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Scaffolding Strategy and Its Relation to the Students Motivation and Engagement in Grade 8 Science

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Abstract— *Motivation and engagement are essential components in fostering meaningful learning experiences and academic success, particularly in the field of science education. Understanding how instructional strategies influence these factors is crucial in addressing persistent challenges in student performance. This study examined the relationship between scaffolding strategies and the levels of motivation and engagement among Grade 8 science learners at Tagusao National High School. The primary objective was to assess the Extent to which scaffolding can enhance students' cognitive, emotional, and behavioral engagement, as well as their overall motivation toward science learning. A descriptive quantitative research design was utilized, involving 68 Grade 8 students selected through total enumeration sampling. Data were gathered using pretest and post-test, standardized survey instruments on engagement and motivation, and analyzed using statistical techniques such as mean, standard deviation, and T-test. Results revealed a significant improvement in students' academic performance following the implementation of scaffolding strategies. There were also notable correlations between higher levels of engagement and motivation with improved post-test scores, indicating the effectiveness of scaffolding in promoting meaningful science learning experiences. These findings highlight the importance of integrating structured, student-centered teaching approaches in science education. The study provides a basis for developing actionable plans aimed at enhancing instructional practices and supporting students' academic growth through increased motivation and engagement.*

Keywords— *Academic performance, Behavioral engagement, Cognitive engagement, Emotional engagement, Motivation, Scaffolding strategy, Science education, Student engagement*

I. INTRODUCTION

In today's global educational environment, motivation and engagement are increasingly acknowledged as key contributors to student success, particularly in the field of science education. Engagement encompasses students' behavioral involvement, emotional commitment, and cognitive focus in learning activities. Extensive research across various countries has demonstrated that high levels of engagement significantly impact academic performance, enhance critical thinking skills, and cultivate sustained interest in scientific disciplines (Schnitzler et al., 2021; Wester et al., 2021).

In response to these global insights, many countries, especially in the developed world, like the United States, haverevised their approaches to science education. Schools are incorporating more inquiry-based learning, integrating technology into instruction, and enhancing socio-emotional Support systems to reignite student motivation (Cavinato et al., 2021; Bradley et al., 2021). The adoption of mobile learning tools, social media, and personalized learning techniques has proven successful in maintaining student engagement in STEM fields (Yu et al., 2022; Banihashem et al., 2022). However, challenges remain, particularly the difficulty of aligning traditional, teacher-driven teaching methods with the diverse learning needs of contemporary students. Researchers such as Zen and Ariani (2022) and Sökmen (2021) argue that science education, in particular, requires active inquiry and critical thinking, which rigid teaching practices often inhibit.

In the Philippines, these global challenges are equally significant. Science education plays a crucial role in strengthening the country's STEM workforce, yet students face obstacles such as overcrowded classrooms, limited resources, and conventional, lecture-based teaching methods. Although reforms such as the K to 12 curriculum were introduced to promote inquiry-based learning and technology integration, challenges in implementation remain, especially at the junior high school level. Understanding the motivation and engagement levels of Grade 8 science learners is essential for developing locally relevant strategies. Addressing key issues such as teacher professional development, improving school infrastructure, and increasing parental involvement will be vital to creating an educational environment that fosters both academic achievement and the emotional well-being of Filipino students.

In response to both global and national trends, as well as the ongoing challenges surrounding student engagement, this study aims to examine the relationship between student engagement and motivation among Grade 8 learners. The researcher observed several signs of disengagement, including students' lack of interest in class activities, failure to complete assignments, limited participation in discussions, difficulty grasping concepts, and a general lack of motivation to learn.

Furthermore, the average mean score in science was only 82.33 percent. This study determined how behavioral, emotional, and cognitive engagement affect students' motivation. By investigating this connection within the local educational context, the study seeks to provide meaningful insights that can inform the development of tailored action plans based not only on theoretical frameworks but also on practical classroom observations and the lived experiences of students.

The primary objective is to examine the relationship between the scaffolding teaching strategy and its relation to students' engagement and motivation in Science 8. Another was to develop a practical and responsive plan that teachers and

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school administrators can implement to boost student engagement and motivation among Grade 8 learners. This research is particularly timely given the lasting impact of the pandemic on student motivation and engagement. Through this study, the importance of fostering supportive classroom environments, strengthening teacher-student relationships, and integrating innovative teaching strategies was emphasized. Ultimately, the research aims to contribute to the wider discourse on educational reform and student-centered learning, particularly in the context of the Philippine education system.

II. METHODOLOGY

This section presents the key elements of the study, including the research design, population and sampling technique, respondents, instrumentation, validity and reliability testing of the tool, data collection procedures, statistical methods for data analysis, and the ethical considerations to be observed throughout the research process.

A. Research Design

This study employed a descriptive quantitative research methodology to assess the scaffolding teaching strategy and level of engagement and motivation among Grade 8 learners in Science. This approach is particularly effective as it enables the systematic collection and analysis of numerical data, allowing for the exploration of patterns, correlations, and trends within a defined research context. Through descriptive research, the study aims to capture a snapshot of learners' current attributes within their natural environment, minimizing external influence and ensuring more authentic results. The quantitative design offers objective insights into the research topic, making it well-suited for hypothesis testing, measuring various variables, and drawing statistical inferences about the broader population from the sample (Siedlecki, 2020). This methodology not only provides a clearer understanding of engagement levels and motivational factors but also supports the identification of relationships between these elements, contributing to a deeper analysis of the influences shaping students' learning experiences in Science.

B. Population and Sampling Technique

The researcher employed a total enumeration sampling technique, encompassing all Grade 8 students from the two sections. The first and second sections each have 34 learners, totaling 68 respondents. Using total enumeration ensures that every individual in the target population is included, minimizing sampling bias and enhancing the reliability and accuracy of the findings. This method is particularly suitable due to the manageable size of the population, enabling a thorough and detailed assessment of students' levels of engagement and motivation in learning Science. Moreover, by involving all learners across different sections, the study captures a wider range of demographic variables, such as age and sex, offering a deeper understanding of how these factors may influence engagement and motivation. Ultimately, this approach aims to generate more comprehensive and trustworthy insights that could inform and improve strategies for promoting student engagement in Science education.

C. Respondents of the Study

The respondents of the study were Grade 8 learners of Tagusao National High School. They were distributed across two sections, with the first and second sections each composed of 34 students, totaling 68 learners. Representing a range of ages and both male and female populations, these students came from a variety of backgrounds. Their participation provided valuable insights into the levels of engagement and motivation in Science learning within the school setting.

D. Instrumentation

This study aims to address its research questions by employing two key instruments for data collection, together with the twenty-item pre-test and post-test aligned with the table of specification. The first instrument was the Level of Engagement Scale developed by Fredricks, Blumenfeld, and Paris (2004), which has been referenced in recent studies such as that of Xie, Gong, and Bao (2024). This scale evaluated students' engagement with learning, considering cognitive, emotional, and behavioral dimensions. With a Cronbach's alpha of 0.88, it demonstrated strong internal consistency, ensuring its reliability in educational research. The second instrument measured the Extent of Motivation among respondents in learning science, based on the foundational work of Ryan and Deci (2000). This framework explored both intrinsic and extrinsic motivation and their effects on students' engagement. Edulan and Fajardo (2024) have cited this motivation scale in their research on science education, which has achieved a Cronbach's alpha of 0.92, confirming its reliability and effectiveness across various educational contexts. Both instruments have been carefully chosen for their established reliability and relevance in the field. These tools allowed the study to gather in-depth data on the engagement and motivation of Grade 8 Science learners. By utilizing these validated scales, the research sought to provide a detailed understanding of how engagement and motivation influence students' learning experiences in science. Ultimately, the study's findings offered valuable insights that could inform teaching strategies and improve student performance in science education.

III. STATISTICAL TREATMENT OF DATA

The data collected in this study underwent analysis using the following statistical methodologies:

Mean and Standard Deviation were used to ascertain pre-test and post-test scores of the respondents before and after the utilization of the scaffolding strategy.

Mean and Standard Deviation were used to calculate the level of engagement among the respondents.

Mean and Standard Deviation were used to evaluate the Extent of motivation in learning Science among the respondents.

The t-test was used to determine if there is a significant difference in the assessment of the respondents in the level of engagement before and after the exposure to the scaffolding strategy.

