WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Tailoring Classroom Behavioral Menus in Enhancing Science Learning Achievement

Dianne Cyrill B. Bautista, Dr. Elisa N. Chua*

Laguna State Polytechnic University – San Pablo City Campus, San Pablo City, Laguna, 4000, Philippines
Faculty, College of Teacher Education, Graduate Studies of Applied Research, Laguna State Polytechnic University – San Pablo City Campus, San Pablo City, Laguna, 4000, Philippines

A B S T R A C T

This study explored the impact of classroom behavioral and learning menus on Grade 8 students' science achievement, motivation, and behavior. Disruptive behavior in classrooms remains a challenge that affects learning, and there is limited research on how structured behavioral interventions like learning menus can improve academic performance and engagement in Science education. The main objective was to determine how classroom behavioral and learning menus influence students' science achievement, behavior, and motivation. A descriptive developmental research design was employed, involving 80 Grade 8 students from Recto Memorial National High School. Validated instruments included self-assessment and Likert-scale questionnaires, a metacognitive awareness inventory, behavior checklist, pre- and post-tests, and structured lesson plans integrating differentiated learning menus. Data were analyzed using descriptive statistics, Pearson's r, and paired t-tests to assess relationships and differences before and after the intervention. Results showed significant improvement in students' science literacy—particularly in scientific knowledge and process skills—between pre- and post-tests. Metacognitive awareness correlated with some aspects of science learning but not with understanding scientific context. Among various behavioral strategies, only the response cost technique showed a statistically significant relationship with science achievement. Motivation levels, however, did not show a significant change post-intervention. The study concludes that classroom behavioral and learning menus, along with metacognitive awareness strategies, can enhance science achievement. The response cost strategy emerged as an effective behavior management tool, and further research is encouraged to develop long-term interventions to sustain motivation and learning across diverse classrooms.

Keywords: classroom behavior menus, science education, metacognitive awareness, academic achievement

Introduction

Science education is described as a "creative education to foster the future needs of society" (Bayram-Jacobs, 2015). Scientific knowledge contributes to creating a more comfortable and functional environment and society, underscoring its importance in the modern world. Therefore, nurturing future scientists has become essential, with science education playing a critical role in this endeavor. It should cultivate individuals with a comprehensive understanding of scientific concepts, coupled with the skills and values to apply this knowledge ethically. While information, values, and qualifications are essential components of science education, assessments and qualifications serve as the bridge that integrates these elements. A primary goal of science education is to equip students with scientific knowledge and skills, enabling them to comprehend complex concepts and apply them to real-world problems (Ozkan,G. et.al 2021).

The K-12 (K to 12 Curriculum), introduced in the Philippines in 2013, is the most recent educational framework in the country. According to Roy Montebon (2014), students generally perceive the implementation of the new science curriculum as having a positive impact on their understanding of science concepts, acquisition of scientific skills, and development of scientific attitudes and values. Among the curriculum's objectives is enhancing values and attitude formation, a learning domain that students find particularly relevant (Sumardani 2021).

Additionally, students generally view their teachers as effectively implementing the K-12 curriculum. One interviewee noted that the curriculum expects Filipino teachers to deliver a high-quality teaching and learning process. For instance, teachers are expected to ensure that students master specific skills or concepts, such as those in chemistry, by the end of the lesson. This requires teachers to be knowledgeable and capable of presenting these concepts effectively. The focus on pedagogy underscores the importance of teachers' proficiency and competence in facilitating the learning process (Sumardani 2021).

Schools function as communities where it is important for every student to establish a meaningful connection with at least one adult. Positive behavior is thus viewed as a foundational element for effective learning. Nonetheless, behavior is multifaceted and often differs from one student to another.

Therefore, students' conduct within the school, their interactions with teachers and peers, and their responses to various activities and tasks illustrate the intricate nature of their experiences in the educational environment

Creemers Delamarre et al. (2021), along with researchers like Crone and Teddlie, and Oliver and Reschly, argue that preventing and managing disruptive behavior enhances student success by improving teaching effectiveness and maximizing learning opportunities. Often, teachers use a trial-and-error approach in their classrooms to refine their behavior management skills, which can negatively impact both the learning environment and the educational experience for teachers and students. Enhancing classroom behavior management (CBM) skills can help reduce negative interactions and foster better student learning.

