

# TEACHER ENGAGEMENT AND EFFECTIVENESS IN IMPLEMENTING THE SPIRAL PROGRESSION APPROACH IN MATHEMATICS: A DESCRIPTIVE CORRELATIONAL STUDY IN BISLIG CITY DIVISION

Irelle Boyonas Tesado<sup>1</sup>, Rio S. Consigna, PhD<sup>2</sup>

<sup>1</sup>Teacher, Department of Education, Bislig City Division, Philippines

<sup>2</sup> Graduate School Faculty, Andres Soriano Colleges of Bislig, Philippines

## ABSTRACT

This study examined the levels of teacher engagement and teaching effectiveness and determined their relationships with the extent of implementation of the Spiral Progression Approach (SPA) in Mathematics in public secondary schools in the Bislig City Division, Surigao del Sur, Philippines. A quantitative descriptive–correlational research design was used. Participants were Mathematics teachers from nineteen (19) public secondary schools in the division; of 43 eligible teachers, 33 participated during School Year 2024–2025. Data were gathered using a researcher-developed questionnaire measuring teacher engagement, teaching effectiveness, and SPA implementation. The instrument underwent expert validation and pilot testing for reliability. Descriptive statistics (mean) were used to describe levels, while Pearson product–moment correlation tested relationships at  $\alpha = 0.05$ . Findings indicated very high teacher engagement ( $M = 4.64$ ), very high teaching effectiveness ( $M = 4.40$ ), and very high SPA implementation ( $M = 4.42$ ). Correlation results showed very strong positive relationships between teacher engagement and SPA implementation ( $r = 0.87, p < .001$ ), teaching effectiveness and SPA implementation ( $r = 0.92, p < .001$ ), and teacher engagement and teaching effectiveness ( $r = 0.89, p < .001$ ). The results suggest that highly engaged and effective teachers tend to implement SPA more consistently, reinforcing the importance of sustained professional development, collaborative planning, and strong instructional practices in Mathematics.

**Keyword:** Teacher engagement; Teaching effectiveness; Spiral Progression Approach; Mathematics; Descriptive–correlational; Bislig City Division

## 1. INTRODUCTION

The K to 12 Basic Education Curriculum in the Philippines institutionalized the Spiral Progression Approach (SPA) as a core instructional design in Mathematics. Grounded in Bruner's spiral curriculum concept, SPA requires learners to revisit key ideas across grade levels with increasing complexity, supporting conceptual coherence and long-term retention.

Despite curriculum reforms, persistent gaps in Mathematics achievement indicate continuing challenges in curriculum delivery and instructional quality. Research consistently identifies teachers as central to the fidelity of curriculum implementation; teacher engagement and teaching effectiveness shape how curricular standards are translated into coherent classroom practice.

Teacher engagement—behavioral, emotional, and cognitive involvement in instructional work—can strengthen lesson planning, reflective practice, and professional learning. Teaching effectiveness reflects the quality of instruction, including scaffolding, connecting new and prior learning, differentiation, assessment, and feedback—practices that are essential for a spiral curriculum to function as intended.

Given the demands of SPA in Mathematics, this study examined the levels of teacher engagement, teaching effectiveness, and the extent of SPA implementation among public secondary school Mathematics teachers in the Bislig City Division, and tested the relationships among these variables.

## 2. METHODOLOGY

### 2.1 Research Design

A quantitative descriptive–correlational research design was employed to describe the levels of teacher engagement, teaching effectiveness, and SPA implementation and to determine the strength of relationships among these variables without manipulating conditions.

### 2.2 Research Locale

The study was conducted in the Schools Division of Bislig City, Province of Surigao del Sur, CARAGA Region (Region XIII), Philippines, covering nineteen (19) public secondary schools implementing the K to 12 Mathematics curriculum during School Year 2024–2025.

### 2.3 Respondents and Sampling

Respondents were secondary Mathematics teachers from the nineteen (19) public secondary schools in the division. Teachers with at least three (3) years of teaching experience were invited through purposive cluster sampling. Of the 43 eligible teachers, 33 participated by completing the survey questionnaire.