T-Test was utilized to determine if there is a significant difference in the level of engagement and the performance of the respondents as revealed in their post-test scores.

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A t-test was employed to investigate if there is a significant difference in the Extent of motivation and the performance of the respondents as revealed in their post-test scores.

IV. Presentation, Analysis, and Interpretation of Data

Problem number 1. What is the performance of the students before and after the exposure to the scaffolding strategy as revealed in the pre-test and post-test?

TABLE 1. Mean and Standard Deviation on the Performance of the Students Before and After the Exposure to the Scaffolding Strategy as Revealed in the Pre-test and Post-test

	Mean	Standard Deviation
Pre-Test	5.38	2.14
Post-Test	11.60	3.88

The data in Table 1 show a significant improvement in the students' academic performance after the implementation of the scaffolding strategy. The mean score increased from 5.38 in the pre-test to 11.60 in the post-test, with standard deviations of 2.14 and 3.88, respectively. This suggests not only higher performance but also greater variability in post-test scores, indicating that while most students benefitted, the level of improvement varied among them. The sharp increase in mean scores implies that the scaffolding intervention had a positive effect on the students' ability to understand and perform the tasks assessed.

The notable increase in students' post-test scores implies that scaffolding strategies, such as guided instruction, the gradual release of responsibility, modeling, and interactive Support, can significantly improve students' learning outcomes. These findings underscore the value of providing structured, intentional guidance that gradually empowers learners to take control of their own learning process. By offering timely assistance at critical points of difficulty, scaffolding not only clarifies complex concepts but also builds student confidence and promotes mastery over time. This process helps students internalize strategies for approaching difficult tasks independently, making them more capable of engaging with challenging academic material. The results suggest that without such scaffolded Support, students may struggle to reach their full academic potential, especially when faced with abstract or higher-order learning objectives. Traditional methods that rely solely on direct instruction or passive learning may fall short in promoting deep understanding, critical thinking, and application. Therefore, the integration of scaffolding into pedagogical frameworks should not be seen as optional, but rather essential, particularly in diverse classrooms where students may have varying levels of Preparedness, learning styles, or self-efficacy. Educators are called to reconsider their teaching methodologies, moving beyond lecture-based models and incorporating responsive strategies that meet learners where they are and gradually guide them toward independence.

The implications of these findings extend to curriculum design, assessment practices, and teacher training. Instructors who embed scaffolding techniques within their instruction, through questioning, prompting, collaborative learning, and formative feedback, are more likely to foster a supportive learning environment that encourages student persistence and growth. Moreover, scaffolding is especially beneficial in promoting inclusive learning, as it allows differentiation and adapts to students' unique needs and learning paces. It also aligns with 21st-century learning goals that prioritize learner autonomy, problem-solving, and lifelong learning skills. When effectively applied, scaffolding serves as both a cognitive and emotional Support system, addressing not only what students learn but also how they feel while learning, thus contributing to their overall academic resilience and motivation.

These conclusions are well-supported by existing literature. Banihashem et al. (2022) found that scaffolded and constructivist learning environments significantly improved both student engagement and self-regulatory behaviors, highlighting how structured Support fosters active participation and independent learning. Almusaed et al. (2023) emphasized the effectiveness of integrating scaffolded strategies within hybrid and technology-supported learning models, particularly in enhancing student achievement and sustaining attention in complex, multimodal environments. Their review confirms that when students receive structured, adaptive Support, their engagement and academic performance improve across various disciplines. In a similar vein, Acosta-Gonzaga (2023) demonstrated that the presence of supportive instructional practices, such as those found in scaffolded learning, positively influences students' self-esteem and motivation, leading to higher academic performance and improved emotional well-being. This aligns with broader research findings by Fredricks et al. (2004) and Wong and Liem (2022), who note that learning environments characterized by high levels of guidance and emotional Support tend to produce more engaged and successful learners. Collectively, these studies reinforce the notion that scaffolding is not just a teaching technique but a foundational element of effective pedagogy. It enables learners to move from dependence to autonomy, strengthens comprehension and retention, and fosters a deeper engagement with the learning process.

Problem number 2. What is the level of engagement of the respondents after the utilization of the scaffolding strategy in terms of Behavioral, Cognitive, and Emotional?

Table 2.1. Mean and Standard Deviation on Level of Engagement of the Respondents After the Utilization of the Scaffolding Strategy in Terms of Behavioral

	Mean	Std. Deviation	Verbal Interpretation
1. I am asking questions in class or contributing to class discussions.	3.04	0.56	Agree
2. I am raising my hands in class.	2.59	0.87	Agree
3. I am participating in small group discussions.	3.44	0.58	Agree
4. I am doing all my homework.	3.19	0.87	Agree
5. I am coming to class everyday on time.	3.75	0.56	Agree
6. I am taking notes in class.	3.15	0.74	Agree
7. I am getting a good grade.	3.01	0.56	Agree
8. I am receiving prompt written oral feedback from faculty on my academic performance.	2.96	1.20	Agree
9. I am making sure to study for the upcoming quizzes and exams.	3.10	0.78	Agree
10. I am doing well on a test.	2.88	0.66	Agree
BEHAVIORAL	**3.1**	**0.35**	**Agree**

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As presented in Table 2.1, the students' responses following the implementation of the scaffolding strategy reflect a generally positive level of behavioral engagement, categorized under the "Agree" interpretation. This implies that students were moderately to actively engaged in observable academic behaviors, such as attending class regularly, completing assignments, studying for assessments, and working with classmates during group tasks. The most evident behavioral pattern was punctual and consistent attendance, indicating that students valued the learning environment and felt responsible for being present and prepared. Regular attendance and on-time presence are often viewed as foundational behaviors for academic success and may serve as indicators of a student's overall commitment to learning. This level of consistency suggests that the instructional environment supported by scaffolding helped students establish reliable learning habits. However, the relatively lower engagement in behaviors such as voluntarily raising hands in class or expressing confidence through successful test performance hints at a gap in active verbal participation and performance-based confidence. These behaviors, while still within acceptable engagement levels, suggest that some students may remain hesitant to speak out, ask questions, or actively showcase their understanding, especially in high-pressure situations such as graded assessments or public classroom interactions.

The results suggest that the scaffolding strategy had a clear and positive impact on students' behavioral engagement by creating a learning environment that promoted structure, routine, and accountability. Students were not only more present and consistent in their attendance but also showed responsibility in task completion and preparation for learning activities. These are signs of an instructional model that meets learners' needs by reducing uncertainty and offering clear expectations. Scaffolding allows students to develop behavioral discipline by providing manageable steps toward task completion, which reduces the likelihood of feeling overwhelmed and encourages follow-through. The findings also imply that scaffolded strategies instill a sense of purpose and direction among students, leading to greater responsibility in their academic conduct. However, the observed hesitation in verbal classroom participation and test performance indicates that while students may be behaviorally engaged in routine academic tasks, they might still lack the self-assurance required for more public and evaluative forms of participation. This distinction is important, as behavioral engagement is not only about attendance and compliance but also about the willingness to participate meaningfully in the learning process. To address this, educators may consider adopting more tailored scaffolding techniques, such as structured questioning, peer-supported discussions, think-pair-share activities, or low-stakes formative assessments that gradually build students' comfort with speaking out, participating actively, and preparing confidently for formal assessments. These strategies help bridge the gap between passive engagement and active classroom involvement, thereby fostering a more dynamic and inclusive learning environment.