Disruptive student behavior creates a classroom environment that hinders learning, reduces instructional time, and promotes negative peer interactions, posing a significant concern for schools. Research consistently shows that behavioral issues like classroom disruption are often linked to poor academic performance and low levels of school connectedness From an ecological standpoint, such disruption can be even more problematic. A classroom characterized by frequent negative behaviors risks normalizing these disruptions, potentially influencing otherwise well-behaved students to adopt similar behaviors While existing literature highlights the relationship between disruptive behavior and individual student factors like gender and race/ethnicity there is limited research on how classroom-level characteristics influence these behaviors (Pas, E. T., et.al. 2015)

When people go to a restaurant, they aim to find something on the menu that will satisfy their hunger. Similarly, when students enter a classroom, we hope they come with a strong desire to learn. Choice menus offer students a way to fulfill this learning desire by allowing them to select from various activities that interest them. At its simplest, a menu provides a list of options from which students can choose activities to demonstrate their learning. At its most advanced, it can be a detailed system where students earn points by completing different tasks aligned with Bloom's revised taxonomy. Additionally, these menus should include a "free choice" option for those students who prefer to tailor their learning experience to their specific interests (Westphal, 2021).

This study aimed to examine how behavior menus can be tailored to enhance students' performance in Science. Its objectives are to design and implement classroom behavior menus that foster positive behaviors and active engagement in science classes, explore the relationship between behavioral strategies and academic success, and provide insights into effective classroom management techniques aligned with the goals of Science education. However, a research gap exists due to the limited studies directly connecting the use of behavioral menus to measurable improvements in student achievement.

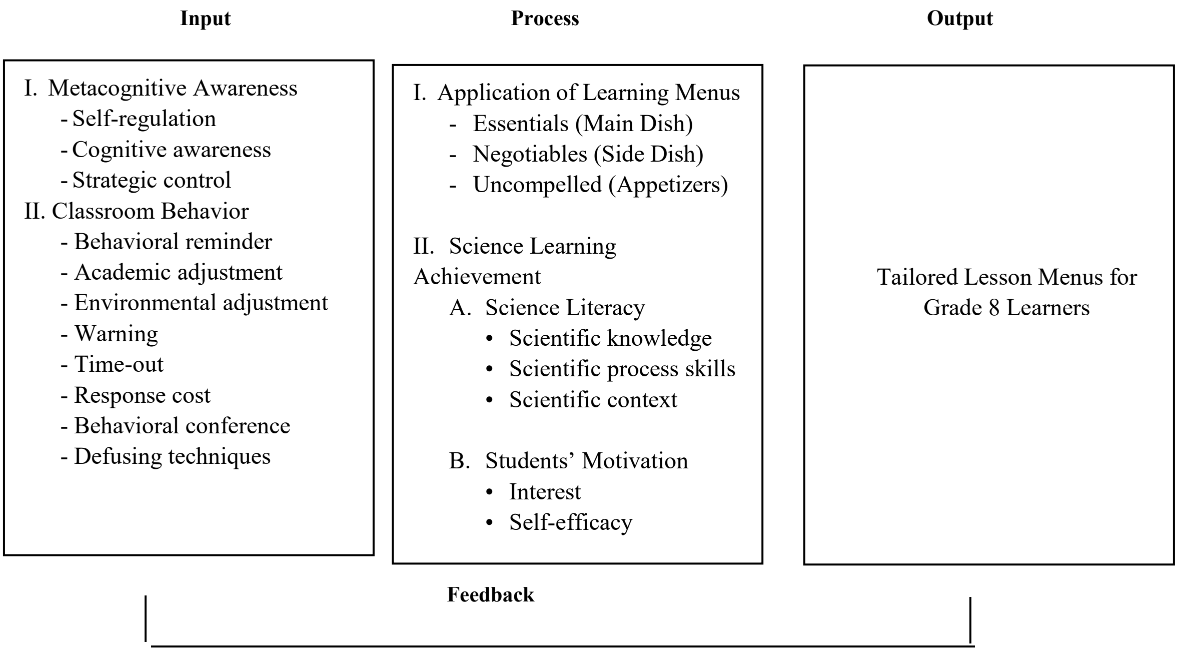

Figure 1: Research Framework

Research Problem

Specifically, this study aimed to answer the following questions:

1. How is the metacognitive awareness of the learners be described in terms of:

1.1 self-regulation;

1.2 cognitive awareness; and

1.3 strategic control?

2. To what extent is classroom behavioral menus practice by students as to:

2.1 behavioral reminder;

2.2 academic adjustment;

2.3 environmental adjustment;

2.4 warning;

2.5 time-out;

2.6 response cost;

2.7 behavioral conference; and

2.8 defusing techniques?

3. How does the science learning achievement be described as to students' science literacy in terms of:

3.1 scientific knowledge;

3.2 scientific process skills; and

3.3 scientific context?

4. What is the science learning achievement of the students be described as to students' motivation in terms of:

4.1 Interest; and

4.2 Self-efficacy?

5. Do Science Learning Achievement significantly related to:

5.1 metacognitive awareness; and

5.2 classroom behavior practices?

