retain and apply previously learned concepts over time. Long-term retention is necessary because mathematical concepts are interconnected and cumulative in nature. Without consistent reinforcement, students may forget previous lessons, resulting in learning gaps that negatively affect their independent performance.

In Grade 9 Mathematics, students are introduced to more complex topics such as trigonometric ratios, Law of Sines and Cosines, and angle of elevation and depression. These lessons require learners to recall prior knowledge and apply mathematical concepts independently. However, many students experience difficulty in retaining and applying mathematical ideas after instruction. As a result, they often struggle to solve problems independently and perform poorly in assessments.

Studies revealed that Filipino students encounter challenges in Mathematics due to poor retention, weak foundational knowledge, and a lack of independent learning skills. According to Gutierrez (2023), students experience difficulties in Mathematics because of delayed submission of activities, poor understanding of instructions, and lack of engagement in assigned tasks. Similarly, Santos et al. (2023) emphasized that students often fail to remember previously learned concepts, which affects their ability to answer mathematical problems independently.

To address these issues, educators continuously search for strategies that can improve students' retention and independent performance. One of the strategies commonly used in Mathematics instruction is spiral review. Spiral review refers to the repeated revisiting of previously learned lessons while introducing new concepts. This instructional strategy allows students to continuously recall and reinforce their understanding of concepts, helping them retain information for a longer period of time. In addition, exit quizzes are formative assessment tools given at the end of a lesson to assess students' understanding and reinforce learning.

Several studies support the effectiveness of spiral review and exit quizzes in enhancing learning retention and independent performance. Jones (2021) explained that retrieval practices and repeated exposure to concepts strengthen long-term memory retention. Likewise, Tirol (2024) stated that spiral review aligns with the spacing effect theory, which emphasizes that repeated exposure to information improves retention and recall. Lim (2025) also found that exit quizzes positively affect students' retention, engagement, and understanding of mathematical concepts.

At Princeton Science School – Home of Young Achievers, students’ retention and independent performance in Mathematics became a growing concern. Although students can participate during discussions, many struggle to recall lessons and solve mathematical problems independently after moving to new topics. The researcher observed that students frequently rely on teachers or classmates when completing activities and assessments. This situation motivated the researcher to investigate whether spiral review strategies and exit quizzes can improve students’ retention and independent performance in Mathematics.

The study focused on determining the effectiveness of spiral review strategies in improving the retention and independent performance of Grade 9 students in Mathematics during the School Year 2025–2026 at Princeton Science School. Specifically, the study examined students’ performance in trigonometric ratios, Law of Sines and Cosines, and angle of elevation and depression.

Research Questions

This study aims to determine the effectiveness of exit quizzes and spiral review strategies in enhancing the retention and independent performance of Grade 9 students in Mathematics this school year 2025- 2026.

Specifically, it will seek to answer the following questions:

1. What is the level of retention and independent performance of Grade 9 students in Mathematics, based on the results of the pre-test in the following competencies:
 - 1.1 Trigonometric ratios;
 - 1.2 Law of Sines and Cosines and
 - 1.3 Angle of elevation and depression?
2. How effective is the spiral review strategy in improving the retention and independent performance of Grade 9 students in terms of;
 - 2.1. daily quizzes;
 - 2.2. written works; and
 - 2.3. Summative test results.
3. To what extent do spiral review strategies affect the retention and independent performance as assessed by teachers’ respondents in terms of;
 - 3.1. problem-solving skills;
 - 3.2. application of formulas and concepts; and
 - 3.3. Completing assignments and exercises?
4. What challenges do students encounter in the implementation of spiral review strategies in Mathematics?
5. Based on the results of the study, what enhancement activities may be proposed?

Methodology

Research Design

A descriptive-quantitative research design was employed to gather quantitative data about the level of retention and independent performance of Grade 9 students. The researcher utilizes teacher-made tests, including pretests, exit quizzes, individual activities, and performance-based tasks, to determine the learners' academic performance before and after the integration of the spiral review strategies. The researcher employs this research design to describe the characteristics, behaviors, and changes in the study using numerical data.