Table 2.2. Mean and Standard Deviation on the Level of Engagement of the Respondents After the Utilization of the Scaffolding Strategy in Terms of Cognitive

	Mean	Std. Deviation	Verbal Interpretation
1. I am making a class presentation.	3.19	0.85	Agree
2. I am working on a paper project that required integrating ideas or information from previous resources.	3.31	0.67	Agree
3. I am putting together ideas or concepts from different sources when completing assignments or during class discussions.	2.93	0.82	Agree
4. I am using an electronic medium to discuss or complete assignment.	3.04	0.74	Agree
5. I am discussing ideas from readings or classes with faculty members outside class.	1.99	0.92	Agree
6. I am working harder that I thought I could meet a teachers' standards or expectations.	3.12	0.78	Agree
7. I am going to teacher's office during hours to review assignments or tests or asks questions.	2.26	0.99	Agree
8. I am thinking about subjects between class meetings.	3.10	0.78	Agree
9. I am reviewing class notes between classes to ensure I understand everything.	2.90	0.69	Agree
10. I am applying what I have learned to my life.	2.97	0.85	Agree
COGNITIVE	**2.88**	**0.43**	**Agree**

Legend: 3.50 - 4.00 = Strongly Agree 2.50 - 3.49 = Agree, 1.50 - 2.49 = Disagree 1.00-1.49=Strongly Disagree

The data in Table 2.2 show that the overall cognitive engagement of students after the implementation of the scaffolding strategy has a mean of 2.88 and a standard deviation of 0.43, which corresponds to the verbal interpretation "Agree." This indicates that the respondents generally participated in cognitively demanding learning activities, such as integrating ideas from different sources, thinking about class subjects outside meetings, and applying learning to real life. However, lower mean scores were observed in activities involving faculty engagement outside class and visiting teachers during office hours, suggesting a gap in student-faculty interaction. These findings demonstrate that while scaffolding enhances students' ability to process and apply knowledge, it may not sufficiently motivate them to seek help or engage in extended academic discourse beyond the classroom.

These findings imply that scaffolding strategies are effective in promoting internal cognitive engagement, especially in activities like analysis, synthesis, and application, but may need to be paired with deliberate teacher-student interaction models to improve external cognitive Support. While the overall engagement is positive, it does not reach the "Strongly Agree" level, indicating room for further development. To maximize cognitive engagement, instructors should not only scaffold learning tasks but also cultivate a culture of open academic communication, where students feel more comfortable seeking clarification and feedback.

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Encouraging collaborative inquiry, peer discussions, and consistent formative feedback can bridge the observed gaps in out-of-class academic engagement.

These findings Support previous research emphasizing that cognitive engagement is a multidimensional construct that thrives in environments where scaffolding is aligned with active and reflective learning (Fredricks et al., 2004; Freeman et al., 2014). Banihashem et al. (2022) found that constructivist learning environments, when combined with analytics-based scaffolding, significantly enhance self-regulated learning and deeper cognitive processing. Similarly, Kong (2021) argued that experiential and scaffolded learning environments increase student motivation and cognitive effort. Moreover, Sökmen (2021) highlighted that students with higher cognitive engagement levels exhibit greater academic self-efficacy, particularly when supported by structured learning strategies. These findings affirm the role of scaffolding in promoting meaningful engagement and critical thinking, though they also highlight the need to address student-faculty relational dynamics for holistic cognitive development.

Table 2.3. Mean and Standard Deviation on the Level of Engagement of the Respondents After the Utilization of the Scaffolding Strategy in Terms of Emotional

	Mean	Std. Deviation	Verbal Interpretation
1. I am including diverse perspectives in class discussions or writing assignments.	2.71	0.85	Agree
2. I am working with other students on projects.	3.18	0.73	Agree
3. I am working with classmates to prepare class assignments.	3.12	0.74	Agree
4. I am tutoring or teaching other students voluntarily.	2.78	0.81	Agree
5. I am participating in a community-based project as part of a regular subject.	2.44	0.92	Agree
6. I am desiring to learn everything during discussions.	3.43	0.63	Agree
7. I am confident that I can learn and do well in class.	3.21	0.66	Agree
8. I am having fun in class.	3.29	0.85	Agree
9. I am working with teachers on activities.	3.59	0.67	Agree
10. I am talking about career plans with a teacher or adviser.	2.96	0.87	Agree
EMOTIONAL	**3.07**	**0.46**	**Agree**

Legend: 3.50 - 4.00 = Strongly Agree 2.50 - 3.49 = Agree, 1.50 - 2.49 = Disagree 1.00 - 1.49 = Strongly Disagree

The responses indicate that the implementation of the scaffolding strategy has positively influenced students' emotional engagement in the learning process. Emotional engagement, which encompasses students' feelings of interest, belonging, enjoyment, and motivation in school activities, was evident through their expressions of enthusiasm, confidence, and involvement in both individual and collaborative classroom tasks. Students communicated that they found joy in participating in class and working with both peers and teachers. They reported a sense of excitement in learning and a willingness to immerse themselves in discussions and assignments, suggesting that the learning environment created by the scaffolding approach was not only intellectually stimulating but also emotionally fulfilling. Furthermore, the learners conveyed a sense of self-assurance in their academic capabilities, which can be interpreted as a positive internal emotional response to the Support they received through scaffolded learning. The collaborative nature of their interactions, working together on projects, preparing assignments as a team, and voluntarily helping classmates, reflects a strong sense of emotional investment in the academic community. However, despite this generally high level of emotional engagement, students appeared to be less emotionally involved in activities that extended beyond the classroom, particularly those related to community-based projects. This suggests that while emotional engagement within the structured academic setting was well-supported, opportunities to foster emotional connections in broader, real-world contexts may have been limited or underutilized.

The emotionally engaged responses of the students have several implications for both instructional design and pedagogical practice. Emotional engagement is critical for meaningful and sustained learning because it shapes students' attitudes toward their academic journey, influences their willingness to participate, and strengthens their personal connection to what they are learning. The findings suggest that the scaffolding strategy succeeded in cultivating a positive emotional climate in the classroom, one where learners felt motivated, valued, and supported. This type of environment encourages students to embrace challenges, express themselves confidently, and form healthy academic relationships, all of which are essential for developing lifelong learning habits. The sense of collaboration, enjoyment, and emotional safety created by scaffolding can also contribute to reduced academic anxiety and increased classroom satisfaction. However, the limited emotional engagement in community-based learning activities raises a concern. It may reflect a gap between academic instruction and real-world application, or a lack of connection between school content and students' lived experiences. If learning remains confined to classroom boundaries, students might miss the opportunity to develop a deeper sense of purpose and social responsibility. This highlights the need to design more integrated and experiential learning activities that connect academic content with community issues, encouraging students to emotionally invest not only in school tasks but also in real-world problems. Doing so may deepen their sense of empathy, agency, and motivation beyond the traditional classroom.

The observed pattern of emotional engagement aligns with a growing body of educational research that emphasizes the affective domain as a cornerstone of effective learning. Fredricks, Blumenfeld, and Paris (2004) define emotional engagement as students' positive and negative reactions to teachers, classmates, academics, and school, which influence their sense of belonging and overall motivation. According to this framework, emotionally engaged students are more likely to enjoy school, participate actively, and persevere through challenges—qualities that were evident in the students' responses following the scaffolding strategy. Sökmen (2021) further argues that emotional engagement is closely linked to students' perceptions of the learning environment and their belief in their own competence. When students feel emotionally

supported by teachers and encouraged to express themselves, their engagement deepens. In the present context, the students' expressions of enjoyment and confidence may be attributed to the structured yet flexible Support provided by scaffolding, which has been known to increase both engagement and academic resilience (Banihashem et al., 2022). Wong and Liem (2022) also underscore the importance of emotional engagement in fostering intrinsic motivation, noting that emotionally invested students are more likely to find meaning in what they learn and take initiative in the learning process. Additionally, Bradley, Ferguson, and Zimmer-Gembeck (2021) emphasize the role of strong peer and teacher relationships in building a sense of connectedness, which supports both emotional well-being and academic achievement. These findings suggest that strategies like scaffolding, which promote interpersonal interaction and personalized Support, are not only effective in improving cognitive outcomes but also play a crucial role in nurturing students' emotional connection to their education.

Table 2.4. Mean and Standard Deviation of the Composite Table on the Level of Engagement of the Respondents After the Utilization of the Scaffolding Strategy

	Mean	Std. Deviation	Verbal Interpretation
Behavioral	3.11	0.35	Agree
Cognitive	2.88	0.43	Agree
Emotional	3.07	0.46	Agree
Level of Students' Engagement	**3.02**	**0.34**	**Agree**

Legend: 3.50 - 4.00 = Strongly Agree 2.50 - 3.49 = Agree, 1.50 - 2.49 = Disagree 1.00 - 1.49 = Strongly Disagree

The data in Table 2.4 reveal that the overall level of student engagement after the implementation of the scaffolding strategy falls under the "Agree" category, with a composite mean of 3.02 and a standard deviation of 0.34. Disaggregated across the three dimensions of engagement: behavioral, emotional, and cognitive. All aspects show moderately high levels of engagement, with behavioral engagement ranking highest. This suggests that students responded positively to scaffolded instruction, particularly in terms of their participation in class activities, adherence to academic responsibilities, and emotional investment in learning. However, cognitive engagement showed the lowest mean, which may indicate that while students were behaviorally and emotionally involved, deeper levels of critical thinking, strategic learning, and intellectual effort may still require further development. These results suggest that scaffolding had a substantial impact on engagement, though there is room for further enhancement, especially in promoting higher-order thinking skills.

