

# Flexible Scaffolding on the Learners' Affective Domain and Mathematical Abilities

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**Abstract**—The main purpose of this study was to determine the effect of flexible scaffolding on learners' affective domain and mathematical abilities. Specifically, it aimed to determine the level of utilization of flexible scaffolding, the level of learners' affective domain, and the level of learners' performance in mathematics. It also examined the significant relationship between the utilization of flexible scaffolding and learners' affective domain and the significant effect of the utilization of flexible scaffolding on learners' mathematical abilities. This study used a descriptive and quantitative design with 30 Grade 5 learners from one of the private schools in Santa Cruz, Laguna selected via purposive sampling. Data were collected through researcher-made questionnaires and written assessments, and analyzed using weighted mean, standard deviation, Pearson Product-Moment Correlation, and Multiple Regression Analysis. The findings revealed that the level of utilizing flexible scaffolding was Highly Utilized across all components. Learners exhibited Very High Effective Engagement in mathematics. Learners' mathematical abilities demonstrated Excellent. A significant relationship between flexible scaffolding and learners' affective domain was observed in the study. Likewise, most indicators of flexible scaffolding showed significant effects on learners' mathematical abilities. Flexible scaffolding has a significant relationship with learners' affective domain and has a significant effect on the learners' mathematical abilities, leading to rejection of the null hypotheses. This means that scaffolding strategies are important for improving and enhancing learners' affective characteristics and enhancing learners' mathematical abilities and overall performance in mathematics. It is recommended that Mathematics teachers and learners engage in flexible scaffolding strategies across various topics, with teachers using diverse instructional approaches and learners actively participating in learning activities. This approach is further encouraged to enhance learners' understanding, engagement, and performance in Mathematics.

**Keywords**— Flexible scaffolding, affective domain, mathematical abilities, performance, engagement.

## I. INTRODUCTION

Education in the 21st century requires adaptive teaching strategies that address the diverse needs of learners. Traditional “one-size-fits-all” instruction has been widely criticized for overlooking individual learning styles, prior knowledge, and varying levels of cognitive development. As a result, students often face difficulties in fully grasping mathematical concepts, which are considered abstract, layered, and cumulative in nature (Darling-Hammond et al., 2020).

Mathematics is often viewed as one of the most challenging subjects among learners, where performance is affected not only by cognitive ability but also by affective

factors such as motivation, self-efficacy, and emotional regulation. Despite reforms in mathematics instruction, many students continue to struggle in both performance and attitudes toward the subject (Dowker, Sarkar, & Looi, 2016).

With this, the government implemented the Republic Act No. 10533 or the Enhanced Basic Education Act saying that the curriculum shall use pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative, and integrative.

Considering the digitalization of society, there is an increasing need to constantly develop one's competencies in the sense of continuous lifelong learning (OECD, 2019). Teachers must encourage their students to embrace mathematics and study it as simply as possible, as the majority of students consider mathematics to be one of the most difficult subjects.

Flexible scaffolding is a teaching approach where support is given, adjusted, and slowly removed as students improve. It helps learners take more responsibility and handle harder tasks on their own. Flexible scaffolding enhances learners' motivation by encouraging engagement, focus, and persistence, which leads to a deeper understanding of mathematical concepts. As teacher support is gradually reduced, students gain confidence and develop self-efficacy, enabling them to apply concepts and solve problems independently.

This study, therefore, seeks to determine the effect of flexible scaffolding on the affective and mathematical ability of students in Mathematics. By examining how assessment, differentiation, customization, progress monitoring, gradual release of responsibility, and responsive feedback contribute to affective domain, problem solving, reasoning, and critical thinking, the research aims to provide empirical evidence that may strengthen instructional practices in mathematics classrooms.

### 1.1 Statement of the Problem

#### Problem/s which were addressed by the research

The study aimed to determine the effect of Flexible Scaffolding on the Learners' Affective Domain and Mathematical Abilities.

Specifically, it sought to answer the following questions:

1. What is the level of utilizing flexible scaffolding in terms of:
  - 1.1 Assessment;
  - 1.2 Differentiation;
  - 1.3 Customization;

- 1.4 Progress Monitoring;
- 1.5 Gradual Release of Responsibility; and
- 1.6 Responsive Feedback?
- 2. What is the level of Learners' Affective Domain in Mathematics in terms of:
  - 2.1 Performance Task Motivation;
  - 2.2 Self-Efficacy;
  - 2.3 Open-Mindedness;
  - 2.4 Adaptability; and
  - 2.5 Emotional Regulation?
- 3. What is the level of Learner's Mathematical Abilities in terms of:
  - 3.1 Problem Solving;
  - 3.2 Mathematical Reasoning;
  - 3.3 Critical Thinking; and
  - 3.4 Logical Reasoning?
- 4. Does Flexible Scaffolding have significant relationship with the Learners' Affective?
- 5. Does Flexible Scaffolding have significant effect to the Learners' Mathematical Abilities?