6. Is there a significant difference between the pre-and post-performance of the students' in Science Learning Achievement in terms of:

6.1 science literacy; and

6.2 motivation?

Materials and Methods

Descriptive developmental research design is a recognizable methodology in the educational and behavioral sciences. As it involves looking at individuals or groups of individuals over a period of time while not intervening and manipulating any independent variable (Fraenkel, Wallen, & Hyun, 2019). It is the method used in studying the relationship between behavior and learning menus in the classrooms for the purpose of improving science learning achievement to better understand how these factors develop and relate together over time for their influence on students.

The respondents of this study are Grade 8 students from Recto Memorial National High School, located in Quipot, Tiaong, Quezon. A total of 80 students participated, with 40 students from each of the two sections: 8-Garnet and 8-Emerald. Grade 8 students were chosen because they are at a key stage in their development—capable of grasping abstract ideas such as classroom management strategies and demonstrating emotional and social engagement in their learning. Their increasing independence and readiness for self-regulation make them well-suited to assess the impact of a learning and behavioral menu on their classroom behavior and science academic performance.

This study used multiple validated research instruments to assess the impact of classroom behavioral and learning menus on Science 8 students' learning and achievement. These included self-assessment and Likert-scale questionnaires to gather student reflections and perceptions, a metacognitive awareness inventory adapted from Palennari et al. (2018), and a behavior checklist to identify students needing support. A pre-survey on self-efficacy and motivation measured student confidence and engagement, while a structured lesson plan ensured consistent implementation. Pre- and post-tests were administered to evaluate learning gains in scientific knowledge and skills. All instruments were validated by the master teachers of Recto Memorial National High School, ensuring their relevance and appropriateness for the study.

The impact of classroom behavior and learning menus on Science 8 students' performance and participation was explored in this study. It began with tools to assess metacognitive ability, behavior patterns, prior knowledge, and motivation. During instruction, differentiated learning menus (essential, negotiable, and uncompelled activities) were used to address students' academic and behavioral needs. After each unit, students completed questionnaires to evaluate motivation and learning openness. A post-test measured knowledge, skills, and understanding. All data were organized and statistically analyzed to determine the relationship between learning menus, behavior, motivation, and academic performance.

The study used descriptive statistics (mean and standard deviation) to summarize data from Likert-scale questionnaires and self-assessments, capturing students' perceptions of classroom behavioral and learning menus and their impact on motivation and achievement. Motivation data came from self-reported responses, while achievement data were based on pre- and post-test scores assessing scientific knowledge, process skills, and contextual understanding. Pearson's r was used to analyze correlations among menu use, motivation levels, and achievement scores. A paired t-test compared pre- and post-test results to determine the intervention's impact on student performance in Science 8 at a 5% significance level.

Result and Discussions

Table 1. Metacognitive Awareness as to Self-Regulation

Indicators	$\bar{X}$	*SD*	*VI*
1. have control over how well I learn.	*3.93*	*1.08*	***A***
2. summarize what I've learned after I finish.	*3.91*	*1.00*	***A***
3. am aware of what strategies I use when I study.	*3.95*	*0.98*	***A***
4. find myself analyzing the usefulness of strategies while I study.	*3.80*	*0.82*	***A***
5. am a good judge of how well I understand something.	*3.78*	*0.93*	***A***
6. know when each strategy I use will be most effective.	*3.93*	*1.02*	***A***
7. ask myself how well I accomplish my goals once I'm finished.	*3.80*	*1.06*	***A***
8. draw pictures or diagrams to help me understand while learning	*3.59*	*1.18*	***A***
9. ask myself if I have considered all options after I solve a problem.	*3.55*	*1.11*	***A***
10. try to translate new information into my own words.	*3.93*	*1.04*	***A***
11. change strategies when I fail to understand.	*3.86*	*1.00*	***A***
12. use the organizational structure of the text to help me learn.	*4.01*	*0.95*	***A***
13. read instructions carefully before I begin a task.	*3.85*	*1.16*	***A***
14. ask myself if what I'm reading is related to what I already know.	*4.16*	*0.92*	***A***
15. reevaluate my assumptions when I get confused.	*3.76*	*0.92*	***A***
16. organize my time to best accomplish my goals.	*3.94*	*1.11*	***A***
17. learn more when I am interested in the topic.	*4.61*	*0.82*	***HA***
18. try to break studying down into smaller steps.	*3.83*	*0.98*	***A***
19. focus on overall meaning rather than specifics.	*3.76*	*0.98*	***A***
20. ask myself questions about how well I am doing while I am learning something new.	*3.83*	*1.17*	***A***
21. ask myself if I learned as much as I could have once, I finish a task.	*3.84*	*0.96*	***A***
22. stop and go back over new information that is not clear.	*4.06*	*0.99*	***A***
23. stop and reread when I get confused.	*4.31*	*0.94*	***A***
Overall	***3.91***	***1.03***	***A***