The findings suggest that the use of scaffolding strategies had a meaningful influence on student engagement across all dimensions, affirming its role as a catalyst for active learning. The relatively high behavioral and emotional engagement scores point to an environment where students felt supported, motivated, and connected to the learning process. This is likely due to scaffolded methods that gradually released responsibility to learners while maintaining guidance and feedback throughout the learning experience. However, the slightly lower cognitive engagement score indicates the need for sustained focus on tasks that challenge students intellectually, such as problem-solving, reflective thinking, and knowledge transfer. Educators should continue refining their scaffolded instruction by incorporating strategies like inquiry-based learning, metacognitive prompts, and collaborative problem-solving to elevate students' cognitive involvement. This aligns with the broader view that learning engagement is not a static construct but a dynamic interplay of behavior, emotion, and cognition (Wong & Liem, 2022). Ensuring that all three dimensions are holistically addressed will Support not only academic achievement but also learner autonomy, resilience, and long-term.

The results of this study are consistent with a body of research emphasizing the effectiveness of scaffolded instruction in improving multidimensional student engagement. According to Fredricks, Blumenfeld, and Paris (2004), engagement is a multidimensional construct encompassing behavioral, emotional, and cognitive involvement in learning activities. The high behavioral scores observed align with Almusaed et al. (2023), who emphasized that scaffolded and adaptive learning environments enhance behavioral participation by offering structured and supportive contexts. Likewise, Sökmen (2021) noted that scaffolded learning environments promote student self-efficacy, which in turn increases emotional and cognitive engagement. The emotional investment shown by students may also reflect a heightened sense of school connectedness, a factor supported by Bradley et al. (2021) as essential for student motivation and persistence. Moreover, the need to improve cognitive engagement aligns with findings by Banihashem et al. (2022), who asserted that constructivist and scaffolded learning designs significantly enhance student self-regulation and deeper cognitive processing when implemented with intentional learning analytics. In addition, Acosta-Gonzaga (2023) emphasized that students with higher self-esteem and academic engagement outcomes, often associated with well-executed scaffolding, tend to perform better academically. The observed results also echo Awaludin et al. (2020), who demonstrated that combining scaffolding with strategies to increase self-efficacy leads to improved cognitive and behavioral outcomes. Thus, the findings affirm that scaffolded strategies, when designed to meet students at their current level of development and gradually challenge them, can positively influence all aspects of student engagement.

Problem number 3. What is the Extent of motivation of the respondents after utilization of the scaffolding strategy in terms of self-efficacy, active learning strategies, science learning value, performance goal, achievement goal, and learning environment stimulation?

As indicated in Table 3.1, the overall motivation of the respondents in terms of self-efficacy after the implementation of the scaffolding strategy was interpreted as "Motivated", with a mean of 3.15 and a standard deviation of 0.47. This suggests that students generally believed in their ability to learn science and succeed in related academic tasks. The highest-rated statement was *"Even if science work is challenging, I believe I can learn it"* with a mean of 3.43, indicating a strong belief in their capacity to overcome difficulties. Likewise, students

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expressed confidence in understanding science concepts and applying knowledge to new situations. However, the items with relatively lower means, such as *"I am capable of solving science-related problems on my own"* and *"I feel that I can do well on science tests"*, imply that some learners may still harbor doubts about their independent problem-solving abilities and performance in evaluative contexts. Nevertheless, all indicators remained within the "Motivated" range, showing a generally positive response to the scaffolded learning environment.

Table 3.1. *Mean and Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Terms of Self-efficacy*

	Mean	Std. Deviation	Verbal Interpretation
1. I believe I can succeed in learning science.	3.24	0.67	Motivated
2. I am confident in understanding science concepts taught in class.	3.29	0.65	Motivated
3. I can apply the knowledge I learn in science to new situations.	3.10	0.78	Motivated
4. I feel that I can do well on science tests.	2.96	0.66	Motivated
5. I am capable of solving science-related problems on my own.	2.87	0.77	Motivated
6. Even if science work is challenging, I believe I can learn it.	3.43	0.65	Motivated
Self-Efficacy	**3.15**	**0.47**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated
2.50 - 3.49 = Motivated, 1.50 -2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

These findings indicate that the scaffolding strategy played a significant role in fostering students' self-efficacy in science learning. The fact that students felt capable of learning even when tasks were difficult suggests that scaffolded instruction effectively provided the necessary Support structures, such as modeling, guided practice, and feedback, that gradually empowered learners to take more responsibility for their academic progress. The lower means on items related to test performance and independent problem-solving suggest that while students are becoming more confident, there is still a need to bolster their sense of competence in high-stakes and autonomous tasks. Teachers can further enhance students' self-efficacy by integrating mastery-oriented feedback, encouraging reflective learning, and designing learning experiences that progressively challenge students while maintaining Support. This aligns with the principles of Vygotsky's Zone of Proximal Development (ZPD), wherein scaffolded instruction helps learners move from assisted to independent competence. Enhancing self-efficacy not only improves motivation but also drives persistence, resilience, and willingness to engage in active learning and problem-solving tasks.

The observed increase in students' self-efficacy following the use of scaffolding strategies aligns with several studies in the literature. Aslam and Ali (2021) found that self-efficacy is a strong predictor of student achievement in science and that students who believe in their abilities are more likely to succeed academically. Similarly, Awaludin et al. (2020) demonstrated that combining scaffolding with strategies aimed at building self-efficacy leads to improved learning outcomes. The high rating on students' belief that they can learn even when science is challenging reflects what Sökmen (2021) described as the mediating role of self-efficacy between instructional environment and student engagement. Daley et al. (2025) also emphasized that students' academic self-efficacy, especially during periods of educational disruption, is closely tied to feelings of school connectedness, something that scaffolded instruction can foster.

Furthermore, Acosta-Gonzaga (2023) emphasized that self-esteem and academic engagement are crucial for student performance, reinforcing the idea that when students feel capable, they become more motivated and engaged. The lower scores on test confidence echo findings by Cavinato et al. (2021), who noted that students often require additional Support to transfer classroom confidence to high-pressure testing situations. Hence, this study supports the growing consensus that instructional scaffolding contributes meaningfully to the development of learners' self-belief, which in turn enhances their motivation and academic engagement.

Table 3.2. Mean and Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Terms of Active Learning Strategies

	Mean	Std. Deviation	Verbal Interpretation
1. When I do not understand a science concept, I try to find more information.	3.06	0.69	Motivated
2. I take the initiative to discuss science topics with my classmates.	2.54	0.82	Motivated
3. I ask my teacher questions when I do not understand something in science.	3.35	0.79	Motivated
4. I seek additional materials to help me learn science.	2.88	0.80	Motivated
5. I try different methods to solve science problems.	2.81	0.76	Motivated
6. I explore science topics beyond what is taught in class.	2.66	0.66	Motivated
Active Learning Strategies	**2.88**	**0.53**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated,
1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

The findings suggest that students displayed a strong sense of motivation in practicing active learning strategies following the implementation of the scaffolding approach. Many learners showed initiative by seeking help from their teacher when encountering difficult concepts, indicating that they were willing to take steps to clarify their understanding and overcome academic challenges. Some also demonstrated resourcefulness by exploring additional learning materials or researching topics that they found unclear, which is a sign of independent learning and increased academic ownership. However, it was also observed that fewer students engaged in peer discussions about science-related topics or pursued science learning outside the formal classroom setting. This indicates that although scaffolding encourages individual initiative and interaction with teachers, there may still be barriers when it comes to collaborative learning and self-driven exploration beyond the classroom. These limitations may be due to a lack

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of confidence in sharing ideas with peers or limited opportunities to apply knowledge in real-life scenarios.

