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Spiral Progression Approach in Elementary Mathematics and Learners' Academic Performance Mediated by Motivation

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ABSTRACT

In the pursuit of quality education, understanding how the implementation of the Spiral Progression Approach and learners' mathematical motivation contribute to academic achievement is essential for strengthening mathematics instruction and improving learning outcomes. This study investigated the mediating role of mathematical motivation in the relationship between the implementation of the Spiral Progression Approach and the academic performance of Grade 4 learners in Inabanga North District, Division of Bohol, during Term 1 of School Year 2026–2027. The study employed a quantitative, non-experimental mediation research design. Data were gathered form 26 teachers and 221 learners through survey questionnaires, learners' Mathematics performance records and analyzed using descriptive statistics and path analysis. Findings revealed that teachers generally agreed that lesson planning was the strongest dimension of implementation approach with a *(M= 3.78)* and *(SD=0.35).* Learners demonstrated high mathematical motivation, with intrinsic motivation as the strongest dimension with a *(M= 3.05*) and *(SD=0.80),* while their academic performance was generally satisfactory, with a mean score of *(M=84.15)* and *(SD=6.62)*. Path analysis examined the direct, indirect, and total effects among the study variables. The findings revealed that the Spiral Progression Approach has a significant positive effect on learners' mathematical motivation *(p-value = 0.017)*, while mathematical motivation significantly predicts academic performance *(p-value=0.006).* However, the reported mediation results were inconsistent regarding the statistical significance of the indirect and overall effects (p-value = 0.191) requiring further verification before a definitive conclusion about the mediating role of mathematical motivation can be established. Based on the findings, an action plan was proposed to strengthen the Implementation of the Spiral Progression Approach, Enhance Mathematical Motivation, and Improve Learners' Academic Performance

Keywords: *Spiral Progression Approach, Learners' Academic Performance, and Motivation*

INTRODUCTION

The Spiral Progression Approach in Mathematics is designed to deepen learners' understanding by introducing, revisiting, and developing mathematical concepts with increasing complexity across grade levels. However, its effectiveness may depend on the quality of implementation, teachers' instructional practices, and learners' mathematical motivation. Since mathematics requires conceptual understanding, persistence, and problem-solving skills, examining the relationship between the Spiral Progression Approach, mathematical motivation, and academic performance is essential to improving mathematics education.

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Despite the Department of Education's initiatives to strengthen numeracy, the Philippines continues to face challenges in mathematical literacy. The 2022 Program for International Student Assessment (PISA) results revealed low mathematics performance among Filipino learners, highlighting the need for more effective teaching and learning interventions (Sahin et al., 2024). Similarly, initial teacher interviews and Rapid Mathematics Assessment Tool (RMAT) results in Inabanga North District indicate that many learners remain at the Emerging or Low Proficient levels. These findings raise concerns about learners' mastery of fundamental numeracy skills and their readiness to understand more complex mathematical concepts.

Grade 4 learners are at a critical stage of developing foundational mathematical skills while facing more advanced learning demands. Their academic performance may be influenced by the implementation of the Spiral Progression Approach and their mathematical motivation, particularly intrinsic motivation, extrinsic motivation, and perceptions of mathematics. However, it remains unclear whether mathematical motivation mediates the relationship between the implementation of the approach and learners' academic performance. This lack of localized evidence among Grade 4 learners in Inabanga North District highlights the need for further investigation.

Thus, this study aimed to examine the mediating role of mathematical motivation in the relationship between the implementation of the Spiral Progression Approach and the academic performance of Grade 4 learners in Inabanga North District during Term 1 of School Year 2026–2027. The findings are expected to provide insights for improving mathematics instruction, strengthening learner motivation, and developing appropriate interventions to enhance mathematics achievement.

Statement of the Problem

This study aimed to examine the mediating role of motivation between the relationship of implementation of the Spiral Progression Approach and academic performance of Grade 4 learners in Inabanga North District during the Term 1 on the school year 2026 to 2027

Specifically, this study sought to answer the following questions:

1. What is the level of implementation of the Spiral Progression Approach in elementary Mathematics in terms of lesson planning, instruction, assessment and teaching strategies?
2. What is the level of learners' mathematical motivation in terms of intrinsic, extrinsic and perception about mathematics?
3. What is the level of learners' academic performance in Mathematics?
4. Does mathematical motivation significantly mediate the relationship between the implementation of the spiral progression approach and learners' academic performance?
5. What action plan can be proposed based from the findings of the study?