Scale: *4.50 – 5.00 Highly aware (HA), 3.50 – 4.49 Aware (A), 2.50 – 3.49 Moderately aware (MA), 1.50 – 2.49 Slightly aware (SA), 1.00 – 1.49 Unaware (U)*

Table 1 reveals that respondents are aware of metacognition in the context of self-regulation, with a mean score of 3.91 and a standard deviation of 1.03. Among the indicators, the highest mean score of 4.61 corresponds to item 17, which states that students learn more when they are interested in the topic. In contrast, the lowest mean score of 3.55 is on item 9, which reflects students' tendency to ask themselves whether they have explored all possible alternatives after solving a problem.

Self-regulation refers to the ability to monitor and control one's thoughts, feelings, and behaviors, especially in learning and problem-solving. This was measured during the implementation of learning menus, each aligned with specific components of metacognitive awareness. Following the administration of pre-tests and post-tests, a noticeable improvement in students' scores indicated a heightened interest and engagement in the subject. Activities that promoted self-regulation included answering true-or-false questions that guided students to plan their answers, check their progress, correct mistakes, manage time, and adjust strategies when necessary. Another task required students to create a labeled diagram of a shorthand notation, explain each part, and apply their understanding by analyzing two elements—encouraging independent thinking and deeper cognitive engagement.

Respondents showed a strong grasp of self-regulation, attributed to excellent teacher support, their application of metacognitive strategies, high academic motivation, a genuine desire to learn, and activities that encouraged reflection and strategic thinking. This provided valuable insight into how the learning menus fostered self-regulated learning. While the current approach effectively develops self-planning and self-monitoring skills, future instruction must prioritize critical thinking and reflective analysis. These insights are crucial for refining learning menus, leading to more complete metacognitive development and equipping students with greater independent thinking abilities.

Table 2.

Indicators	$\bar{X}$	*SD*	*VI*
1. ask myself periodically if I am meeting my goals.	*3.76*	*1.00*	***A***
2. consider several alternatives to a problem before I answer.	*3.68*	*1.13*	***A***
3. try to use strategies that have worked in the past.	*3.88*	*1.06*	***A***
4. pace myself while learning in order to have enough time.	*3.68*	*0.95*	***A***
5. understand my intellectual strengths and weaknesses.	*3.95*	*1.05*	***A***
6. think about what I really need to learn before I begin a task.	*4.11*	*0.86*	***A***
7. set specific goals before I begin a task.	*3.91*	*1.05*	***A***
8. know what kind of information is most important to learn.	*4.00*	*2.09*	***A***
9. am good at organizing information.	*3.56*	*0.98*	***A***
10. learn best when I know something about the topic.	*3.88*	*1.04*	***A***
11. know what the teacher expects me to learn.	*4.03*	*0.94*	***A***
12. am good at remembering information.	*3.80*	*1.01*	***A***
Overall	***3.85***	***1.02***	***A***

Metacognitive Awareness as to Cognitive Awareness

Scale: *4.50 – 5.00 Highly aware (HA)**, 3.50** – 4.49 Aware (A)**,** 2.50 – 3.49 Moderately aware (MA)**,***

1.50 – 2.49 Slightly aware (SA), 1.00 – 1.49Unaware (U)

Table 2 data show that the respondents tend to be aware of their cognitive awareness as indicated by a mean score of 3.85 and a standard deviation of 1.02. The highest level of cognitive awareness was reported in the dimension of planning their learning, in particular with the item concerning whether they thought about what they have to learn before they begin an activity, and it had a mean score of 4.11. Conversely, the lowest level of awareness observed was in information organization, evidenced by the question on their information organization ability and which had an average score of 3.56.

Cognitive awareness involves reflecting on one's own thinking, including the ability to recognize personal strengths, weaknesses, and effective learning strategies. The high mean scores (X =4.11) indicate that students are aware of the lesson's aims and objectives before the discussion, which enhances their interest and engagement. This awareness allows them to participate actively by sharing ideas about the lesson content, expected outputs, and topics they find challenging resulting in more focused and purposeful learning. However, the lowest means (X =3.56) is that some students have trouble in organizing information. Despite being informed of the objectives beforehand, these students struggle to manage and connect new knowledge, which makes it hard for them to explain basic science concepts or relate them to previous lessons. This lack of organization hinders their ability to process and apply information effectively, limiting their overall learning progress.

The overall cognitive awareness is good, but concerted efforts at enhancing the way they organize information can significantly enhance their learning efficiency. Students can be poor in clarity of work, confused when handling complicated tasks, and exhibit irregular study habits. This area needs to be addressed, as enhancing students' capacity to organize information can result in more efficient learning, enhanced academic performance, and enhanced problem-solving ability.