### 2.4 Research Instrument

A researcher-developed questionnaire was used to measure: (a) teacher engagement (behavioral, emotional, and cognitive indicators), (b) teaching effectiveness (instructional clarity, scaffolding, assessment, and strategy use), and (c) extent of SPA implementation (sequencing, revisiting concepts, progression, and alignment with standards). Responses were rated using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

### 2.5 Validity and Reliability

The instrument underwent content validation by experts in Mathematics education, curriculum implementation, and educational research. A pilot test among Mathematics teachers outside the study locale was conducted, and

reliability was assessed using Cronbach's alpha, indicating acceptable internal consistency across questionnaire sections.

## 2.6 Data Gathering Procedure

Approvals were secured from education authorities and school heads prior to data collection. Teachers were oriented on the study purpose and assured of confidentiality and voluntary participation. Questionnaires were administered and retrieved within an agreed schedule, after which responses were encoded and prepared for analysis.

## 2.7 Statistical Treatment

Means were computed to describe levels of teacher engagement, teaching effectiveness, and SPA implementation. Pearson product-moment correlation (Pearson  $r$ ) was used to test relationships among variables at the 0.05 level of significance. Mean scores were interpreted using the following ranges: 4.21–5.00 (Very High), 3.41–4.20 (High), 2.61–3.40 (Moderate), 1.81–2.60 (Low), and 1.00–1.80 (Very Low).

## 3. RESULTS AND DISCUSSION

Tables 1–3 summarize the descriptive results on teacher engagement, teaching effectiveness, and SPA implementation, while Table 4 presents the correlations among the variables.

### 3.1 Teacher Engagement

Table 1. Level of Teacher Engagement in Implementing the Spiral Progression Approach

Indicator	Mean	Interpretation
I am emotionally invested in helping my students succeed in Mathematics.	4.58	Very High
I plan my lessons based on students' learning needs and curriculum goals.	4.68	Very High
I feel motivated to continuously improve my teaching strategies.	4.89	Very High
I participate in school-based training and development related to Mathematics instruction.	4.79	Very High
I reflect on my teaching practices to improve student learning.	4.79	Very High
I collaborate with my colleagues to enhance Mathematics instruction.	4.16	High
I feel enthusiastic when delivering	4.58	Very High

Mathematics lessons.		
Overall Teacher Engagement	4.64	Very High

Teacher engagement was rated very high overall ( $M = 4.64$ ). Teachers reported strong motivation to improve teaching strategies ( $M = 4.89$ ) and high participation in training and reflective practice ( $M = 4.79$ ). Collaboration with colleagues received the lowest mean ( $M = 4.16$ ) but still reflected a high level of engagement, suggesting that structured professional learning communities may further strengthen peer collaboration.

### 3.2 Teaching Effectiveness

Table 2. Level of Teaching Effectiveness of Mathematics Teachers in Implementing SPA

Indicator	Mean	Interpretation
Use a variety of strategies to cater to different types of learners.	4.89	Very High
Relate new concepts to previously learned topics.	4.74	Very High
Regularly assess students' understanding and adjust teaching accordingly.	4.68	Very High
Provide timely and constructive feedback to students.	4.26	Moderate
Ensure that students understand how topics are connected across grade levels.	4.58	Very High
Clearly explain complex mathematical ideas in a simple and understandable way.	4.53	Very High
Students are actively engaged and participate in class activities.	4.11	High
Overall Teaching Effectiveness	4.40	Very High

Teaching effectiveness was very high overall ( $M = 4.40$ ). The highest-rated indicator was the use of varied strategies for different learners ( $M = 4.89$ ), reflecting strong differentiation practices aligned with effective Mathematics instruction. Providing timely and constructive feedback obtained a comparatively lower mean ( $M = 4.26$ ), indicating an area for continued capacity-building in formative assessment and feedback.