METHODS

Research Design

This study employed a quantitative non-experimental mediation design with the use of highly structured survey questionnaires to examine the level of implementation the Spiral Progression Approach in Elementary Mathematics in terms of lesson planning, instruction, assessment, and teaching strategies. Additionally, it sought to explore the level of learners' mathematical motivation in terms of intrinsic, extrinsic, and perception about Mathematics. It assessed the level of learners' academic performance in Mathematics. Further, examined whether there are significant relationships between the spiral progression approach and learners' academic performances mediated by motivation.

Respondents

This study involved two hundred twenty-one (221) elementary learners and twenty-six (26) Mathematics teachers in Inabanga North District, Inabanga, Bohol. The researcher employed **purposive sampling,** a non-

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probability sampling technique in which participants are deliberately selected based on specific characteristics, experiences, or qualifications that are relevant to the objectives of the study. This sampling approach enabled the researcher to identify and include respondents who possessed the necessary knowledge, experiences, and characteristics pertinent to the research variables, thereby ensuring that the data gathered were relevant to the purpose and scope of the study.

Instrument

The study primarily employed a structured questionnaire adapted from the instrument of Bartolome (2023). Necessary modifications would be made to ensure that the questionnaire corresponds with the objectives of the present investigation and appropriately reflects the context of spiral progression approach and motivation. Data were collected through self-administered questionnaires and analyzed using descriptive, inferential, and content analysis to generate comprehensive findings.

Data Gathering Procedure

After obtaining permission from the Schools Division Office and the principals of the sampled schools, the researcher finalized the validated and reliability-tested questionnaire. A formal request to conduct the study was approved, after which the purpose of the study, the contents of the questionnaire, and the respondents' roles were explained to the School Head. The questionnaire was administered face-to-face, allowing the researcher to clarify items and ensure complete and accurate responses. Completed questionnaires were collected, organized, and prepared for analysis, while ethical considerations such as informed consent, confidentiality and anonymity, voluntary participation, and the right to withdraw were strictly observed throughout the process.

Statistical Treatment

The data gathered in this study were analyzed using appropriate statistical tools. Weighted means and standard deviations were used to determine the level of Implementation of the spiral progression approach in elementary mathematics and level of learners' mathematical motivation. Mean and standard deviation were also used to determine the level of learners' academic performance. To determine the significance and degree of the relationships among spiral progression approach, learners' academic performance, and motivation, the Pearson Product-Moment Correlation Coefficient (Pearson *r*) was used.

RESULTS AND DISCUSSIONS

Level of Teachers' Implementation of Spiral Progression Approach in terms of Lesson Planning

The level of the implementation of the spiral progression approach was measured in terms of lesson planning, instruction, assessment and teaching strategy of the Grade 4 teachers of Inabanga North District as presented in table.

Table 1 presents that Lesson Planning obtain the highest level of the implementation of the spiral progression approach with the mean of 3.78 and standard deviation of 0.35 interpreted as very high implementation.

Table 1. *Level of Implementation of the Spiral Progression Approach in Elementary Mathematics n = 26*

Dimension	Mean	SD	Interpretation
Lesson Planning	3.78	0.35	Very High Implementation
Assessment	3.77	0.42	Very High Implementation
Instruction	3.73	0.46	Very High Implementation
Teaching Strategy	3.51	0.49	Very High Implementation
Overall Composite Mean	3.70	0.43	Very High Implementation

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The extent of implementation of the Spiral Progression Approach in Elementary as reflected in table 1. Among the four dimensions, lesson planning obtained the highest composite mean of 3.78 and a standard deviation of 0.35, followed closely by assessment composite mean of 3.77 with standard deviation of 0.42 and instruction composite mean of 3.73, a standard deviation of 0.46. While teaching strategy obtained the lowest mean of 3.51 and with the highest standard deviation of 0.49. Notably, the overall result with a mean of 3.70 and a standard deviation of 0.43, interpreted as Very High Implementation with use of the formula of weighted mean and standard deviation.