Table 3. Metacognitive Awareness as to Strategic Control

Indicators		$\bar{X}$	*SD*	*VI*
1.	***know how well I did once I finish a test.***	3.76	1.03	***A***
2.	***slow down when I encounter important information***	3.78	1.11	***A***
3.	***ask myself if I have considered all options when solving a problem***	3.73	1.01	***A***
4.	***consciously focus my attention on important information.***	3.65	1.08	***A***
5.	***have a specific purpose for each strategy I use.***	4.04	1.00	***A***
6.	***use different learning strategies depending on the situation.***	3.93	0.99	***A***
7.	***ask myself if there was an easier way to do things after I finish a task.***	3.94	1.04	***A***
8.	***periodically review to help me understand important relationships***	3.73	1.07	***A***
9.	***ask myself questions about the material before I begin.***	4.18	0.85	***A***
10.	***think of several ways to solve a problem and choose the best one.***	3.86	0.92	***A***
11.	***ask others for help when I don't understand something.***	3.95	1.07	***A***
12.	***can motivate myself to learn when I need to.***	3.88	1.11	***A***
13.	***use my intellectual strengths to compensate for my weaknesses.***	3.81	1.02	***A***
14.	***focus on the meaning and significance of new information.***	4.08	0.88	***A***
15.	***create my own examples to make information more meaningful.***	3.95	1.05	***A***
16.	***find myself pausing regularly to check my comprehension.***	3.74	1.10	***A***
17.	***know when each strategy I use will be most effective.***	4.14	0.91	***A***
Overall		***3.89***	***1.02***	***A***

Scale: *4.50 – 5.00 Highly aware (HA), 3.50 – 4.49 Aware (A), 2.50 – 3.49 Moderately aware (MA), 1.50 – 2.49 Slightly aware (SA)*

Table 3 displays the students' metacognitive awareness in the strategic control area. Their overall mean score of 3.89 suggests that they are generally knowledgeable about the methods they use. The item with the highest mean score, 4.18, where participants reported asking themselves questions about the material before beginning a task, demonstrates strong anticipatory thinking and active self-questioning. The lowest mean score achieved was 3.65 for the item on consciously directing attention to significant information.

The table shows that most students demonstrate high strategic control in metacognition by asking themselves questions about the content before beginning, a process that helps them select appropriate strategies to achieve learning goals. Many students use this self-reflection to connect new knowledge with what they already know, which prepares them mentally and makes it easier to focus on key points. However, some students struggle to concentrate on important information, often becoming distracted by classroom noise. These students may not yet be familiar with how to regulate their attention or apply strategies to stay focused.

The findings imply that students have a solid awareness of their metacognitive processes which implies not only the use of learning strategies, but a conscious selection, application and fine tuning for their goals, task demands and ongoing self-assessment. Yet, to achieve even greater academic success and extend strategic control, they will benefit from improving their capacity to discern which are the key priorities, and focusing on the most important and relevant information more efficiently.

Table 4. Extent of Students Classroom Behavior Practices as to Behavior Reminder

Indicators		$\bar{X}$	*SD*	*VI*
1.	***use behavioral reminders to remember classroom rules when needed.***	*3.54*	*1.41*	***VOP***
2.	***stay on task during class when I use behavioral reminders.***	*3.56*	*1.36*	***VOP***
3.	***find it easy to follow the behavioral reminders in the classroom.***	*3.86*	*1.08*	***VOP***
4.	***follow the classroom rules without my teacher having to remind me.***	*4.03*	*1.17*	***VOP***
5.	***behave and act better in class when I use behavioral reminders.***	*4.13*	*1.00*	***VOP***
Over-all		***3.82***	***1.23***	***VOP***

Scale: *4.50 – 5.00 Always practiced (AP)**,** 3.50 – 4.49 Very often practiced (VOP)**,** 2.50 – 3.49 Sometimes practiced (SP)**,** 1.50 – 2.49 Rarely practiced (RP)**,** 1.00 – 1.49 Never practiced (NP)*

The findings in Table 4 show that students very often practiced behavioral reminders, with mean scores ranging from 3.54 to 4.13. This suggests that behavioral reminders effectively promote positive behavior. The highest mean score of 4.13 (SD = 1.00) reflects students' belief that such reminders improve classroom behavior. However, the lowest score of 3.54 (SD = 1.41) relates to using behavioral reminders to remember classroom rules when needed, which, while still rated as very often, suggests it is the area practiced slightly less compared to others.