Participants

The respondents of this study are the 45 Grade 9 students and ten teachers of Princeton Science School – Home of Young Achievers during the fourth quarter period of the school year 2025- 2026.

Research Instruments

The study used teacher-made tests and survey questionnaires as data-gathering instruments. The teacher-made tests included pre-tests, exit quizzes, written works, and summative assessments covering the fourth-quarter competencies in Mathematics 9, specifically trigonometric ratios, Law of Sines and Cosines, and angle of elevation and depression. The survey questionnaire consisted of four parts: Students' level of retention and independent performance; Effectiveness of spiral review and exit quizzes; Challenges encountered during the implementation of spiral review strategies; and Teachers' assessment of the extent of spiral review strategies.

Data Collection Procedure

The researcher secured permission from the principal of Princeton Science School before conducting the study. After approval, informed consent forms were distributed to parents and guardians. The researcher explained the purpose and importance of the study to the respondents. The teacher-made tests were administered to the students before and after the implementation of spiral review strategies. Survey questionnaires were distributed through Google Forms after the implementation of the intervention. Students were given enough time to answer the questionnaires honestly. The collected data were checked, organized, tallied, and analyzed using appropriate statistical tools.

Data Analysis

Frequency. This is used to count the number of learners who selected each response option in the Likert scale for every item in the survey questionnaire. It can also be applied to identify how many learners fall within certain score ranges in the assessment. This allows the researcher to observe the distribution of responses and identify common patterns among learners.

Percentage. This is used alongside frequency to determine the proportion of learners who selected each response on the Likert scale. It was also used to express the percentage of learners who attained specific performance levels pre – test and the survey questionnaires' responses. This provided a clearer understanding of how widespread certain perceptions, challenges, or performance levels were among the respondents

Weighted Mean. This was used to determine the effectiveness of the spiral review and exit quizzes in students' learning retention. This is also used to determine the challenges and opportunities that arise while employing the spiral review and exit quizzes.

Ranking. This was used to identify the relative importance of each item based on its weighted mean score. It helped determine which parts the learners performed best or least in, and which aspects of the spiral review and exit quizzes activities were perceived as most effective, most challenging, or most beneficial. Ranking enabled the researcher to prioritize findings and highlight areas of strength or concern

Results

1. Level of retention and independent performance of Grade 9 students in Mathematics.

Table 1

Level of Retention and Independent Performance of Grade 9 Students: Teacher-made test.

Area	Mean Score	Percentage Score (%)	Descriptive Interpretation
Trigonometric Ratios	6.93	69.33%	Needs Improvement
Law of Sine and Cosine	5.71	57.11%	Needs Improvement
Angle of Elevation and Depression	4.49	44.90%	Needs Improvement
Composite Mean	5.71	57.11%	Needs Improvement

Legend: 90% - 100% - Outstanding 85% - 89% - Very Satisfactory 80%- 84% - Satisfactory 75% – 79% - Fairly Satisfactory Below 75% - Needs Improvement

Based on the table below, all learning areas fall under “Needs Improvement” as their descriptive interpretation. It shows that the students have not yet achieved the desired mastery.

Among different areas, Trigonometric ratios got the highest mean score of 6.93, equivalent to the percentage score of 69.33%, suggesting that the students perform better in this area compared to the others. However, despite being the Highest, this does not meet the satisfactory level, and it was verbally interpreted as “Needs Improvement”, implying that more practice and reinforcement are needed.

Overall, the composite mean score was 5.71, and the percentage of 57.11%. This means students' performance in these topics is below the desired proficiency level.

2. Effectiveness of Spiral Review Strategy in Improving the Retention and Independent Performance of Grade 9 Students.

2.1. Retention Level. It shows how well the learners can recall or remember over time.

Table 2 presents the effectiveness of the spiral review strategy in retaining students' learning, as perceived by the participants.