II. METHODOLOGY

This study used a descriptive and quantitative design with 30 Grade 5 learners from one of the private schools in Santa Cruz, Laguna selected via purposive sampling. Data were collected through researcher-made questionnaires and written assessments, and analyzed using weighted mean, standard deviation, Pearson Product-Moment Correlation, and Multiple Regression Analysis.

III. RESULTS AND DISCUSSION

This part presents, analyzes, and interprets the data gathered that showed a significant relationship between flexible scaffolding and learner's affective, and significant effect of flexible scaffolding on the learner's mathematical ability.

*Flexible Scaffolding*

In this study, it refers to dynamic, responsive, and student-centered instructional approach where the level and type of support provided by an educator.

The extent of utilizing flexible scaffolding in terms of assessment, differentiation, customization, progress monitoring, gradual release of responsibility and responsive feedback was treated statistically using mean and standard deviation.

Table 1 shows the extent of utilizing flexible scaffolding in terms of assessment, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed the teacher is regularly checking to see how well students understand before moving on to the next lesson, as well as providing opportunities for students to self-assess in order to track their own progress, and adapting classroom activities so that they can assess each student's strengths and weaknesses in mathematics.

The weighted mean for the use of flexible scaffolding in terms of assessment is 4.87 with a standard deviation of 0.33

and is verbally rated as "Highly Utilized." This indicates that respondents have experienced assessment practices that explain and assist in their learning throughout the year.

**Table 1.** Level of Utilizing Flexible Scaffolding in Terms of Assessment

Statements	Mean	SD	Remarks
My teacher regularly checks my understanding before moving on to new lessons.	4.93	0.25	Strongly Agree
I am given opportunities to assess my own progress in mathematics.	4.83	0.38	Strongly Agree
Classroom activities help reveal my strengths and weaknesses in math.	4.80	0.41	Strongly Agree
Assessments are used not only for grading but also for guiding my learning.	4.93	0.25	Strongly Agree
I receive constructive evaluations that show where I need improvement.	4.87	0.33	Strongly Agree
Weighted Mean	4.87		
SD	0.33		
Verbal Interpretation			Highly Utilized

In summary, this implies that the assessment component of flexible scaffolding is being utilized effectively. All results demonstrated an overall high level of assessment practice and further demonstrated that assessment practice serves as an evaluative and developmental tool for assisting students in understanding their current level of learning and progressing toward improved mathematical performance.

**Table 2.** Level of Utilizing Flexible Scaffolding in terms of Differentiation

Statements	Mean	SD	Remarks
My teacher uses a variety of strategies to address different learning needs.	4.90	0.31	Strongly Agree
Activities in math class are adjusted to suit students' readiness and abilities.	4.90	0.31	Strongly Agree
I am provided with options to solve problems in ways that match my learning style.	4.83	0.38	Strongly Agree
I am encouraged to work on math tasks that fit my pace of learning.	4.80	0.41	Strongly Agree
Differentiated instructions help me understand mathematics better.	4.90	0.31	Strongly Agree
Weighted Mean	4.87		
SD	0.34		
Verbal Interpretation			Highly Utilized

Table 2 shows the extent of utilizing flexible scaffolding in terms of differentiation, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that the teacher uses a variety of strategies and adjusts math activities to meet each student's readiness, abilities, and learning styles. Also, the teacher provides opportunities for students to work at their own pace, which helps them understand mathematics more effectively.

The weighted mean for the use of flexible scaffolding in terms of differentiation is 4.87 with a standard deviation of 0.34, verbally rated as "Highly Utilized." This indicates that the teacher effectively implements differentiation practices, adjusting instruction to meet students' varying readiness, abilities, and learning styles.

Overall, these practices serve as an evaluative and developmental tool, helping students understand their current

level of learning and progress toward improved mathematical performance.

**Table 3.** Level of Utilizing Flexible Scaffolding in terms of Customization

Statements	Mean	SD	Remarks
Mathematics tasks are designed to match my personal learning goals.	4.93	0.25	Strongly Agree
I am given learning activities that connect with my real-life experiences.	4.90	0.31	Strongly Agree
My teacher adapts lessons to suit my preferred learning strategies.	4.90	0.31	Strongly Agree
I receive customized feedback that is specific to my work.	4.93	0.25	Strongly Agree
I feel that lessons are tailored to address my unique challenges in math.	4.87	0.35	Strongly Agree
Weighted Mean	4.91		
SD	0.29		
Verbal Interpretation	Highly Utilized		

Table 3 shows the extent of utilizing flexible scaffolding in terms of customization, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that the teacher designs mathematics tasks to align with students' personal learning goals, connects activities to real-life experiences, adapts lessons to suit preferred learning strategies, and provides customized feedback specific to each student's work.