The data indicates that students' behavior improves when they receive behavioral reminders, which serve as brief, neutral prompts to help them remember and adhere to classroom expectations. Grade 8 students, being naturally curious and adventurous, often require frequent reminders from teachers regarding proper conduct. This results in respectful interactions with peers and teachers, fostering a positive classroom environment. However, students tend to rely on explicit reminders from the teacher rather than independently using available behavioral tools, often only recalling classroom rules when prompted. posted rules, cue cards, or teacher cues to regulate their behavior.

The positive behavior reported by students in response to behavioral reminders suggests that these methods effectively promote self-discipline, concentration, and responsibility. A classroom with students who respond well to such reminders is likely to be more organized and positive, with fewer instances of rule-breaking or disengagement. Therefore, the primary function of behavioral reminders is to foster proper conduct and support classroom management. Additionally, it is important to reinforce students' ability to independently use behavioral reminders as tools for self-regulation and consistent adherence to rules.

Table 5. Extent of Students Classroom Behavior Practices as to Academic Adjustment

Indicators		$\bar{X}$	*SD*	*VI*
1.	***believe I can finish my schoolwork successfully.***	*4.15*	*0.93*	***VOP***
2.	***feel sure I can understand difficult lessons.***	*3.49*	*1.09*	***SP***
3.	***believe I can handle challenges in my studies.***	*3.80*	*1.00*	***VOP***
4.	***am eager to do well in school.***	*3.83*	*1.06*	***VOP***
5.	***feel okay asking for help when I don't understand something in class.***	*3.89*	*1.06*	***VOP***
Over-all		***3.83***	***1.05***	***VOP***

Scale: *4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)*

The results in Table 5 indicate that academic adjustment was very often practiced by students, with an overall mean of 3.83. The highest mean of 4.15 was recorded for students' self-perception of their ability to succeed in schoolwork, reflecting high motivation and self-efficacy. In contrast, the lowest mean of 3.49 was observed for students' belief in their ability to learn difficult lessons, indicating that they sometimes practiced this mindset.

Academic adjustment is a change made to the student's academic task(s) to improve behaviors. Such changes could include the amount of work assigned, provision of support to the student during the work, giving additional time to complete the work, etc. Teachers maximize discussion time and activities, ensuring that students have enough time to finish seatwork and tasks, while also promoting methods to manage time effectively without compromising the quality of their work. Additionally, students are encouraged to complete tasks properly. However, when faced with more complex lessons, students often feel uncertain about their ability to understand difficult content, relying more on direct instruction than independent learning strategies. These doubts can lead to emotional reactions like frustration, which may hinder their learning process.

Despite students' motivation, they may lack confidence in their ability to handle challenging subjects. Therefore, employing various instructional methods or offering additional support can be crucial in helping build their confidence to manage more difficult schoolwork.

Table 6. Extent of Students Classroom Behavior Practices as to Environmental Adjustment

Indicators		$\bar{X}$	*SD*	*VI*
1.	***have enough light in the classroom.***	*3.71*	*1.12*	***VOP***
2.	***stay focused and interested during discussions.***	*4.26*	*0.84*	***VOP***
3.	***feel confident making decisions and taking charge of my learning inside the classroom.***	*3.65*	*1.13*	***VOP***
4.	***pay better attention during discussions because of the classroom setup.***	*3.83*	*0.99*	***VOP***
5.	***think the classroom environment helps me do well in my studies.***	*3.84*	*1.04*	***VOP***
Over-all		***3.86***	***1.04***	***VOP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49Never practiced (NP)

Table 6 reveals that students very often practiced good classroom behavior as they adjust to their environment, with a mean of 3.86 and a standard deviation of 1.04, indicating that the classroom setting encourages positive behavior and attitudes. The highest mean score of 4.26 for item 2 highlights students' ability to stay engaged and interested during discussions, underlining the significance of a supportive environment in fostering engagement. On the other hand, the lowest mean score, though still within the very often practiced category, was 3.65 for item 3, which relates to students feeling comfortable making choices and taking control of their learning in the classroom.

As mentioned earlier, students stay on-task and engaged during discussions, demonstrating active involvement in behaviors that support their adjustment to the classroom environment, where changes are made to improve behaviors. However, the lower mean score for confidence in decision-making and control over their learning suggests that, although students exhibit generally positive actions, they are still in the process of developing autonomy and independent learning skills. Many students continue to rely on the teacher for guidance, are hesitant to take initiative, and lack confidence in making independent decisions.

This implies that while students generally respond positively to their classroom environment, fostering a culture of active engagement and participation, their confidence in independent learning may need further development. Therefore, additional strategies may be necessary to help students become more self-assured, independent learners who can effectively manage their own learning experience.