The composite mean of 3.03, which is verbally interpreted as effective. This suggests that, to a moderate extent, students are trying to recall prior knowledge and apply it in solving mathematical tasks without relying on the teacher's assistance.

The data show that the students can follow instructions in the Math task independently, with the highest weighted mean of 3.53, and verbally interpreted as Very Effective. This implies that the students are capable of understanding and executing on their own, reflecting a strong sense of independence. Next, the students can solve problems from the past lesson, obtained a weighted mean score of 3.09, and verbally interpreted as effective, and the students can apply new concepts learned from the previous quarters to the new topics with a weighted mean of 3.07 and verbally interpreted as effective. These indicators also received a relatively high ranking. These results suggest that students acquire a fair ability to apply and use learned concepts in answering new mathematical problems.

Table 2.
Effectiveness of the Spiral Review in Retention and Independent Performance of Student Learning.

Indicators	Weighted mean	Verbal Interpretation	Rank
1. I can recall previous Math lessons without needing a long review.	3.00	Effective	7
2. I can solve Math problems from the past lessons.	3.09	Effective	2
3. I can remember formulas and steps needed for solving Math tasks.	2.89	Effective	8
4. I can answer teacher-made tests without much difficulty.	2.76	Effective	10
5. I can apply concepts learned in the previous quarters to new topics.	3.07	Effective	3
6. I can follow instructions in Math tasks independently.	3.53	Very Effective	1
7. I can complete Math tasks even without help from classmates.	2.78	Effective	9
8. I can easily connect new lessons to older lessons I have learned.	3.07	Effective	3
9. I can perform well in Math tests that require recalling past lessons.	3.04	Effective	5
10. feel confident answering Math questions independently.	3.04	Effective	5
Composite Mean	3.03	Effective	

Legend: *Very Effective* 3.50 – 4.00 *Effective* – 2.50 – 3.49 *Less Effective* – 1.50 – 2.49 *Not effective* – 1.00 – 1.49

In summary, the findings reveal that the students generally agree that they have the retention and independent learning skills in Mathematics, these competencies are not yet fully developed. Strengthening and providing strategies that enhance retention, understanding, and independent problem-solving skills are important to enhance and improve overall student performance. These findings are corroborated by Cabildo et al. (2024), who emphasized that retention is strengthened when learners actively engage and reflect on prior knowledge. Similarly, Fisher (2020) highlighted that giving continuous formative assessment and review activities is necessary to fully develop students' understanding and independence.

2.2. Daily Quizzes. It is the short assessment given daily to check students' understanding of the lesson.

Table 3 presents the effectiveness of the exit quizzes as a strategy in retention and the independent performance of the students in Mathematics, which is based on the weighted mean, verbal interpretation, and rank of each indicator.

Table 3
Effectiveness of the Spiral Review in Retention and Independent Performance in terms of Daily Quizzes.

Indicators	Weighted mean	Verbal Interpretation	Rank
1. Exit quizzes help me remember the lesson better.	4.00	Very Effective	1
2. I can answer exit quizzes faster compared to regular quizzes.	3.07	Effective	7
3. Exit quizzes guide me in identifying which topics I need to review.	3.60	Very Effective	3
4. I get higher scores in exit quizzes after spiral review activities.	3.24	Effective	5
5. The questions in exit quizzes help me strengthen my understanding of the lesson.	3.62	Very Effective	2
6. Exit quizzes make me more attentive during lessons.	3.22	Effective	6
7. I feel motivated to study after taking exit quizzes.	2.78	Effective	10
8. Exit quizzes help me organize my study time better.	2.82	Effective	9
9. I notice improvement in recalling important formulas and concepts.	3.38	Effective	4
10. Exit quizzes encourage me to review lessons consistently.	2.98	Effective	8
Composite Mean	3.27	Effective	

Legend: *Very Effective* 3.50 – 4.00 *Effective* – 2.50 – 3.49 *Less Effective* – 1.50 – 2.49 *Not effective* – 1.00 – 1.49

The composite mean of 3.27, which is verbally interpreted as effective. This shows that the students perceived that daily quizzes are an effective tool in enhancing learning and retention, and at the same time, it suggests that exit quizzes contribute positively to students' retention of the lessons and help with ongoing understanding of the mathematical problems. Such findings align with the study of Lim (2025), who found that exit tickets positively influenced students' understanding and engagement in mathematics, as students who regularly completed them demonstrated better comprehension of lessons. Similarly, Basco (2021) reported a strong positive relationship between students' self-assessed understanding through exit slips and their academic performance, indicating that exit quizzes serve as an effective formative assessment tool that enhances retention and supports continuous learning.