The weighted mean for the use of flexible scaffolding in terms of customization is 4.91 with a standard deviation of 0.29, verbally rated as "Highly Utilized." This indicates that the teacher effectively implements customization practices, tailoring instruction to address students' individual needs and learning preferences.

Overall, these practices serve as an evaluative and developmental tool, helping students understand their current level of learning and progress toward improved mathematical performance.

**Table 4.** Level of Utilizing Flexible Scaffolding in terms of Progress Monitoring

Statements	Mean	SD	Remarks
My teacher keeps track of my progress in math regularly.	4.97	0.18	Strongly Agree
I am updated on my performance to know if I am improving.	4.90	0.31	Strongly Agree
Progress reports motivate me to do better in mathematics.	4.93	0.25	Strongly Agree
I receive support whenever I encounter difficulties in class.	4.77	0.43	Strongly Agree
Monitoring helps me identify areas where I need more practice.	4.97	0.18	Strongly Agree
Weighted Mean	4.91		
SD	0.27		
Verbal Interpretation	Highly Utilized		

Table 4 presents the extent of utilizing flexible scaffolding in terms of progress monitoring, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that the teacher regularly tracks students' progress in mathematics, provides updates on their

performance, offers support when difficulties arise, and uses monitoring to help students identify areas that need more practice.

The weighted mean for the use of flexible scaffolding in terms of progress monitoring is 4.91 with a standard deviation of 0.27, verbally rated as "Highly Utilized." This indicates that the teacher effectively implements progress monitoring practices, using them as an evaluative and developmental tool to guide learning, motivate improvement, and enhance students' understanding of mathematics.

Progress monitoring is another approach that complements scaffolding by providing data-driven insights into student learning. Methods such as Curriculum-Based Assessment (CBA) and Curriculum-Based Measurement (CBM) allow teachers to track performance, set goals, and make instructional decisions, particularly in mathematics

**Table 5.** Level of Utilizing Flexible Scaffolding in terms of Gradual Release of Responsibility

Statements	Mean	SD	Remarks
My teacher demonstrates first before asking us to practice independently.	4.97	0.18	Strongly Agree
I am guided step-by-step until I can solve math problems on my own.	5.00	0.00	Strongly Agree
I feel confident solving problems after practicing with my teacher's support.	4.87	0.35	Strongly Agree
The responsibility of learning gradually shifts from the teacher to me.	4.83	0.38	Strongly Agree
I am encouraged to take ownership of my learning in mathematics.	4.87	0.35	Strongly Agree
Weighted Mean	4.91		
SD	0.25		
Verbal Interpretation	Highly Utilized		

Table 5 shows the extent of utilizing flexible scaffolding in terms of the gradual release of responsibility, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that the teacher demonstrates tasks before allowing students to practice independently, provides step-by-step guidance until learners can solve problems on their own, and gradually shifts the responsibility of learning from the teacher to the students.

The weighted mean for the use of flexible scaffolding in terms of gradual release of responsibility is 4.91 with a standard deviation of 0.25, verbally rated as "Highly Utilized." This indicates that the teacher effectively implements the gradual release of responsibility, supporting students in gaining confidence, taking ownership of their learning, and developing independence in mathematics.

Table 6 presents the extent of utilizing flexible scaffolding in terms of responsive feedback, as perceived by the respondents, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that the teacher provides immediate feedback on students' performance in mathematics, helps them correct mistakes quickly, offers constructive guidance to improve problem-solving skills, motivates students to do better, and provides opportunities to reflect on the feedback received.

**Table 6.** Level of Utilizing Flexible Scaffolding in terms of Responsive Feedback

Statements	Mean	SD	Remarks
My teacher gives immediate feedback on my performance in math.	4.83	0.38	Strongly Agree
Feedback from my teacher helps me correct mistakes quickly.	4.90	0.31	Strongly Agree
I receive feedback that motivates me to do better.	4.87	0.35	Strongly Agree
Constructive feedback helps me improve my problem-solving skills.	4.83	0.38	Strongly Agree
I am given opportunities to reflect on the feedback provided.	4.83	0.38	Strongly Agree
Weighted Mean	4.85		
SD	0.36		
Verbal Interpretation	Highly Utilized		

The weighted mean for the use of flexible scaffolding in terms of responsive feedback is 4.85 with a standard deviation of 0.36, verbally rated as "Highly Utilized." This indicates that the teacher effectively implements responsive feedback, using it as a tool to guide learning, support improvement, and enhance students' understanding and performance in mathematics.