Thus, these findings indicate that the Spiral Progression Approach is highly implemented in Elementary Mathematics of Inabanga North District, particularly in lesson planning. The results suggest that teachers consistently incorporate the approach into their instructional preparation and assessment practices. In addition, this result explained Jerome Bruner's Spiral Curriculum Theory, which emphasizes revisiting fundamental concepts at progressively higher levels of complexity to help learners build on their prior knowledge. In elementary mathematics, effective lesson planning allows teachers to sequence learning competencies from simple to complex, while assessment and instruction help determine learners' understanding and readiness for more advanced concepts. The high ratings for lesson planning, assessment, and instruction are consistent with the principles of this theory. Similarly, Perez, Bongcales, and Bellen (2020), in their scoping review of the Spiral Progression Approach in the Philippines, identified the importance of learner-centered teaching practices and recommended strengthening teachers' curriculum knowledge and instructional procedures. Sanchez (2025) also reported high implementation of the approach among mathematics teachers in the Second District of Ilocos Sur. These related findings support the present result that the approach is implemented at a high level, although differences in study settings and respondents should be considered.

However, teaching strategy, despite its very high rating, may require further enhancement to strengthen the delivery of mathematics instruction. Overall, the findings reflect a strong level of implementation across all four dimensions.

Level of Learners' Mathematical Motivation

The level of learners' mathematical motivation among 221 respondents was measured in terms of intrinsic motivation, extrinsic motivation, and perception about mathematics by the use of the formula of weighted mean and standard deviation. The data of the results are further explained below.

Table 2. *Level of Learners' Mathematical Motivation n =221*

Dimension	Mean	SD	Interpretation
Intrinsic	3.05	0.80	Highly motivated
Extrinsic	2.97	0.82	Highly motivated
Perception about Mathematics	2.91	0.79	Highly motivated
Overall Composite Mean	2.98	0.80	Highly motivated

The result shows the level of learners' mathematical motivation among the 221 respondents in terms of intrinsic motivation, extrinsic motivation and perception about mathematics using the weighted mean and standard deviation. Among the dimensions, intrinsic motivation revealed the highest result with the composite mean of 3.05 with standard deviation of 0.80 interpreted as highly motivated followed by extrinsic motivation with the composite mean of 2.97 with standard deviation of 0.82. Perception about mathematics obtained the lowest with the composite mean of 2.91 with standard deviation of 0.79, although it was also interpreted as highly motivated. The results revealed with overall composite mean of 2.98 with standard deviation of 0.80. Overall, the findings emphasize the need to sustain learners' intrinsic interest, provide appropriate external encouragement, and cultivate positive perceptions of mathematics to support meaningful engagement and improved academic performance.

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The findings align with Self-Determination Theory by Ryan and Deci (2020), which emphasizes the importance of intrinsic and extrinsic motivation in learning. They also relate to Expectancy-Value Theory, which highlights the influence of learners' expectations of success and the value they attach to learning tasks. Therefore, teachers should sustain learners' interest, provide appropriate encouragement, build confidence, and use real-life mathematical activities to strengthen positive perceptions and support academic performance.

Level of Learners' Academic Performance

Learners' academic performance was determined using the final grade in mathematics in term 1 of the 221 grade 4 learners in Inabanga North District. In this table learners' academic performance was classified according to its grade scaling and description reflected on the table. The Data of the results are further discussed below:

Table 3. *Level of Learners' Academic Performance in Mathematics n = 221*

Grading Scale	Frequency	Percentage	Interpretation
90 - 100	59	26.70%	Advancing
80 - 89	108	48.87%	Benchmarking
75 - 79	48	21.72%	Connecting
65 – 74	6	2.72%	Developing
0-64	0	0%	Emerging
Summary Performance	Mean: 84.15	SD: 6.62	Benchmarking

Table 3 presents the academic performance of 221 learners in Mathematics using the weighted mean and standard deviation formula. The results show that 108 learners (48.87%) belong to the Benchmarking level, representing the largest proportion of the respondents. Meanwhile, 59 learners (26.70%) are classified as Advancing, while 48 learners (21.72%) fall under Connecting. Only six learners (2.71%) are categorized as Developing, and none are classified as Emerging. The overall mean score of 84.15, with a standard deviation of 6.62, indicates that the learners' academic performance is generally within the Benchmarking level.