In summary, the findings show that the exit quizzes are an effective instructional strategy to enhance students' retention and independent learning. However, there's a need to further strengthen their roles in promoting motivation and study habits. Exit quizzes are not enough, but integrating more strategies may help to maximize the students' learning and independent performance. This result finds its basis in the study of Fisher (2020), who emphasized that feedback, scaffolding, and spaced review can highly improve formative assessments like exit quizzes. Moreover, Bautista (2025) noted that combining assessment strategies with active learning and student engagement techniques leads to better retention and independent performance.

2.3. Written Works. It is the assessment or task where the students answer questions in written form to show understanding of the lessons.

Table 4 summarizes the effectiveness of the spiral review in retention and independent performance in terms of written works.

Table 4
Effectiveness of the Spiral Review in Retention and Independent Performance in terms of written works

Indicators	Weighted mean	Verbal Interpretation	Rank
1. Spiral review activities help me complete individual tasks more accurately.	3.30	Effective	3
2. I gain more confidence when working independently after doing a spiral review.	3.22	Effective	7
3. I see improvements in my scores on individual activities because of regular review.	3.31	Effective	2
4. Independent tasks become easier after doing daily spiral review practices.	3.24	Effective	6
5. Spiral review helps me solve Math problems on my own with less help.	3.40	Effective	1
6. I can identify mistakes in my work more quickly after spiral review.	3.20	Effective	8
7. Spiral review helps me understand the steps needed to solve complex problems.	3.29	Effective	3

8. I complete my individual activities with fewer errors after regular review.	3.27	Effective	5
9. I feel less anxious when doing independent tasks because of spiral review.	3.16	Effective	10
10. Spiral review improves my time management when completing individual activities.	3.20	Effective	8
Composite Mean	3.26	Effective	
<i>Legend: Very Effective 3.50 – 4.00 Effective – 2.50 – 3.49 Less Effective – 1.50 – 2.49 Not effective – 1.00 – 1.49</i>			

The composite mean rating of 3.26 is interpreted verbally as "Effective." Thus, it can be concluded that through the use of spiral reviews, it appears to provide students with the opportunity to be able to complete assignments independently. In addition, according to the research, frequent exposure to previously learned material can help build confidence and be able to complete the work successfully. Tirol (2024) noted that spiral review strategies support long-term retention and understanding through repeated exposure to key concepts. Similarly, Jones (2021) also indicated that through frequent retrieval of prior knowledge, memory becomes stronger and easier to apply independently.

In summary, the table above indicates that spiral review is an effective instructional strategy for students' improvement. It enhances accuracy, supports deeper understanding, and promotes individuality in problem-solving. However, additional strategies are needed to further develop students' confidence, reduce anxiety, and help to have time management skills during independent tasks.

2.4 Summative test. It is an assessment given at the end of the unit period to measure how much the students have learned.