Overall, these findings suggest that responsive feedback within flexible scaffolding is essential in supporting student learning, promoting reflection, and improving mathematical outcomes.

*Learners' Affective Domain*

In this study, it refers to students' affective responses toward mathematics tasks in terms of measures measured through survey instruments.

The level of learners' affective domain in Mathematics in terms of performance task motivation, self-efficacy, open-mindedness, adaptability, and emotional regulation was analyzed using the mean and standard deviation. These statistical tools were used to determine the overall level of affective engagement of the learners

Table 7 presents the level of learners' affective domain in mathematics in terms of performance task motivation, including several indicators with their corresponding mean, standard deviation, and remarks.

**Table 7.** Level of Learners' Affective Domain in Mathematics in terms of Performance Task Motivation

Statements	Mean	SD	Remarks
I feel motivated to learn mathematics because of my teacher's strategies.	4.87	0.35	Strongly Agree
I am willing to spend extra time understanding math lessons.	4.90	0.31	Strongly Agree
Mathematics makes me curious and eager to learn more.	4.83	0.38	Strongly Agree
I set personal goals to improve my performance in mathematics.	4.80	0.41	Strongly Agree
I remain interested in mathematics even when tasks are challenging.	4.93	0.25	Strongly Agree
Weighted Mean	4.87		
SD	0.34		
Verbal Interpretation	Very	High	Affective Engagement

The results revealed that students feel motivated to learn mathematics due to their teacher's strategies, are willing to

spend extra time understanding lessons, exhibit curiosity and eagerness to learn more, set personal goals to improve performance, and remain interested even when tasks are challenging.

The weighted mean for performance task motivation is 4.87 with a standard deviation of 0.34, verbally interpreted as "Very High Affective Engagement." This indicates that the teacher's instructional strategies effectively foster motivation, encouraging students to engage actively and persistently in mathematics learning.

Overall, this indicates that students demonstrate strong motivation and active engagement in mathematics, suggesting that the teacher's instructional strategies effectively support their affective development and persistence in learning.

**Table 8.** Level of Learners' Affective Domain in Mathematics in terms of Self-Efficacy

Statements	Mean	SD	Remarks
I believe I can solve difficult math problems if I try hard enough.	4.83	0.46	Strongly Agree
I feel confident in answering mathematics activities.	4.90	0.40	Strongly Agree
I trust my ability to perform well in mathematics tasks.	4.97	0.18	Strongly Agree
I can handle mathematics problems without giving up easily.	4.83	0.38	Strongly Agree
I believe I can succeed in math with effort and practice.	4.80	0.48	Strongly Agree
Weighted Mean	4.87		
SD	0.38		
Verbal Interpretation	Very	High	Affective Engagement

Table 8 presents the level of learners' affective domain in mathematics in terms of self-efficacy, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students believe they can solve difficult math problems with effort, feel confident in answering mathematics activities, trust their ability to perform well, handle problems without giving up easily, and believe they can succeed through practice.

The weighted mean for self-efficacy is 4.87 with a standard deviation of 0.38, verbally interpreted as "Very High Affective Engagement."

Overall, this indicates that students demonstrate strong confidence in their mathematical abilities, suggesting that the teacher's instructional strategies effectively promote self-efficacy and perseverance in learning mathematics.

Table 9 presents the level of learners' affective domain in mathematics in terms of open-mindedness, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students are open to different ways of solving math problems, adapt easily to new teaching methods, consider suggestions from classmates and teachers, are willing to try multiple approaches, and adjust well when presented with unexpected challenges.

The weighted mean for open-mindedness is 4.86 with a standard deviation of 0.36, verbally interpreted as "Very High

Affective Engagement." Overall, this indicates that students demonstrate strong open-mindedness in learning mathematics, suggesting that the teacher's instructional strategies effectively encourage flexibility, adaptability, and receptiveness to diverse problem-solving approaches. In mathematics education, open-mindedness is particularly important in problem-solving situations that involve ambiguity or conflicting information.