Table 7.Extent of Students Classroom Behavior Practices as to Warning

Indicators		$\bar{X}$	*SD*	*VI*
1.	***know what warning behaviors mean.***	*3.88*	*1.22*	***VOP***
2.	***know how to handle stress with helpful strategies.***	*3.85*	*1.11*	***VOP***
3.	***can identify warning signs in myself.***	*3.63*	*1.27*	***VOP***
4.	***understand why it's important to help someone who is struggling.***	*3.98*	*1.09*	***VOP***
5.	***know how academic stress can affect warning behaviors.***	*3.26*	*1.46*	***SP***
Over-all		***3.72***	***1.26***	***VOP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)

Table 7 shows an overall mean of 3.72 with a standard deviation of 1.26, indicating that students very often practiced and respond to warning signs in the classroom. This reflects a general awareness and caution towards emotional and behavioral cues. The highest mean of 3.98 for Item 9, which emphasizes helping others in distress, highlights students' empathy and social awareness. In contrast, the lowest mean of 3.26 for Item 5 suggests that academic stress may affect students' response to warning behaviors.

As shown in the table, students recognize the importance of helping peers in difficulty, reflecting empathy, sympathy, and a strong sense of responsibility. These positive social behaviors contribute to a supportive classroom atmosphere where students collaborate and assist one another. However, while they demonstrate social awareness, their limited understanding of how academic stress influences behavioral responses indicates a gap in emotional regulation. This suggests that students may not fully connect stress with their reactions, which can lead to challenges in managing pressure effectively. In such cases, teacher-issued warnings—verbal prompts signaling that continued misbehavior will result in specific consequences—play a critical role in guiding students toward more appropriate behavior and helping them become more aware of their emotional responses under stress.

Students may struggle to identify or cope with stress, respond negatively to academic pressure, and miss opportunities to seek help. This underscores the importance of implementing targeted interventions to raise stress awareness and develop effective coping strategies.

Table 8. Extent of Students Classroom Behavior Practices as to Time-out

Indicators	$\bar{X}$	*SD*	*VI*
1. was able to manage my behavior well because of time-out.	*2.61*	*1.38*	***SP***
2. used time-out to calm down and reflect on my actions.	*2.64*	*1.47*	***SP***
3. learned from my mistakes through time-out.	*2.14*	*1.44*	***RP***
4. did not feel embarrassed or punished when I had a time-out.	*2.36*	*1.32*	***RP***
5. behaved better because of time-out.	*2.60*	*1.38*	***SP***
Over-all	***2.47***	***1.41***	***RP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)

Table 8 indicates that students rarely practiced time-outs in the classroom, with an overall mean of 2.47 and a standard deviation of 1.41. This indicates that they do not see time-outs as an effective behavior management tool. Yet, the highest mean score of 2.64 for using time-out to relax and reflect, which is in the sometimes-practiced category, means that some students use time-outs to regulate themselves. The lowest score of 2.14 in the item of learning from errors means that students do not tend to view time-outs as a useful learning experience.

The data indicates that students occasionally utilize time-out as a strategy to relax and reflect on their behavior, showing an emerging understanding of its role in emotional regulation and self-control. For example, when a student becomes upset during group work, a brief removal from the classroom setting—used in response to problem behaviors—can help them calm down and return with better focus. This suggests that some students find time-out useful in regaining composure. However, others view time-out as ineffective, providing minimal opportunity for reflection or behavioral growth. These students may simply use the break to recover emotionally without addressing the underlying issues or considering how to improve future conduct.

The findings suggest that time-out is seldom utilized and often not seen as a meaningful strategy for self-regulation. To improve its impact, time-outs should include guided reflection that helps students link their actions to outcomes and make more thoughtful behavioral choices in the future"Highly Engaged" ranking. Students tend to answer problems related in Nail care services when they are grouped in pairs or more.

Table 9. Students Behavior to Response Extent of Classroom Practices as Cost

Indicators		$\bar{X}$	*SD*	*VI*
1.	***clearly understood the consequences of my actions.***	*3.69*	*1.10*	***VOP***
2.	***was encouraged to improve my behavior because of the response cost.***	*3.74*	*1.00*	***VOP***
3.	***learned valuable lessons from my mistakes through the response cost***	*3.66*	*1.08*	***VOP***
4.	***became more aware of the negative outcomes of my actions because of the response cost.***	*3.61*	*1.19*	***VOP***
5.	***found the consequences of the response cost easy to understand.***	*3.65*	*1.21*	***VOP***
Over-all		***3.67***	***1.11***	***VOP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.4 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)

Table 9 shows that students very often practiced response cost, a strategy involving the removal of privileges for misbehavior, with an overall mean of 3.67 (SD = 1.11). The highest-rated item suggests students view it as a motivator for behavior change, while the lowest mean of 3.61 indicates that some students remain unaware of its consequences.