Table 5 presents the effectiveness of the spiral review in retention and independent performance in terms of the summative test. As the participants perceived

Table 5.
Effectiveness of the Spiral Review in Retention and Independent Performance in terms of the summative test

Indicators	Weighted mean	Verbal Interpretation	Rank
1. Spiral review helps me recall lessons during summative tests.	3.30	Effective	6
2. I get better summative test scores after taking exit quizzes regularly.	3.22	Effective	8
3. I understand the lessons more deeply because of spiral review.	3.36	Effective	4
4. Exit quizzes help me prepare for long tests.	3.18	Effective	10
5. I feel more confident taking summative tests because of repeated review.	3.51	Very Effective	2

6. Spiral review helps me identify weak areas before summative tests.	3.58	Very Effective	1
7. I can answer more questions correctly in summative tests after regular review.	3.31	Effective	5
8. Exit quizzes improve my speed and accuracy in summative tests.	3.24	Effective	7
9. I feel less stressed during summative tests because of constant review.	3.38	Effective	3
10. Spiral review motivates me to study consistently for summative tests.	3.20	Effective	9
Composite Mean	3.32	Effective	

Legend: *Very Effective* 3.50 – 4.00 *Effective* – 2.50 – 3.49 *Less Effective* – 1.50 – 2.49 *Not effective* – 1.00 – 1.49

The composite mean of 3.32, which is interpreted as effective. This indicates that the students perceived spiral review and exit quizzes as an effective strategy in preparing for the summative test. This suggests that consistent review will contribute to the overall performance of the students. Fisher (2020), emphasized that frequent formative assessments and continuous review practices help consolidate prior learning and better prepare students for summative assessments. Similarly, Tirol (2024) explained that spiral review, anchored in the spacing effect theory, enhances long-term retention, which is essential for performing well in cumulative tests.

3. Extent of spiral review strategies in terms of Retention and independent Performance Assessed by teachers.

3.1 Problem – Solving Skills. It is the ability to understand problems, think critically, and find the correct solutions using correct strategies.

Table 6 presents the extent of spiral review in the retention and independent performance of Grade 9 students as assessed by the teachers.

The composite mean of 3.50 was interpreted as Very Great Extent, indicating that the students generally showed a high level of independence in completing the mathematical task.

The data shows that the students can complete the mathematics assignment without asking for help. This was ranked first, with a weighted mean of 4.00, which is verbally interpreted as Very Great Extent. It suggests that the students developed a strong independence in doing academic work.

Table 6.

Extent of Spiral Review in Retention and Individual Performance in Mathematics in terms of Problem - Solving Skills

Indicators	Weighted mean	Verbal Interpretation	Rank
I...			
1. observed that my students can complete mathematics assignments without asking for help.	4.00	Very Great Extent	1
2. observed that my students can work independently because of spiral review activities.	3.90	Very Great Extent	2
3. observed that my students can answer exercises without depending on their classmates.	3.30	Great Extent	9
4. observed that my students can finish math activities within the given time.	3.70	Very Great Extent	3
5. observed that my students can check and correct their own mistakes.	3.40	Great Extent	6
6. observed that my students can follow instructions without teacher assistance.	3.40	Great Extent	6
7. observed that my students can take responsibility for completing math work independently.	3.60	Very Great Extent	5
8. observed that my students can understand tasks clearly before starting them.	2.60	Great Extent	10
9. observed that my students can answer practice exercises on their own.	3.40	Great Extent	6
10. observed that my students can complete challenging exercises without guidance.	3.70	Very Great Extent	3
Composite Mean	3.50	Very Great Extent	

Legend: *Very Great Extent* 3.50 – 4.00 *Great Extent* – 2.50 – 3.49 *Moderate Extent* – 1.50 – 2.49 *Least Extent* – 1.00 – 1.49

Overall, the results imply that spiral review is highly effective in enhancing students' independent performance in Mathematics. However, there remains a need to strengthen students' comprehension skills to achieve a more consistent level of independence at all levels.

3.2. Application of formula. It is using a mathematical formula correctly to solve a problem.

Table 7 presents the analysis and interpretation of the teacher's observations regarding students' retention and independent performance in mathematics, particularly in terms of their understanding and application of the mathematical concepts and formulas.

The composite mean of 3.33, interpreted as Great Extent, indicates that students demonstrate a strong level of retention and independent performance in Mathematics. These results suggest that learners are capable of recalling, understanding, and applying mathematical concepts with minimal assistance from the teacher.