### 3.3 Extent of SPA Implementation

Table 3. Extent of Implementation of the Spiral Progression Approach in Mathematics

Indicator	Mean	Interpretation
I consistently integrate previous lessons into new content.	4.42	Very High
I follow the K to 12 Mathematics curriculum standards.	4.79	Very High
I scaffold lessons to build on prior knowledge.	4.32	Very High
I ensure continuity and progression of mathematical concepts across grade levels.	4.53	Very High
I use instructional materials aligned with SPA.	4.16	High
I encounter challenges in implementing SPA effectively.	4.53	Very High
I feel confident in delivering Mathematics using the spiral progression approach.	4.21	High
Overall SPA Implementation	4.42	Very High

SPA implementation was very high overall ( $M = 4.42$ ), indicating strong alignment with curriculum standards and consistent use of scaffolding and concept progression strategies. Teachers strongly agreed that they follow K to 12 Mathematics standards ( $M = 4.79$ ) and ensure continuity across grade levels ( $M = 4.53$ ). Teachers also reported that they encounter challenges in implementing SPA ( $M = 4.53$ ), suggesting that continued support in resources, pacing, and curriculum mapping remains important even when implementation levels are high.

### 3.4 Relationships Among Variables

Table 4. Pearson Correlations Among Teacher Engagement, Teaching Effectiveness, and SPA Implementation

Variables Correlated	Pearson r	Interpretation
Teacher Engagement & SPA Implementation	0.87	Very Strong Positive Relationship

Teaching Effectiveness & SPA Implementation	0.92	Very Strong Positive Relationship
Teacher Engagement & Teaching Effectiveness	0.89	Very Strong Positive Relationship

Results indicated very strong positive relationships among the study variables. Teacher engagement was strongly associated with SPA implementation ( $r = 0.87, p < .001$ ), and teaching effectiveness was strongly associated with SPA implementation ( $r = 0.92, p < .001$ ). Teacher engagement also showed a very strong positive relationship with teaching effectiveness ( $r = 0.89, p < .001$ ). These findings suggest that strengthening teacher engagement and instructional effectiveness may support more coherent and consistent implementation of the spiral curriculum in Mathematics.

#### 4. CONCLUSIONS

Mathematics teachers in the Bislig City Division demonstrated very high levels of teacher engagement, teaching effectiveness, and SPA implementation.

Teacher engagement and teaching effectiveness were both very strongly and positively associated with the extent of SPA implementation, indicating that engaged and effective teachers tend to deliver the spiral curriculum with greater consistency and coherence.

Teacher engagement and teaching effectiveness were also very strongly related, implying that these constructs reinforce each other in practice.

#### 5. RECOMMENDATIONS

Professional development programs may prioritize formative assessment and feedback strategies to address the comparatively lower rating on timely feedback, while sustaining strengths in differentiation, scaffolding, and concept linking.

School leaders may strengthen collaborative structures (e.g., Learning Action Cells, peer coaching, and shared lesson study) to further enhance teacher collaboration and instructional coherence across grade levels.

Division-level curriculum support may focus on resource development and pacing guidance to help teachers manage challenges in SPA implementation while maintaining high standards of delivery.

Future studies may include classroom observations, learner performance measures, or mixed-method approaches to triangulate self-reported implementation data and further explain the mechanisms linking engagement, effectiveness, and SPA delivery.

#### 6. REFERENCES

- Abragan, J. C., Flores, M. T., & Reyes, R. P. (2022). Implementation challenges of the K to 12 curriculum in the Philippines: A comprehensive review. *Journal of Education and Practice*, 13(4), 45–58.
- Abad, A., & Arellano, R. (2020). The influence of mathematical literacy on life outcomes: Evidence from PISA-based analyses. *International Journal of Educational Development*, 74, 102–145.