**Table 9.** Level of Learners' Affective Domain in Mathematics in terms of Open-mindedness

Statements	Mean	SD	Remarks
I am open to different ways of solving math problems.	4.93	0.25	Strongly Agree
I adapt easily to new teaching methods in mathematics.	4.90	0.40	Strongly Agree
I consider suggestions from classmates and teachers when solving problems.	4.83	0.38	Strongly Agree
I am willing to try multiple approaches before arriving at a solution.	4.83	0.38	Strongly Agree
I adjust well when presented with unexpected challenges in math.	4.80	0.41	Strongly Agree
Weighted Mean	4.86		
SD	0.36		
Verbal Interpretation	Very High		Affective Engagement

**Table 10.** Level of Learners' Affective Domain in Mathematics in terms of Adaptability

Statements	Mean	SD	Remarks
I stay calm even when math problems seem difficult.	4.93	0.25	Strongly Agree
I can control my anxiety during math tests and activities.	4.97	0.18	Strongly Agree
I feel comfortable asking questions when I do not understand a lesson.	4.80	0.41	Strongly Agree
I manage my frustration when I make mistakes in solving math problems.	4.80	0.41	Strongly Agree
I remain positive even when I initially fail to solve math tasks.	4.90	0.31	Strongly Agree
Weighted Mean	4.88		
SD	0.31		
Verbal Interpretation	Very High		Affective Engagement

Table 10 presents the level of learners' affective domain in mathematics in terms of adaptability, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students remain calm when math problems are difficult, control their anxiety during tests and activities, feel comfortable asking questions when lessons are unclear, manage frustration when mistakes occur, and stay positive even when they initially fail to solve tasks.

The weighted mean for adaptability is 4.88 with a standard deviation of 0.31, verbally interpreted as "Very High Affective Engagement."

Overall, this indicates that students demonstrate strong adaptability in mathematics, suggesting that the teacher's instructional strategies effectively promote emotional regulation, resilience, and a positive approach to learning challenges.

Table 11 presents the level of learners' affective domain in mathematics in terms of emotional regulation, including several indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students are able to manage their emotions during challenging math tasks, stay focused despite difficulties, remain composed when mistakes occur, and regulate feelings of frustration or anxiety while learning. The weighted mean for emotional regulation is 4.87 with a standard deviation of 0.33, verbally interpreted as "Very High Affective Engagement." Overall, this indicates that students demonstrate strong emotional regulation in mathematics, suggesting that the teacher's instructional strategies effectively support self-control, resilience, and a positive learning mindset.

**Table 11.** Level of Learners' Affective Domain in Mathematics in terms of Emotional Regulation

Statements	Mean	SD	Remarks
I stay calm even when math problems seem difficult.	4.93	0.25	Strongly Agree
I can control my anxiety during math tests and activities.	4.93	0.25	Strongly Agree
I ask questions when I do not understand a lesson.	4.90	0.31	Strongly Agree
I can manage frustration when I make mistakes in solving math problems	4.80	0.41	Strongly Agree
I remain positive even when I initially fail to solve math tasks.	4.80	0.41	Strongly Agree
Weighted Mean	4.87		
SD	0.33		
Verbal Interpretation	Very High		Affective Engagement

*Learner's Mathematical Ability*

In this study, it refers to students' performance in problem-solving tasks and assessments.

The level of learner's mathematical ability in terms of problem solving, mathematical reasoning, critical thinking and logical reasoning was treated statistically using the frequency and percentage.

**Table 12.** Level of Learner's Mathematical Ability in terms of Problem Solving

Scores	Frequency	Percentage	Descriptive Equivalent
13-15	28	93.33%	Excellent
10-12	2	6.67%	Proficient
7-9	0	0.00%	Developing
4-6	0	0.00%	Beginning
0-3	0	0.00%	Needs Improvement
Total	30	100%	

Weighted Mean = 14.63

SD = 0.89

Verbal Interpretation = Excellent

Table 12 presents the level of learners' mathematical ability in terms of problem solving, including the distribution of mean scores with their corresponding frequency, percentage, and descriptive remarks.

The result shows that 93.33 percent of the learners are rated an excellent level (13-15) for their mathematical problem-solving capabilities and 6.76 percent are proficient

(10-12). No students were found at a developing, beginning or needs improvement level. Thus, the entire group demonstrates a very high degree of mathematical problem-solving capability, indicating that learners possess a strong degree of mastery in their problem-solving skills.

The mean weighted score for learners' mathematical abilities in terms of problem-solving is 14.63 and has a standard deviation of 0.89; thus, their overall performance related to problem-solving abilities meets the definition of "Excellent. On average, the learners perform extremely well in terms of mathematical problem-solving capabilities. The learners' scores were typically consistent across the group and there was little variation to the scores; therefore, all learners consistently perform at high levels and demonstrate little diversity.

In summary, this implies that all the students in this study achieved an excellent level in mathematical problem-solving capability. This is indicative of the effectiveness of the instructional strategies and learning experiences provided to learners that support and facilitate the learners' development of problem-solving skills. Continued implementation of these practices will maintain high performance and provide opportunities for deeper mathematical understanding for learners.