The data shows that the students can understand mathematical concepts through repeated review. This ranks first, with the highest weighted mean of 3.70, and was verbally interpreted as 'Very Great Extent.' The findings highlight the importance of the repeated review strategy in strengthening students' conceptual understanding.

The findings reveal that students show a great extent of retention and independent performance in Mathematics. This reflects the effectiveness of the spiral review in retention and independent performance. However, there is still a need to enhance students' ability to explain mathematical concepts and deepen their higher-order thinking skills. This conclusion aligns with Fisher (2020), who emphasized that while repeated review and formative practices improve retention, higher-order thinking skills require deeper engagement, structured questioning, and opportunities for explanation.

Table 7

Extent of Spiral Review in Retention and Individual Performance in Mathematics in terms of Application of Formula

Indicators	Weighted mean	Verbal Interpretation	Rank
I...			
1. observed that my students can recall mathematical formulas easily.	3.40	Great Extent	3
2. observed that my students can apply the correct formula without being reminded by the teacher.	3.20	Great Extent	7
3. observed that my students can understand mathematical concepts through repeated review.	3.70	Very Great Extent	1
4. observed that my students can determine when and where to use specific formulas.	3.30	Great Extent	4
5. observed that my students can explain the meaning behind mathematical formulas.	3.10	Great Extent	10
6. observed that my students can connect different mathematical concepts when solving problems.	3.30	Great Extent	4
7. observed that my students can substitute values correctly into formulas.	3.60	Very Great Extent	2
8. observed that my students can solve problems even when the formula is not directly given.	3.20	Great Extent	7
9. observed that my students can retain concepts from previous lessons.	3.30	Great Extent	4
10. observed that my students can confidently apply mathematical rules and principles independently.	3.20	Great Extent	7
Composite Mean	3.33	Great Extent	

Legend: *Very Great Extent* 3.50 – 4.00 *Great Extent* – 2.50 – 3.49 *Moderate Extent* – 1.50 – 2.49 *Least Extent* – 1.00 – 1.49

2.3 Completing Assignments and Exercises. It is to finish the given task accurately, on time, and with minimal assistance.

Table 8 presents the analysis and interpretation of the extent of spiral review in enhancing students' retention and independence performance in mathematics in terms of completing assignments and exercises.

Table 8
Extent of Spiral Review in Retention and Individual Performance in Mathematics in terms of Completing Assignments and Exercises

Indicators	Weighted mean	Verbal Interpretation	Rank
I...			
1. observed that my students can complete mathematics assignments without asking for help.	3.10	Great Extent	3
2. observed that my students can work independently because of spiral review activities.	3.50	Very Great Extent	1
3. observed that my students can answer exercises without depending on their classmates.	3.00	Great Extent	5
4. observed that my students can finish math activities within the given time.	2.90	Great Extent	7
5. observed that my students can check and correct their mistakes.	3.10	Great Extent	3
6. observed that my students can follow instructions without teacher assistance.	2.90	Great Extent	7
7. observed that my students can take responsibility for completing their math work independently.	3.20	Great Extent	2
8. observed that my students can understand tasks clearly before starting them.	3.00	Great Extent	5
9. observed that my students can answer practice exercises on their own.	2.80	Great Extent	9
10. observed that my students can complete challenging exercises without guidance.	2.80	Great Extent	9
Composite Mean	3.03	Great Extent	

Legend: *Very Great Extent* 3.50 – 4.00 *Great Extent* – 2.50 – 3.49 *Moderate Extent* – 1.50 – 2.49 *Least Extent* – 1.00 – 1.49

The Composite mean of 3.03, interpreted as 'Great Extent.' The findings indicate that the spiral review significantly contributes to students' ability to complete mathematical tasks independently. This suggests that the students are capable of doing assignments with minimal assistance, demonstrating improved self-responsibility and self – reliance.

The data shows that the students can work independently because of the spiral review activities. This ranks first, with a weighted mean of 3.50 and was verbally interpreted as ‘Very Great Extent’. The finding highlights that spiral review plays a crucial role in developing students’ independence, enabling them to perform individually.