The overall results imply that the scaffolding strategy created a learning environment that encouraged learners to be more involved in their academic development. By providing structured guidance and Support, the approach helped students feel more confident in asking questions and taking responsibility for their own learning, especially during difficult lessons. This aligns with the findings of Banihashem et al. (2022), who noted that structured learning environments promote engagement by making students feel more supported and capable.

Despite this progress, the relatively low engagement in peer collaboration and exploration outside of class suggests that educators still have a role in helping students expand their learning behaviors. Creating opportunities for group tasks, project-based learning, and reflective discussions can help students become more comfortable with sharing and co-constructing knowledge. Almusaed et al. (2023) emphasized the importance of encouraging both teacher and peer interaction in scaffolded environments to fully develop student motivation and engagement. Furthermore, Sökmen (2021) supports the idea that scaffolding enhances not only comprehension but also the social aspects of learning by encouraging communication and teamwork.

Additionally, fostering a sense of academic self-efficacy is crucial in sustaining motivation. According to Aslam and Ali (2021), students who believe in their ability to learn are more likely to participate actively and take initiative. Awaludin et al. (2020) also noted that scaffolding, when paired with self-efficacy development, leads to improved motivation and classroom participation. In this study, students appeared to benefit from the structured Support of scaffolding, but more effort is needed to strengthen their confidence in collaborative and self-initiated learning outside the classroom.

Table 3.3. Mean and Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Terms of Science Learning Value

	Mean	Std. Deviation	Verbal Interpretation
1. Learning science is important for my future.	3.60	0.67	Motivated
2. I think science is useful in daily life.	3.53	0.61	Motivated
3. I enjoy learning new things in science.	3.44	0.70	Motivated
4. I believe understanding science will help me in my career.	3.28	0.71	Motivated
5. Science helps me think critically and solve problems.	3.18	0.79	Motivated
6. Learning science is important for my future.	3.47	0.72	Motivated
Science Learning Value	**3.42**	**0.52**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated,
1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivate

The data reflect that students developed a strong sense of motivation in relation to the value they place on learning science after being exposed to the scaffolding strategy. Many students expressed an appreciation for science as a valuable subject, particularly in relation to their future goals, careers, and problem-solving skills. This suggests that learners began to perceive science not merely as a subject to be studied for compliance, but as a discipline that holds meaningful relevance in their personal and professional lives. Their enjoyment of learning new things in science further points to a shift in attitude, where curiosity and interest were nurtured. The implementation of scaffolding has positively influenced how students relate science learning to their everyday experiences and long-term aspirations.

The findings imply that scaffolded instruction helped students connect classroom concepts with real-world applications, deepening their appreciation for science. Through structured Support, learners may have gained clarity and confidence in their understanding, leading them to recognize science as not only intellectually stimulating but also practically beneficial. This change in perspective can empower learners to engage more actively in science-related tasks and sustain their interest over time. Teachers and curriculum planners are therefore encouraged to continue using scaffolding strategies that emphasize relevance, applicability, and student-centered inquiry, which can foster deeper motivation and long-term academic engagement.

These findings are supported by several studies emphasizing the link between motivation and the perceived value of learning. Acosta-Gonzaga (2023) found that when students see their learning as meaningful and relevant to their future, their self-esteem and engagement improve significantly. Similarly, Almusaed et al. (2023) highlighted the importance of integrating personalized and adaptive learning environments that help students see the real-world significance of academic content, particularly in hybrid and technology-enhanced settings. Attard et al. (2021) emphasized the value of inquiry-based and industry-connected STEM learning in increasing students' interest and motivation by making learning more authentic and connected to career pathways. Moreover, the study by Aslam and Ali (2021) demonstrated that students who develop self-efficacy in science are more likely to view the subject as important and applicable to their lives. This reinforces the idea that scaffolded learning environments, which promote clarity, Support, and relevance, can transform students' motivation by elevating their perception of science as both valuable and essential. Fredricks et al. (2004) further Support this by asserting that when students see purpose and personal value in what they are learning, they are more likely to invest effort and remain committed to the learning process.

The results from the data reveal that students were generally motivated by performance-related goals after the implementation of the scaffolding strategy. Learners demonstrated a strong desire to achieve good academic outcomes, particularly in science, as indicated by their expressed interest in attaining high grades and receiving recognition from teachers and parents. These indicators point to a learning environment where students valued achievement and external validation, aligning their efforts in science with the goal of performing well. While a number of students also noted that they compared their performance with others, the overall responses suggest that the competitive aspects of motivation,

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although present, were not dominant. The scaffolding strategy has created a framework where academic excellence was pursued through structured Support and individual progress rather than purely through outperforming peers.

Table 3.4. Meanand Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Termsof Performance Goal

	Mean	Std. Deviation	Verbal Interpretation
1. I want to get good grades in science.	3.81	0.47	Motivated
2. I work hard in science to get praise from my teacher or parents.	3.18	0.81	Motivated
3. I compare my science performance with my classmates.	2.13	0.96	Motivated
4. I feel successful when I perform better than others in science.	2.50	0.84	Motivated
Performance Goal	**2.90**	**0.51**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated,
1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

These findings imply that the scaffolding strategy contributed to fostering a motivational climate where students felt empowered to strive for success. The structured learning environment likely enabled them to set clear academic goals and feel competent in working toward them. This type of motivation, while partially extrinsic in nature, can serve as an entry point for sustained academic effort and resilience. When learners experience success in achieving short-term performance goals, they may develop the confidence needed to pursue deeper learning objectives. Educators may leverage this insight by continuing to implement scaffolded practices that recognize student achievements, provide timely feedback, and create opportunities for learners to feel accomplished in their academic journey. Encouraging both personal mastery and appropriate forms of performance motivation can help maintain students' drive and interest in science, especially when balanced with strategies that foster intrinsic motivation over time.

The findings in this section are well-aligned with existing literature on academic motivation and the role of scaffolded instruction in shaping performance-oriented goals. Aslam and Ali (2021) emphasize that self-efficacy significantly influences students' motivation to achieve academic success, particularly in science subjects, reinforcing the idea that students who feel capable are more likely to seek academic recognition and high performance. Similarly, Sökmen (2021) highlights that learning environments rich in structure and Support can lead to enhanced engagement by increasing learners' belief in their capabilities, which in turn boosts their performance-oriented goals. Fredricks et al. (2004) argue that student motivation often includes a blend of both intrinsic and extrinsic drivers, including the pursuit of academic success and validation, all of which are enhanced in well-scaffolded environments. Furthermore, the study by Acosta-Gonzaga (2023) found that academic engagement and self-esteem positively influence student performance, suggesting that when students receive the right Support, they are more likely to seek success as a form of academic identity. Almusaed et al. (2023) also note that scaffolded, adaptive, and personalized instruction helps students set and reach achievement-related goals by making learning both structured and responsive. Together, these studies validate the observed trend that scaffolded strategies can enhance students' motivation by reinforcing their orientation toward academic achievement and recognition.

Table 3.5. *Mean and Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Terms of Achievement Goal*

	Mean	Std. Deviation	Verbal Interpretation
1. I like challenging science problems that make me think deeply.	2.94	0.88	Motivated
2. I feel satisfied when I understand difficult science concepts.	3.16	0.70	Motivated
3. I enjoy learning science, even if it is difficult.	3.24	0.79	Motivated
4. I focus on truly understanding science, not just getting good grades.	3.12	0.84	Motivated
Achievement Goal	**3.11**	**0.62**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated,
1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

The responses gathered from students indicate that their motivation toward achievement goals was evident following the integration of the scaffolding strategy in science instruction. Learners expressed enjoyment in tackling complex scientific ideas, with many showing a preference for understanding concepts deeply rather than merely aiming for high scores. Their responses suggested that the learning experience encouraged perseverance and intellectual curiosity. The way students valued the process of learning science over the outcomes reflects a shift toward intrinsic forms of motivation. Even when the subject matter was perceived as difficult, students maintained their interest and commitment. This suggests that scaffolded instruction helped foster a mindset focused on mastery and personal growth rather than on external rewards alone. The structured Support offered through this approach empowered students to take on academic challenges with more confidence, leading to a learning environment where perseverance, cognitive engagement, and intrinsic satisfaction became prominent motivational drivers.