Table 13 presents the level of learners' mathematical ability in terms of mathematical reasoning, including the distribution of mean scores with their corresponding frequency, percentage, and descriptive remarks.

**Table 13.** Level of Learner's Mathematical Ability in terms of Mathematical Reasoning

Scores	Frequency	Percentage	Descriptive Equivalent
13-15	25	83.33%	Excellent
10-12	5	16.67%	Proficient
7-9	0	0.00%	Developing
4-6	0	0.00%	Beginning
0-3	0	0.00%	Needs Improvement
Total	30	100%	

Weighted Mean = 14.47

SD = 1.14

Verbal Interpretation = Excellent

The results show that 83.33 percent are rated at an excellent level (13-15) for their mathematical reasoning capabilities and 16.67 percent are proficient (10-12). No students were found at the developing, beginning, or needs improvement levels. Thus, the entire group demonstrates a very high degree of mathematical reasoning, indicating that learners possess strong logical thinking and analytical skills in mathematics.

The mean weighted score for learners' mathematical abilities in terms of problem-solving is 14.47 and has a standard deviation of 1.14; thus, their overall performance related to mathematical reasoning meets the definition of "Excellent". On average, the learners perform extremely well in applying logical processes and reasoning to solve mathematical problems. The learners' scores were generally consistent across the group, showing minimal variation, which suggests that all learners consistently demonstrate high levels of reasoning ability.

In summary, this implies that all students in this study achieved an excellent level in mathematical reasoning. This reflects the effectiveness of the instructional strategies and learning experiences provided, which support and enhance learners' development of logical thinking and problem-solving skills. Continued implementation of these practices will help maintain high performance and foster deeper understanding of mathematical concepts.

**Table 14.** Level of Learner's Mathematical Ability in terms of Critical Thinking

Scores	Frequency	Percentage	Descriptive Equivalent
13-15	25	83.33%	Excellent
10-12	5	16.67%	Proficient
7-9	0	0.00%	Developing
4-6	0	0.00%	Beginning
0-3	0	0.00%	Needs Improvement
Total	30	100%	

Weighted Mean = 14.50

SD = 1.14

Verbal Interpretation = Excellent

Table 14 presents the level of learners' mathematical ability in terms of critical thinking, including the distribution of mean scores with their corresponding frequency, percentage, and descriptive remarks.

The results show that all 83.33 percent of the learners are rated at an excellent level (13-15) for their critical thinking skills in mathematics and 16.67 are proficient (10-12). No students were found at the developing, beginning, or needs improvement levels. This indicates that the entire group demonstrates a very high capacity for analyzing, evaluating, and reasoning through mathematical problems.

The weighted mean score for learners' mathematical abilities in terms of critical thinking is 14.50 with a standard deviation of 1.14, which reflects an overall "Excellent" performance. Learners consistently applied logical reasoning and evaluative thinking to solve mathematical tasks, showing minimal variation in scores across the group.

In summary, this implies that all students in this study achieved an excellent level in critical thinking. This suggests that the instructional strategies and learning experiences provided effectively promote analytical and evaluative skills, supporting learners in developing strong mathematical reasoning and problem-solving abilities.

**Table 15.** Level of Learner's Mathematical Ability in terms of Logical Reasoning

Scores	Frequency	Percentage	Descriptive Equivalent
13-15	27	90.00%	Excellent
10-12	3	10.00%	Proficient
7-9	0	0.00%	Developing
4-6	0	0.00%	Beginning
0-3	0	0.00%	Needs Improvement
Total	30	100%	

Weighted Mean = 14.70

SD = 0.92

Verbal Interpretation = Excellent

Table 15 presents the level of learners' mathematical ability in terms of logical reasoning, including the distribution

of mean scores with their corresponding frequency, percentage, and descriptive remarks.

The results show that 90 percent of the learners are rated at an excellent level (13-15) for their logical reasoning skills in mathematics and 10 percent are proficient (10-12). No students were found at the developing, beginning, or needs improvement levels. This indicates that the entire group demonstrates a very high ability to apply logical thinking, identify patterns, and draw valid conclusions when solving mathematical problems.

The weighted mean score for learners' mathematical abilities in terms of logical reasoning is 14.70 with a standard deviation of 0.92, reflecting an overall "Excellent" performance. Learners consistently demonstrated high-level reasoning skills with minimal variation across the group, indicating that all students reliably apply logical processes in mathematics.

In summary, this implies that all students in this study achieved an excellent level in logical reasoning. This reflects the effectiveness of instructional strategies and learning experiences that cultivate strong logical thinking and problem-solving skills, supporting learners in achieving high levels of mathematical competence.