In summary, the findings reveal that spiral review has a Great extent in improving students’ retention and independent performance in completing assignments and exercises. It promotes independence, responsibility, and self-correction among learners. However, there is still a need to strengthen students’ ability to manage time efficiently and confidently handle more challenging mathematical tasks without guidance.

4. Challenges encountered in the Implementation of the spiral review strategy.

Challenges. It is the difficulties or obstacles that make a task harder to do or achieve.

Table 9 presents the analysis and interpretation of the challenges encountered in the implementation of the spiral review strategy in grade 9 students.

Table 9
Challenges Encountered in the Implementation of the Spiral Review Strategy.

Indicators	Weighted mean	Verbal Interpretation	Rank
I...			
1. find some spiral review items too difficult to answer.	2.6	Agree	7
2. sometimes forget previous lessons needed for spiral review.	2.78	Agree	5
3. feel pressured when exit quizzes are given frequently.	3.16	Agree	2
4. struggle to answer exit quizzes when the lesson is new to me.	2.87	Agree	4
5. have difficulty finishing exit quizzes within the time limit.	2.38	Disagree	9
6. sometimes get confused when topics from different lessons are combined.	3.33	Agree	1
7. find it challenging to do a spiral review when many tasks are given in other subjects.	3.09	Agree	3
8. get anxious when answering exit quizzes.	2.36	Disagree	10
9. need more time to review before answering spiral review activities.	2.76	Agree	6
10. experience difficulty recalling old lessons used in spiral review.	2.56	Agree	8
Composite Mean	2.79	Agree	

Legend: Strongly Agree 3.50 – 4.00 Agree 2.50 – 3.49 Disagree – 1.50 – 2.49 Strongly Disagree – 1.00 – 1.49

The composite mean of 2.79, interpreted as agree. This indicates that the students experienced challenges in the implementation of the spiral review and exit quizzes. Although there are challenges, the overall results suggest that they are manageable. This finding is supported by Reynoso (2024), who found that difficulties in spiral progression can be addressed through proper instructional support and engagement strategies. Similarly, Tirol (2024) emphasized that spiral review remains effective despite challenges because repeated exposure still strengthens retention over time.

The data shows that the students became confused when they encountered lessons with combined concepts. Students ranked 1st in their agreement with this, resulting in a weighted mean of 3.33, indicating that integrating several ideas in spiral review activities can often lead to confusion for students, especially if connections among the concepts are unclear. This also provides an opportunity for adjustments in order for students to have a better understanding of the material and to increase their knowledge.

The results of this research indicated that although spiral review has proven to be an effective method for providing instruction, students face certain challenges in relation to cognitive load, integration of topics, and academic pressure. It is important to ensure that lessons are connected through appropriate review time, as well as through equal workloads, to ensure the effectiveness of the spiral review and to enhance the students' learning experience.

5. Based on the results of the study, what enhancement activities may be proposed?

Based on the findings of the study, it was revealed that Grade 9 students are still in a “Needs Improvement” level of performance in terms of retention and independent performance in Mathematics. Although the spiral review strategy and exit quizzes were found to be beneficial in supporting learning, the results indicate that students still encounter difficulties in recalling prior lessons, applying concepts independently, and managing learning tasks effectively.

In view of these findings, the researcher proposed a set of enhancement activities that aim to address the identified issue and learning gaps. These activities are designed to strengthen students' retention, improve independent performance, and enhance overall learning outcomes in Mathematics through more structured, engaging, and supportive instructional strategies.