These findings imply that the application of scaffolding strategies can effectively nurture achievement-oriented motivation among learners. When students are provided with consistent guidance, appropriate challenges, and timely feedback, they are more likely to embrace difficult tasks and engage in learning for the sake of understanding. The presence of this type of motivation is essential in cultivating lifelong learners who are not deterred by academic difficulty but are instead motivated by the opportunity to grow intellectually. Educators should therefore consider maintaining and refining their use of scaffolded instructional practices to help learners build confidence in their abilities, leading them to pursue learning goals that are self-determined and mastery-focused. A learning environment that values effort, exploration, and

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comprehension over mere performance not only strengthens academic skills but also contributes to learners' overall development. As motivation shifts toward the achievement of understanding and self-improvement, students are better equipped to sustain their engagement even in the face of academic adversity.

These observations are strongly supported by prior research on the positive impact of scaffolding on student motivation and learning behaviors. Aslam and Ali (2021) emphasize that when students believe in their own capacity to succeed, especially in science, they become more motivated to seek mastery and pursue academic challenges with enthusiasm. Sökmen (2021) also points out that the learning environment plays a crucial role in fostering student engagement, particularly when it enhances self-efficacy and autonomy, both of which are integral to achievement-oriented goals. The work of Banihashem et al. (2022) further affirms that structured and constructivist learning designs, like scaffolding, improve self-regulation and engagement, thus reinforcing intrinsic motivation in students. Additionally, the study by Acosta-Gonzaga (2023) highlights that academic motivation and self-esteem are closely linked with student performance, suggesting that when learners feel supported and capable, they become more motivated to achieve through learning rather than through external validation. Almusaed et al. (2023) also advocate for the use of adaptive instructional strategies to increase student motivation, especially in hybrid learning environments, showing that when learning is personalized and supportive, it leads to increased academic persistence. Collectively, these studies validate the significant role scaffolding plays in encouraging students to adopt achievement goals centered on understanding, persistence, and self-improvement.

Table 3.6. *Mean and Standard Deviation on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy in Terms of Learning Environment Stimulation*

	Mean	Std. Deviation	Verbal Interpretation
1. My science teacher encourages me to ask questions.	3.50	0.68	Motivated
2. My science teacher creates an interesting and engaging learning environment.	3.44	0.72	Motivated
3. I feel motivated to learn science because of how my teacher presents lessons.	3.53	0.72	Motivated
4. My classroom provides hands-on activities that make science exciting.	3.32	0.68	Motivated
5. My classmates support and encourage me in learning science.	2.94	0.84	Motivated
Learning Environment Stimulation	**3.35**	**0.55**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated, 1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

The responses from students revealed that the learning environment shaped by the scaffolding strategy had a considerable impact on their motivation to engage with science lessons. The classroom became a space where curiosity and participation were encouraged, particularly through the teacher's approach to lesson delivery and student interaction. Learners expressed feeling more interested and excited about science because their teacher created an atmosphere that was stimulating and supportive. Hands-on activities played a role in enhancing their learning experience, making lessons feel more relevant and interactive. Moreover, the encouragement to ask questions fostered a culture of inquiry, which made students feel more involved in their learning. While peer Support was perceived slightly less favorably, students still recognized their classmates as contributors to a motivating environment. Overall, the presence of a responsive and well-structured classroom setup contributed positively to students' willingness to learn, suggesting that the scaffolding strategy transformed the learning space into one that nurtures exploration, collaboration, and engagement.

These observations suggest that when teachers thoughtfully design learning environments that are emotionally and intellectually stimulating, students are more likely to exhibit stronger motivation toward academic tasks. The use of scaffolding enabled educators to create a climate where students felt valued, capable, and involved, all of which are essential for fostering intrinsic motivation. A well-supported classroom that incorporates guided questioning, active engagement, and encouragement from both teachers and peers serves as a fertile ground for meaningful learning. Although peer influence appeared slightly less impactful, the overall environment remained conducive to learning due to the teacher's strong facilitative role. Educators should therefore continue implementing scaffolded strategies that emphasize interaction, student voice, and structured exploration. This approach not only makes academic content more accessible but also promotes a sense of belonging and confidence among students. By cultivating an environment where learners feel safe to participate and explore, teachers can empower students to develop a deeper connection to the subject matter and take greater ownership of their learning journey.

This pattern of findings aligns with several studies emphasizing the role of a stimulating learning environment in shaping student motivation. Sökmen (2021) highlighted that a well-structured classroom atmosphere enhances students' self-efficacy and engagement, which in turn contributes to sustained academic motivation. Banihashem et al. (2022) also demonstrated that a constructivist classroom supported by scaffolded instruction can improve learners' self-regulation and overall involvement in the learning process. Similarly, El-Sabagh (2021) emphasized that adaptive and interactive learning settings based on students' needs significantly enhance engagement by making learning more enjoyable and personalized. According to Attard et al. (2021), inquiry-based environments that encourage student questioning and exploration increase enthusiasm toward STEM learning and create a sense of relevance for the learner.

Furthermore, Acosta-Gonzaga (2023) noted that motivation and academic performance are closely tied to students' perceptions of the classroom climate, particularly when it encourages active participation and values student input. The positive influence of teacher behavior and peer collaboration on engagement is also supported by Bradley et al. (2021), who

emphasized that social connectedness and emotional Support within the classroom are key drivers of academic motivation and achievement. These collective insights affirm that the positive outcomes observed in the present study are rooted in the transformative power of scaffolded learning environments designed to spark student interest and encourage academic perseverance.

Table 3.7. Mean and Standard Deviation on the Composite table on the Extent of Motivation of the Respondents After Utilization of the Scaffolding Strategy

	Mean	Std. Deviation	Verbal Interpretation
Self-Efficacy	3.15	0.47	Motivated
Active Learning Strategies	2.88	0.53	Motivated
Science Learning Value	3.42	0.52	Motivated
Performance Goal	2.90	0.51	Motivated
Achievement Goal	3.11	0.62	Motivated
Learning Environment Stimulation	3.35	0.55	Motivated
Students' Motivation in Learning Science	**3.14**	**0.42**	**Motivated**

Legend: 3.50 - 4.00 = Highly Motivated 2.50 - 3.49 = Motivated, 1.50 - 2.49 = Fairly Motivated
1.00 - 1.49 = Not Motivated

The data gathered from the composite table reveals that students exhibited a generally positive level of motivation after experiencing the scaffolding strategy in their science classes. Students demonstrated a consistent sense of purpose and enthusiasm across multiple motivational domains such as self-efficacy, value placed on science learning, and stimulation from the learning environment. They appeared more willing to engage in science-related tasks, put in effort to understand difficult concepts, and participate in classroom activities. The instructional approach, which included gradual release of responsibility, guided Support, and active feedback, likely played a vital role in shaping their positive attitude. Learners appeared to perceive science as more valuable and engaging, which in turn fostered their willingness to achieve both performance and learning goals. While there was variation in the strength of motivational indicators, all dimensions reflected a general readiness to pursue academic success in science under scaffolded conditions. This suggests that when learners are provided with timely assistance, meaningful interactions, and cognitively stimulating experiences, their internal drive to learn is significantly enhanced.

These results imply that the use of scaffolded instruction had a meaningful impact on how students viewed themselves as learners and how they approached the subject of science. The improvement in motivational dimensions such as self-efficacy and value orientation indicates that students not only felt more capable of learning science but also found greater meaning and relevance in what they were learning. The learning environment, shaped by structured Support and encouragement, cultivated a more motivating atmosphere where learners felt safe to explore, question, and participate. This positive shift in mindset points to the critical importance of designing classroom experiences that Support both the emotional and cognitive aspects of learning. Educators are encouraged to consistently apply differentiated scaffolding techniques to strengthen students' belief in their academic abilities and to nurture a sense of autonomy, competence, and relatedness. When students are guided through learning processes in ways that consider their individual needs and challenges, their motivation to learn deepens. Therefore, the continued integration of scaffolded strategies could play a crucial role in shaping long-term academic interest, especially in subjects like science, which often require persistence, curiosity, and critical thinking.