*Test of Significant relationship between Flexible Scaffolding and Learner's Affective*

To test the significant relationship between flexible scaffolding and learner's affective in terms of performance task motivation, self-efficacy, open-mindedness, adaptability and emotional regulation, was treated statistically using Jamovi 2.3.28 using the Pearson correlation coefficient.

Table 16 presents the relationship between flexible scaffolding and learners' affective domain in terms of performance task motivation, self-efficacy, open-mindedness, adaptability, and emotional regulation using the Pearson correlation coefficient.

**Table 16.** Significant Relationship between Flexible Scaffolding and Learners' Affective Domain

Flexible Scaffolding	Learner's Affective Domain				
	PTM	SE	OM	A	ER
Assessment:					
Pearson Correlation	0.47**	0.40*	0.61***	0.56***	0.64***
Significance(2-Tailed)	0.009	0.028	<.001	<.001	<.001
N	28	28	28	28	30
Differentiation:					
Pearson Correlation	0.47**	0.40*	0.61***	0.56***	0.64***
Significance(2-Tailed)	0.009	0.028	<.001	<.001	<.001
N	28	28	28	28	30
Customization:					
Pearson Correlation	0.39*	0.40*	0.43***	0.44*	0.45*
Significance(2-Tailed)	0.035	0.027	0.018	0.015	0.013
N	28	28	28	28	30
Progress:					
Pearson Correlation	0.48**	0.37*	0.59***	0.47**	0.55**
Monitoring Significance(2-Tailed)	0.008	0.045	<.001	0.009	0.002
N	28	28	28	28	30
Gradual:					
Pearson Correlation	0.41*	0.37*	0.41*	0.41*	0.42*
Release of Significance(2-Tailed)	0.025	0.042	0.026	0.027	0.022
Responsibility N	28	28	28	28	30
Responsive:					
Pearson Correlation	0.78***	0.49**	0.53**	0.56***	0.64***
Feedback Significance(2-Tailed)	<.001	0.006	0.003	<.001	<.001
N	28	28	28	28	30

Note: \*p<.05, \*\* p<.01, \*\*\*p<.001

The results revealed that there exists a weak to moderate positive correlation between assessment and performance task motivation (r=0.47 p<.01) and self-efficacy (r=0.40, p<.05), and a moderate to strong positive correlation between assessment & open-mindedness (r=0.61, p<.001), adaptability (r=0.56, p<.001) and emotional regulation (r=0.64, p<.001). Therefore, assessment as scaffolding is strongly related to improving affective learning outcomes.

Differentiation also shows a similar relationship with the same strength correlation of motivation and self-efficacy, and all statistically significant at moderate/strong levels. This indicates that differentiated instruction based on learners' needs positively supports their affective growth.

The level of correlation for customization is lower across all areas of affective learning including motivation (r=0.39, p<.05), self-efficacy (r=0.40, p<.05), openness (r=0.43 p<.05), adaptability (r=0.44 p<.05), and emotional

regulation (r=0.45, p<.05). Therefore, while customization is a positive support for learners, it does not have as strong an improvement on their affective learning as do the other forms of scaffolding. Progress monitoring has displayed the following correlations: weak to moderate positive relations with performance task motivation (r=0.48, p<.01) and self-efficacy (r=0.37, p<.05) and moderate positive relations with open-mindedness (r=0.59, p<.001), adaptability (r=0.47, p<.01), and emotional regulation (r=0.55, p<.01) through their correlation with affective development suggests that providing learners with monitored support helps build both the motivation to perform as well as develop their emotions.

Gradual release of responsibility has been reported as having weak positive relations across all domains, including performance task motivation (r=0.41, p<.05), self-efficacy (r=0.37, p<.05), open-mindedness (r=0.41, p<.05), adaptability (r=0.41, p<.05), and emotional regulation (r=0.42,

$p < .05$ ). This indicates that while this practice does contribute to learner development in affective areas, it does so only at a relatively low level.

Responsive feedback displays the strongest correlation to all components of scaffolding. It has a strong positive correlation ( $r = 0.78, p < .001$ ) to performance task motivation, a weak to moderate positive correlation ( $r = 0.49, p < .01$ ) to self-efficacy, and moderate to strong positive correlations ( $r = 0.53, p < .01$ ) to open-mindedness, ( $r = 0.56, p < .001$ ) to adaptability and ( $r = 0.64, p < .001$ ) to emotional regulation. Responsive feedback is therefore deemed as being important to enhancing the affective outcomes of learners.

In summary, the results of this study imply that the use of flexible scaffolding strategies to improve learners' affective characteristics is significant. Responsive feedback are the strategies with the highest impact, but the other scaffolding components, including assessment, differentiation, and progress monitoring also have significant effects on learners' affective characteristics, such as their motivation, self-efficacy, adaptability, and emotional regulation.