ENHANCEMENT ACTIVITIES

Objective	Activities	Description / Example	Persons Involved	Frequency
Improve students' mastery of the least learned skills	Targeted Remediation Sessions	Learners with low performance are grouped and given guided worksheets with step-by-step examples, followed by teacher-assisted practice.	Teacher, Students	Weekly as needed

Enhance understanding through real-life application	Visual and Contextual Learning Activities	Lessons are presented using real-life situations, diagrams, drawings, or short videos before answering tasks.	Teacher, Students	Per lesson
Strengthen retention of previous lessons	Structured Spiral Review	Short daily/weekly review (5–10 minutes) combining past and current lessons with gradually increasing difficulty.	Teacher, Students	Daily
Improve recall of key concepts and procedures	Quick Recall Drills	Short oral or written drills where students answer questions on key ideas, steps, or concepts within a limited time.	Teacher, Students	Start of class
Address varying student abilities	Differentiated Learning Tasks	Activities are divided into basic, intermediate, and advanced levels to match students' readiness.	Teacher, Students	Per activity
Promote independent learning	Self-Checking Activities	Students answer tasks individually and check their work using answer keys, followed by reflection on errors.	Teacher, Students	Weekly
Improve study habits and time management	Study Planning Guide	Students are given weekly learning schedules and checklists to monitor their review and practice.	Teacher, Students	Weekly
Encourage collaboration and peer learning	Structured Group Activities	Students work in pairs/groups with assigned roles (solver, checker, explainer) to promote shared learning.	Teacher, Students	Per activity
Increase motivation and engagement	Gamified Learning Activities	Use of quiz bee, point systems, or classroom games to make review sessions more interactive and engaging.	Teacher, Students	Weekly / Monthly

Strengthen understanding of new lessons	Pre-Teaching / Bridging Activities	Brief review of prior knowledge and introductory examples before new lessons to activate readiness.	Teacher, Students	Per lesson
Improve comprehension of instructions	Task Modeling and Clear Instructions	Teacher demonstrates sample outputs and ensures students understand by having them repeat instructions.	Teacher, Students	Every activity
Reduce cognitive overload and pressure	Balanced Task Scheduling	Proper distribution of quizzes, assignments, and review activities to avoid overload and stress.	Teacher, School Admin	Ongoing

Discussion

The findings of the study revealed that Grade 9 students initially demonstrated low retention and independent performance in Mathematics, particularly in trigonometric concepts. This supports the observations of previous studies, which emphasized that students often experience difficulty retaining previously learned concepts without continuous reinforcement. The implementation of spiral review strategies and exit quizzes positively affected students' retention and independent performance. Students were able to recall lessons more effectively, connect prior knowledge to new topics, and solve mathematical problems independently. The results show that repeated exposure to concepts strengthens long-term retention. Through spiral review, students repeatedly encountered previously learned lessons, allowing them to reinforce understanding and improve memory retention. It also shows that spiral review supports students in continuously retrieving prior knowledge during exit quizzes and review activities. This retrieval process strengthened students' ability to recall and apply mathematical concepts independently.

The study also confirmed that spiral review strategies are effective instructional interventions for improving students' performance in daily quizzes, written works, and summative assessments. However, despite the positive effects of spiral review strategies, students still encountered challenges such as cognitive overload, confusion in integrating concepts, and difficulty managing multiple academic tasks.

These findings suggest that while spiral review strategies are effective, teachers must provide appropriate scaffolding, motivation, and differentiated support to maximize students' learning experiences.

Conclusion

Based on the findings revealed in this study, the following conclusions were drawn:

1. The level of retention and independent performance of Grade 9 students in Mathematics remains at a “Needs Improvement” level, particularly across the competencies in trigonometry, law of sines and cosines, and angle of elevation and depression.
2. The spiral review strategy and exit quizzes were found to be effective in improving students’ retention and performance in terms of daily quizzes, written works, and summative tests, as reflected in the overall positive ratings.
3. Teacher assessments show that spiral review strategies are implemented to a “Great Extent” to “Very Great Extent” in enhancing students’ problem-solving skills, application of formulas, and completion of assignments and exercises
4. Despite these positive results, several challenges were identified, such as difficulty in integrating concepts, cognitive overload, time pressure, and limited recall of previous lessons
5. To address the identified gaps, the researcher proposed enhancement activities aimed at strengthening retention and independent performance through targeted remediation, structured spiral review, visual and contextual learning, differentiated instruction, and strategies that promote motivation and independent learning.

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