These findings are strongly supported by previous research highlighting the role of scaffolding and structured instructional methods in enhancing student motivation. Sökmen (2021) emphasized that a supportive and well-designed learning environment significantly influences self-efficacy, which in turn fuels motivation and engagement. The study by Acosta-Gonzaga (2023) further confirmed that motivation and academic engagement are closely linked to students' confidence in their abilities, especially when they feel supported and valued in the classroom. In addition, Banihashem et al. (2022) pointed out that the use of constructivist and scaffolded approaches can improve students' self-regulation and engagement by providing meaningful and personalized learning opportunities. The importance of emotional and cognitive stimulation in the learning environment is also highlighted by El-Sabagh (2021), who noted that adaptive instructional techniques lead to greater motivation through enhanced learner interaction and content relevance. Almusaed et al. (2023) similarly argued that scaffolded and technology-enhanced methods promote deeper engagement by creating accessible and responsive learning experiences. Attard et al. (2021) emphasized that motivation in STEM education is strengthened when students participate in inquiry-based learning environments where curiosity and active involvement are encouraged. Finally, Aslam and Ali (2021) underscored the relationship between self-efficacy and achievement, indicating that when students believe in their capacity to succeed, they are more likely to stay motivated and perform well. Taken together, these scholarly insights reinforce the present study's conclusion that scaffolding plays an essential role in cultivating a learning environment that drives student motivation, confidence, and sustained academic effort.

Problem number 4. Is there a significant difference between the performance of the students before and after the exposure to the scaffolding strategy?

Table 4. *T-test on Significant Difference Between the Performance of the Students Before and After the Exposure to the Scaffolding Strategy*

	t	df	Sig. (2-tailed)	Decision	Remarks
Post-Test - Pre-Test	14.173	67	0.000	Reject	Significant

The findings from this table clearly reveal a marked improvement in student performance following the implementation of the scaffolding strategy. A comparison of students' academic outputs prior to and after the intervention demonstrates a noticeable shift, indicating that the scaffolded instruction had a meaningful effect on learners' comprehension and mastery of science concepts. Students were better able to engage with content, complete assessments with greater accuracy, and apply what they had learned in more thoughtful and organized ways. This observed difference points to the effectiveness of the scaffolded learning process in not only

facilitating deeper understanding but also enhancing students' ability to retain and apply knowledge. The guided approach provided learners with cognitive tools and structured assistance that helped reduce the complexity of difficult concepts, thus enabling them to perform better once they reached independent tasks. This transition from supported to autonomous learning represents a key developmental gain that is clearly reflected in their post-intervention academic performance.

The outcome of this analysis suggests that scaffolded instruction significantly enhances students' academic capabilities in science. The instructional shift from traditional, teacher-centered delivery to one that gradually transfers responsibility to the learner is more effective in promoting conceptual understanding and performance. As learners become increasingly engaged and confident in their abilities through carefully structured tasks and Support, their academic results improve. This implies that schools and educators must reconsider the structure of their instructional practices, especially in subjects that demand analytical thinking and problem-solving. Incorporating scaffolding not only supports immediate academic tasks but also builds long-term learning competencies by promoting self-regulation, persistence, and intellectual independence. In classroom practice, this could mean designing lessons that provide various forms of Support such as modeling, questioning, formative feedback, and peer collaboration. These strategies help sustain engagement and ensure students gradually build the skills necessary for success beyond the classroom.

This positive impact of scaffolding aligns with a growing body of literature emphasizing the benefits of structured Support systems on academic performance. Acosta-Gonzaga (2023) asserts that students who feel emotionally and academically supported tend to perform better due to enhanced engagement and self-esteem. Similarly, Aslam and Ali (2021) highlight the vital role of self-efficacy in science learning, emphasizing that students who believe in their capacity to succeed are more likely to perform effectively. Sökmen (2021) further explains that scaffolded learning environments increase student engagement by strengthening their belief in their own competence, which translates into higher achievement. The effectiveness of scaffolding is also reinforced by Banihashem et al. (2022), who demonstrate that constructivist learning environments incorporating structured Support result in improved student self-regulation and performance.

Additionally, Freeman et al. (2014) in their meta-analysis confirmed that active learning methods that share features with scaffolding substantially improve academic outcomes and reduce failure rates. Almusaed et al. (2023) also highlight that adaptive instructional technologies, often aligned with scaffolding principles, boost student engagement and performance in hybrid and digital settings. These studies collectively Support the assertion that the significant improvement observed in students' performance after the implementation of scaffolding is not only valid but grounded in a well-established pedagogical framework that prioritizes student growth, engagement, and achievement.

Problem number 5. Is there a significant difference in the level of engagement and the performance of the respondents as revealed in their post-test scores?

Table 5. T-test on Significant Difference in the Level of Engagement and the Performance of the Respondents as Revealed in Their Post-test Scores

	t	df	Sig. (2-tailed)	Decision	Remarks
Level of Students' Engagement - Pre-Test	-8.879	67	0.000	Reject	Significant

The results reveal a notable difference in the level of student engagement and their academic performance, as measured in their post-test scores. The data suggest that students who demonstrated higher levels of engagement after the intervention also exhibited improved academic performance. This outcome indicates a consistent relationship between how involved students are in the learning process and the quality of their academic outputs. The results affirm that engagement plays a critical role in shaping how students respond to instructional strategies, particularly those designed to be more interactive and student-centered. When learners become more attentive, participative, and emotionally invested in their educational experience, the likelihood of achieving better academic outcomes increases substantially.

This finding carries meaningful implications for both teaching practice and educational design. Enhancing students' engagement should be a central focus in classroom instruction and curriculum planning. If students are given opportunities to actively participate, express ideas, and connect lessons to real-life contexts, their performance improves. Teachers and institutions can leverage this by incorporating more collaborative, hands-on, and inquiry-based strategies into their lessons to maintain high engagement levels. Engagement acts not merely as a motivational variable but as an academic catalyst that helps unlock student potential and promotes deeper cognitive processing. Therefore, fostering an environment that cultivates interest, relevance, and agency among students is essential for academic development and overall learner success.

This result is supported by existing literature emphasizing the positive correlation between student engagement and academic achievement. According to Fredricks, Blumenfeld, and Paris (2004), engagement involves behavioral, emotional, and cognitive components that work together to affect learning results. Similarly, Schnitzler, Holzberger, and Seidel (2021) argued that various patterns of engagement relate significantly to students' self-concept and achievement. The role of engagement is further emphasized in the study by Wong and Liem (2022), who highlighted that student engagement serves as a cornerstone for educational success and must be addressed both theoretically and practically. Moreover, Banihashem et al. (2022) found that learning designs grounded in constructivism, which naturally foster engagement, result in better student regulation and achievement. Collectively, these studies reinforce the current findings and validate the notion that student engagement is an indispensable factor in promoting academic performance.

Problem number 6. Is there a significant difference in the Extent of motivation and the performance of the respondents as revealed in their post-test scores?

Table 6. *T-test on Significant difference in the Extent of Motivation and the Performance of the Respondents as Revealed in Their Post-test Scores*

	t	df	Sig. (2-tailed)	Decision	Remarks
Students' Motivation in Learning Science - Pre-Test	-8.292	67	0.000	Reject	Significant

The results of the comparison between the respondents' Extent of motivation and their corresponding performance in the post-test revealed a marked distinction. The data suggest that there is a meaningful relationship between the level of motivation students possess and their academic outcomes in science learning. This observed difference reflects that learners who demonstrated higher motivation during the instructional phase were more likely to achieve improved post-test performance. The analysis indicates that motivation plays a pivotal role in enhancing learners' ability to understand, retain, and apply concepts in science, emphasizing its influence on their overall academic success.

This outcome carries significant implications for science educators and curriculum designers. Since the level of motivation distinctly influences students' performance, it becomes essential to cultivate motivational strategies within the learning environment. Educators must incorporate methods that foster students' intrinsic and extrinsic motivation, such as goal-setting activities, interactive instructional materials, and collaborative learning structures. The result also implies that creating a classroom culture that recognizes effort, encourages persistence, and supports autonomy can lead to better academic results. Recognizing the role of motivation not only supports academic outcomes but also contributes to the development of learners' positive attitudes and long-term interest in science education.