The findings suggest that most learners demonstrate satisfactory mathematical achievement, with nearly half meeting the expected performance level and more than one-fourth demonstrating advanced performance. However, the presence of learners in the Connecting and Developing levels indicates that some pupils may still need additional instructional support, targeted remediation, and opportunities to strengthen their mathematical understanding. Although no learners fall within the Emerging category, the distribution highlights the importance of sustaining achievement among higher-performing learners while addressing the learning needs of those who have not yet reached the Benchmarking level.

The findings are consistent with Bloom's Mastery Learning Theory (1968), which emphasizes providing sufficient time, feedback, and corrective instruction to achieve mastery. Similarly, Vygotsky's Sociocultural Theory (1978) highlights the importance of scaffolding and guided learning based on learners' needs. Therefore, teachers should provide enrichment activities for Advancing learners, guided practice for Connecting learners, and targeted remediation for Developing learners to improve overall mathematical achievement.

Path Analysis of the Mediating Effect of Learners Mathematical Motivation on the Relationship Between the level of the Implementation of Spiral Progression Approach and the Academic Performance.

The responses for the fourth item of research questions addressed in the study concerning the relationship between the level of the implementation of spiral progression approach and the academic performance mediated by the mathematical motivation of the leaners. Data of the results are further discussed below:

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Table 4. *Path Analysis of the Mediating Effect of mathematical motivation in the relationship between the implementation of the spiral progression approach and learners' academic performance n = 221*

Effect/Path	Estimate	SE	Z	p-value	Interpretation
Path Estimates					
Spiral Progression Approach → Motivation	0.465	0.196	2.377	.017	Significant
Motivation → Academic Performance	3.818	1.384	2.759	.006	Significant
Spiral Progression Approach → Academic Performance (Direct)	3.577	4.075	0.878	.380	Not Significant
Mediation Estimates					
Indirect Effect	1.78	0.986	1.801	.072	Not Significant
Direct Effect	3.58	4.075	0.878	.380	Not Significant
Total Effect	5.35	4.092	1.308	.191	Not Significant

The Table 4 reveal that the Spiral Progression Approach has a significant positive effect on learners' mathematical motivation (beta = 0.465, p-value = 0.017), while mathematical motivation significantly predicts academic performance (beta = 3.818, p-value = 0.006). However, the direct effect of the Spiral Progression Approach on academic performance is not statistically significant (beta = 3.577, p-value = 0.380), indicating insufficient evidence of a significant direct relationship between the variables.

Furthermore, the indirect effect (beta = 1.78, p-value = 0.072) and total effect (beta = 5.35, p-value = 0.191) are not statistically significant at the 0.05 level. Thus, the null hypothesis of no significant mediation is not rejected, indicating insufficient evidence that mathematical motivation significantly mediates the relationship between the implementation of the Spiral Progression Approach and learners' academic performance.

Findings

The findings suggest that teacher-respondents were highly implemented with lesson planning emerging as strongest motivation and the learner-respondents were highly motivated in Mathematics particularly the intrinsic motivation. Majority of the learners were doing well as reflected in the academic performance who met the standard level of expectation. It was found out that the Spiral Progression Approach significantly predicts mathematical motivation, and motivation significantly predicts academic performance; however, the indirect effect is not significant, indicating that mathematical motivation does not statistically mediate their relationship.

Conclusion and Recommendations

In conclusion, the findings revealed that the Spiral Progression Approach in Mathematics was implemented at a very high level, learners demonstrated high mathematical motivation, particularly intrinsic motivation, and academic performance was generally satisfactory. Although the approach significantly predicted mathematical motivation and motivation significantly predicted academic performance, the direct, indirect, and total effects were not statistically significant, indicating insufficient evidence of a mediating effect. These findings highlight the need to strengthen instructional practices, cultivate positive perceptions of Mathematics, and provide targeted interventions to address learners' diverse needs. Ultimately, effective curriculum implementation and learner motivation are essential, but meaningful academic achievement requires responsive teaching, mastery of mathematical competencies, and sustained support that transforms learning opportunities into actual learner success.

To address these gaps, the action plan is designed to strengthen instructional practices and cultivate positive perceptions in Mathematics, with the ultimate goal of improving learners' academic performance across

various domains and Key Result Areas (KRAs) reflected in the Individual Performance Commitment and Review (IPCR). The study revealed a relationship between spiral progression approach, motivation, and learners' academic performance. Therefore, enhancing teachers' approach in Mathematics can increase their capacity to effectively integrate into classroom learning, which may contribute to improved learners' academic performance and the achievement of organizational goals.

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