*Test of Significant Effect of Flexible Scaffolding on the Learner's Mathematical Abilities*

The significant effect of flexible scaffolding on the learner's mathematical abilities in terms of problem solving, mathematical reasoning, critical thinking and Logical reasoning was treated statistically using Real Statistics Data Analysis Tools using multiple regression analysis.

A multiple regression analysis was conducted to determine whether flexible scaffolding in terms of assessment, differentiation, customization, progress monitoring, gradual release of responsibility, and responsive feedback could significantly predict learners' mathematical ability.

The results from the analysis of variance demonstrate that there is a statistically significant regression model for the flexible scaffolding style of learning ( $F(5, 24) = 10.81; p < .001$ ) showing an overall effect of scaffolding on learners' math ability.

However, when examining the individual predictors, there were some identified as significant and others not significant. The predictors of assessment ( $B = 0.00; t = 0.00; p = 0.997$ ), customization ( $B = -1.24; t = -1.18; p = 0.251$ ), and responsive feedback ( $B = -2.74; t = -1.71; p = 0.100$ ) were found to be non-significant predictors of math ability.

On the other hand, the predictors of differentiation ( $B = -2.43; t = -2.83; p = 0.009$ ), progress monitoring ( $B = 4.51; t = 3.97; p < .001$ ), and gradual release of responsibility ( $B = 0.72; t = 2.71; p = 0.012$ ) were all determined to be statistically significant predictors. This indicates that differentiation, progress monitoring, and gradual release of responsibility had meaningful effects upon learners' math ability; in particular, progress monitoring had the largest positive effects.

In summary, although the overall flexible scaffolding model had a statistically significant effect on learners' mathematical ability, only certain elements of flexible scaffolding were determined to be significant independent predictors of mathematical success. Therefore, some

scaffolding strategies (e.g., progress monitoring and gradual release of responsibility) may have a greater effects on improving learners' math achievement than the other elements of scaffolding, which may work together instead of acting alone.

**Table 17.** Significant Effect of Flexible Scaffolding on the Learner's Mathematical Abilities

**ANOVA<sup>a</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.15	5	0.42	10.81	<.001
Residual	0.95	24	0.04		
Total	3.10	29			

a. Dependent Variable: Learner's Mathematical Ability\_Overall

b. Predictors: Assessment, Differentiation, Customization, Progress Monitoring, Gradual Release of Responsibility and Responsive Feedback

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients			
	B	Std. Error	T	Sig.
(Constant)	-2.74	1.60	-1.71	0.100
Assessment	0.00	0.49	0.00	0.997
Differentiation	-2.43	0.86	-2.83	0.009**
Customization	-1.24	1.06	-1.18	0.251
Progress Monitoring	4.51	1.14	3.97	<.001***
Gradual Release of Responsibility	0.72	0.27	2.71	0.012*
Responsive Feedback	-2.74	1.60	-1.71	0.100

**IV. CONCLUSION AND RECOMMENDATIONS**

All indicators of scaffolding strategies have a significant relationship with learners' affective domain, leading to the rejection of the null hypothesis. This means that scaffolding strategies play an important role in enhancing learners' affective characteristics, particularly their motivation, confidence, engagement, interest, and attitude toward Mathematics. Through appropriate instructional support and guidance, learners become more encouraged to participate actively in classroom activities and develop a more positive perception of the subject.

Most of the indicators of flexible scaffolding strategies have a significant effect on learners' mathematical abilities, leading to rejection of the null hypothesis. This indicates that flexible scaffolding is important in enhancing learners' mathematical skills. The findings tells that most components of flexible scaffolding have stronger influences on learners' performance, while other indicators work collectively to support understanding and skill development. Through adaptive instructional support, learners are guided according to their individual needs and levels of understanding, allowing them to gradually develop independence and confidence in solving mathematical tasks.

In the formulated conclusions from the findings, it was recommended that:

School administrators may provide support and resources to ensure the effective implementation of flexible scaffolding strategies. This includes offering professional development, allocating time and materials, and creating policies that

promote high-impact teaching practices to improve students' mathematical abilities and overall learning outcomes.

Mathematics teachers and learners may actively engage in flexible scaffolding strategies across different mathematical topics. Teachers can design and implement varied instructional approaches, while learners participate in activities that enhance their motivation, problem-solving skills, and affective engagement.

Further research may explore how flexible scaffolding can be integrated with other instructional approaches, such as collaborative learning or project-based tasks, to further enhance students' mathematical abilities and affective domain. Future studies may also include additional variables to examine its broader impact on long-term retention, application

of mathematical concepts, and development of 21st-century skills.

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