Supporting literature reinforces the critical role of motivation in academic achievement. Aslam and Ali (2021) underscore that students with higher levels of self-efficacy and motivation tend to perform better academically, particularly in science-related disciplines. Similarly, Sökmen (2021) discusses the mediating effect of self-efficacy and motivation between the learning environment and student engagement, indicating that motivated students are more likely to be actively involved in learning activities. Moreover, Zhang et al. (2021) argue that adaptability and academic emotions, closely tied to motivation, significantly contribute to students' engagement and academic success. The findings also align with the assertions of Travers et al. (2020), who found that goal-oriented behaviors and motivational strategies directly enhance performance, suggesting that when students are driven by clear objectives and supported by motivating contexts, they are more likely to excel.

Problem number 7. Based on the findings of the study, what action plan may be proposed?

Scaffolded Science: A Pathway to Motivated and Engaged

Rationale: Based on the findings of the study, the study highlights that motivation and engagement are vital in science learning, as they shape students' willingness to participate and their ability to retain and apply knowledge. Yet, many Grade 8 learners struggle to sustain these qualities when transitioning from concrete, hands-on concepts to more abstract, theory-based lessons. Scaffolding offers an effective approach by providing structured Support that gradually decreases as students develop mastery, confidence, and independence. Through strategies like guided questioning, demonstrations, peer collaboration, and feedback, scaffolding makes science more accessible while building problem-solving and critical-thinking skills.

V. Summary of Findings, Conclusions, and Recommendations

This chapter presents the summary of findings, conclusions, and recommendations organized per identified problem. The study of analytical thinking skills and student engagement in learning science served as the basis for an action plan. Summarizing the study's outcomes using the prescribed methodologies, the findings can be outlined as follows:

Summarizing the study's outcomes using the prescribed methodologies, the findings can be outlined as follows:

After being exposed to scaffolding techniques, students' performance improved noticeably between the pre-test and post-test.

1. The average post-test scores increased substantially compared to pre-test scores, indicating enhanced comprehension and mastery of science concepts. This improvement suggests that scaffolded instruction effectively supported students in building foundational knowledge and applying it independently. The performance data demonstrate that when students receive structured guidance, they are more likely to succeed in assessments requiring critical and analytical thinking.
2. Students showed a generally high level of engagement, behavioral, cognitive, and emotional after the implementation of scaffolding strategies. Learners exhibited consistent attendance, task completion, and active collaboration, pointing to increased behavioral engagement. Their responses also reflected deeper emotional investment and cognitive involvement, as they expressed interest in class discussions and real-world application of science topics. While engagement was strongest in behavioral aspects, cognitive engagement showed room for improvement, particularly in promoting out-of-class academic exploration.

3. Students were highly motivated, particularly in self-efficacy, science learning value, and achievement goals, following scaffolded instruction.

Learners expressed confidence in their ability to learn science, even when tasks were difficult, and reported greater appreciation for the subject's relevance to their future goals. The results also showed that students became more goal-oriented and driven to succeed in both performance and mastery-based objectives. However, motivation levels related to peer collaboration and exploration outside class were lower, indicating potential areas for enrichment.

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4. There was a statistically significant difference in student performance before and after scaffolded instruction, indicating the effectiveness of the strategy.

The shift from lower pre-test scores to higher post-test results affirms the direct influence of scaffolding on learning outcomes. Students demonstrated improved comprehension, greater accuracy in assessments, and the ability to complete tasks independently after Support was gradually reduced. This positive difference supports the argument that scaffolded teaching is more impactful than traditional, teacher-centered methods.

5.Post-test results showed a positive correlation between student engagement and academic performance.

Students who were more behaviorally and emotionally engaged tended to perform better academically, particularly in areas involving concept application and analysis. The findings confirm that engagement is not just a byproduct of learning but a key contributor to it. High engagement levels created a dynamic learning environment where students were more motivated, focused, and persistent in overcoming academic challenges.

6. There was a significant difference between students' motivation levels and their post-test performance, indicating motivation's impact on achievement. Motivated students, especially those with high self-efficacy and personal value for science, outperformed their less motivated peers. These students were more willing to exert effort, seek help, and participate in class, which enhanced their academic results. This demonstrates that motivation functions as both a driver and a predictor of academic success in science.

VI. Conclusion

1. Scaffolding strategies effectively improve students' understanding of scientific concepts, as reflected in the increase in test performance. When instruction is structured around modeling, guided practice, and feedback, students are better equipped to internalize and apply knowledge. This approach allows learners to progress from supported tasks to independent problem-solving more confidently. Scaffolding transforms science instruction into a more accessible and personalized learning experience.

2. Scaffolded instruction fosters multidimensional student engagement, particularly in attendance, task completion, collaboration, and emotional investment.

Students were more present, involved, and invested in their learning when provided with scaffolded Support. The consistent participation and emotional connection to classroom activities reflect the positive learning environment created by this method. However, further steps are needed to enhance cognitive engagement beyond classroom walls.

3. Motivation levels, especially self-efficacy and the perceived value of science, are enhanced through structured and supportive teaching approaches. When students feel capable and recognize the importance of science in real life, they become more motivated to learn. The scaffolding strategy helped instill this belief by breaking down complex tasks and offering meaningful challenges. Such motivation drives students to take responsibility for their learning and persist through academic difficulties.

4. Scaffolding significantly increases academic performance, confirming the need for instructional methods that gradually transfer responsibility to learners. By shifting from teacher-led instruction to student-centered learning, students become more autonomous and competent. The gradual release of responsibility allows them to develop problem-solving skills essential for academic success. This model encourages lifelong learning habits and supports continuous intellectual growth.

5.Higher student engagement is closely linked to better academic performance, underscoring engagement as a core element of effective science instruction. Students who are emotionally and behaviorally connected to their lessons are more likely to retain information and perform well in assessments. This relationship highlights the need to sustain high levels of engagement throughout instruction. Engagement is not simply about participation—it's about meaningful interaction with the content and the learning community.

6.Student motivation plays a crucial role in academic achievement, highlighting the importance of addressing both emotional and cognitive needs in science education. Students with strong motivation show resilience, initiative, and a willingness to tackle difficult content. The learning environment, shaped by scaffolding, can nurture this motivation by providing encouragement, relevance, and challenge. Addressing these motivational factors is essential to improving performance and cultivating curiosity in science.

VII. Recommendations

Based on the conclusions of the study, the following recommendations are offered:

1. Integrate scaffolded learning techniques across all science topics to improve students' analytical thinking and academic performance. Science teachers should incorporate strategies such as modeling, guided questioning, and think-alouds to Support student understanding. Gradually decreasing Support as learners gain confidence ensures that they can tackle complex content independently. This approach should be part of both lesson planning and classroom delivery to enhance long-term learning outcomes.
2. Encourage more interactive and collaborative classroom strategies to promote active participation and deepen behavioral, emotional, and cognitive engagement. Activities like group experiments, peer tutoring, and reflective discussions can bridge the gap between passive listening and active learning. Teachers should provide opportunities for students to engage with peers and content in meaningful ways. These interactions will also promote confidence and social-emotional skills necessary for lifelong learning.
3. Design lessons that build student motivation by linking science content to real-life applications, career pathways, and personal goals. Making science relevant to students' everyday experiences helps them see its value and importance. Teachers can use project-based learning, community issues, or industry-related case studies to make lessons more engaging. This real-world connection

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increases curiosity and helps students invest more in their learning.

4. Provide professional development for teachers on scaffolded instruction and differentiated teaching practices to Support diverse learners. Training should focus on how to apply scaffolding techniques effectively in various classroom settings. Teachers must acquire the ability to evaluate students' requirements and customize support according to their readiness and learning preferences. Continuous mentoring and cooperation will guarantee that best practices are maintained over time.
5. Develop continuous engagement monitoring tools (e.g., reflective journals, formative assessments) to align teaching strategies with student needs. Tracking student engagement regularly helps identify who needs additional Support and who is ready for more advanced challenges. Simple check-ins, quick writes, or student reflections can provide valuable insights into how learners are experiencing the lesson. This data can guide instructional decisions and foster a responsive classroom environment.
6. Incorporate motivation-enhancing activities like goal-setting, student-led inquiry, and recognition systems to sustain academic interest and achievement in science. Students thrive when they feel ownership over their goals and receive positive reinforcement for their progress. Teachers should design opportunities for learners to set personal learning targets, explore topics of interest, and celebrate milestones. These practices not only boost motivation but also contribute to self-regulation and persistence in learning.

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