- Bacud, R. A., Futralan, R., & Score, H. M. (2023). Spiral progression in Mathematics: Benefits, challenges, and implications for Philippine basic education. *Asian Journal of Education and Training*, 9(1), 23–35.
- Bartolome, C. A. (2023). Teacher engagement and curriculum fidelity in public secondary schools: Implications for instructional leadership. *Philippine Journal of Education and Human Development*, 11(2), 55–70.
- Batidor, C., & Casinillo, L. (2021). Evaluating the implementation of the spiral progression curriculum in Mathematics. *Journal of Educational Policy and Research*, 7(3), 88–104.
- Bileluigie, M. P. (2024). Spiral progression as a pedagogical innovation: An analysis of its sustainability and impact. *Asia Pacific Journal of Curriculum Studies*, 5(2), 14–29. Bruner, J. S. (1960). *The process of education*. Harvard University Press. Chui, D., &
- Chui, W. (2024). Teaching effectiveness and learner outcomes in Mathematics: A meta-analysis of instructional practices. *International Review of Education Research*, 12(1), 77–96.
- Comediero, A. B., Samillano, M., & Tirol, J. (2022). Rethinking assessment practices: Teacher roles in shaping student success and learning experiences. *Journal of Pedagogical Inquiry*, 18(4), 33–47.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109.
- Garcia, M. T. (2021). Teacher scaffolding and conceptual progression in spiral Mathematics curricula. *Mathematics Education Research Journal*, 33(4), 601–620.
- Gardose, R. L., et al. (2024). Barriers to Mathematics learning: A systems-level analysis in Philippine basic education. *International Journal of Learning and Teaching*, 15(2), 101–120.
- Hattie, J. (2015). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge. (Original work published 2009)
- Igcasama, J. R. (2021). Institutional support and teacher motivation in implementing the spiral progression approach. *Journal of Educational Reform*, 9(1), 88–103.
- Jerald, C. (2019). The effectiveness of spiral curriculum models: Evidence from international school systems. *Educational Perspectives*, 57(2), 47–63.
- Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, 38(5), 758–773.
- Lazaro, L. B. (2023). Teacher engagement and instructional coherence in Mathematics classrooms implementing spiral progression. *Philippine Journal of Instruction*, 5(1), 21–39.
- Law, N., Yuen, H. K., & Fox, R. (2010). *ICT in education: Learning, innovation and technology*. Springer.
- Luzano, J. C. (2024). Capacitating Mathematics teachers for spiral progression delivery: A qualitative inquiry. *Journal of Teaching and Learning Strategies*, 12(3), 44–59.
- Mallik, M. (2023). Teacher factors influencing student academic achievement: A comparative global review. *International Journal of Educational Studies*, 20(3), 122–140.
- Manalo, R., & Yazon, A. (2020). Spiral progression in Mathematics: Effects on retention, conceptual mastery, and student performance. *Asia Pacific Journal of Education*, 40(1), 112–126.

National Reading Panel. (2000). Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. National Institute of Child Health and Human Development.

OECD. (2023). PISA 2022 results: Mathematics performance and equity. OECD Publishing.

Republic Act No. 10533, Enhanced Basic Education Act of 2013 (Phil).

Rico, R. J., & Baluyos, G. R. (2021). The alignment of the spiral progression curriculum and its impact on student performance in Algebra. *Philippine Social Science Journal*, 4(2), 18–29.

Rios, C., et al. (2020). 21st-century skills and Mathematics learning: Global perspectives. *Journal of Educational Psychology Studies*, 8(2), 51–66.

Savage, T. (2022). Revisiting the spiral curriculum: A systematic review of global evidence. *Journal of Curriculum Theory and Practice*, 18(1), 90–108.

Schaufeli, W., & Bakker, A. (2004). Job demands–resources model of work engagement. *Journal of Organizational Behavior*, 25(3), 293–315.

Theobald, E., et al. (2020). Anxiety, learning difficulties, and performance disparities in Mathematics education. *Proceedings of the National Academy of Sciences*, 117(38), 23480–23487.

Tingzon, M., & Buyok, B. (2022). Challenges in implementing Technology and Livelihood Education (TLE) in Philippine schools. *Philippine Journal of Technical Education*, 3(1), 30–46.

Tirol, J. (2022). Examining the spiral progression approach in the K–12 Science curriculum: A literature synthesis. *International Journal of Curriculum and Instruction*, 14(3), 233–249.

Unwin, T. (2008). ICT4D: Information and communication technology for development. Cambridge University Press.