As previously noted, students showed motivation to change their behavior in response to the use of response cost, indicating that they are receptive to clear consequences and use them as motivation to adjust their actions. This reflects a growing sense of responsibility, as students make efforts to follow rules and avoid losing privileges. However, the findings also reveal that some students remain unaware of the negative consequences associated with their behavior, suggesting that they have not fully internalized the link between actions and outcomes. For example, a student who repeatedly speaks out of turn may lose participation points under the response cost system yet may not fully grasp how this consequence relates to their behavior.

The results also indicate that response cost is an efficient behavior management approach for teaching self-discipline and supporting good classroom behavior. It is necessary to have more controlled reflection and more specific instruction so that students have a clearer sense of purpose behind it and learn to utilize it as an aid for long-term behavioral change.

Table 10. Extent of Students Classroom Behavior Practices as to Behavioral Conference

Indicators		$\bar{X}$	*SD*	*VI*
1.	***understood why the behavioral conference was held.***	*2.40*	*1.50*	***RP***
2.	***was able to share my thoughts about what happened.***	*3.55*	*1.18*	***VOP***
3.	***was satisfied with the outcome of the conference.***	*3.04*	*1.24*	***SP***
4.	***received proper follow-up after the conference.***	*2.68*	*1.56*	***SP***
5.	***found the conference helpful.***	*3.39*	*1.44*	***SP***
Over-all		***3.01***	***1.45***	***SP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)

Table 10 shows that behavioral conferences were sometimes practiced by students, as reflected by an overall mean of 3.01 and a standard deviation of 1.45. While students appeared comfortable expressing their views during these conferences—evident from the highest mean score of 3.55, categorized as very often practiced—their inconsistent implementation limited their overall effectiveness. The lowest mean score of 2.40, classified as rarely practiced, indicated that many students did not fully understand the purpose of behavioral conferences, raising concerns about their awareness of the intent behind these interventions.

Students generally feel comfortable sharing their experiences during behavioral conferences, especially when speaking with guidance personnel. These conferences, typically brief meetings between a teacher and student to address problematic behavior, allow students to openly express the context behind their actions. However, the findings also show that many students do not fully understand the purpose of these conferences or how they relate to their behavior. As a result, their participation may lack meaningful reflection, limiting the opportunity for behavioral growth and reducing the effectiveness of the intervention.

This indicates that many students lack a full understanding of the purpose behind behavioral conferences, which may reduce their overall effectiveness. Although students appear engaged during these sessions, the results highlight the need to strengthen goal clarity, establish consistent follow-up procedures, and provide post-conference support to enhance the impact of the intervention.

Table 11. Extent of Classroom Practices as Students Behavior Technique to Defusing

Indicators		$\bar{X}$	SD	VI
1.	***know different ways to calm tense situations.***	*3.75*	*1.19*	***VOP***
2.	***am good at communicating with others.***	*3.86*	*1.22*	***VOP***
3.	***feel confident in managing difficult situations.***	*3.45*	*1.08*	***SP***
4.	***understand how to use body language to show care and understanding.***	*3.66*	*1.21*	***VOP***
5.	***can stay calm and focused during tough or Stressful moments.***	*3.53*	*1.27*	***VOP***
Over-all		***3.65***	***1.20***	***VOP***

Scale: 4.50 – 5.00 Always practiced (AP), 3.50 – 4.49 Very often practiced (VOP), 2.50 – 3.49 Sometimes practiced (SP), 1.50 – 2.49 Rarely practiced (RP), 1.00 – 1.49 Never practiced (NP)

Table 11 indicates that defusing strategies are very often practiced by students, with a mean score of 3.65 and a standard deviation of 1.20. This suggests that students frequently utilize conflict and stress management techniques in the classroom. The highest rating of 3.86 was given to the question about students' ability to communicate effectively, reflecting their confidence in their communication skills. However, the lowest rating of 3.45, concerning their ability to handle difficult or stressful situations, suggests that while students are confident communicators, they feel less certain when faced with challenging circumstances.

Students frequently use effective communication skills to manage stress and conflicts in the classroom. Defusing techniques, which include actions by the teacher to calm a student or prevent escalation, are often employed by students in handling these situations. These techniques involve careful listening, respectful gestures, and proposing solutions to resolve conflicts. However, students lack confidence in managing conflict themselves, which suggests that they may feel uncertain or hesitant under pressure or in confrontational situations. As a result, they may avoid addressing conflicts directly, sometimes opting for silence rather than confronting the issue at hand.

It also indicates that students consistently use calming and conflict-avoidance strategies, which are essential for emotional regulation and effective interpersonal communication. However, there is a need for further practice and guidance to boost students' confidence in independently handling challenging situations.

Table 12. Students' Science Learning Achievement in terms of Scientific Knowledge

Score	***Pre-test***			***Post-test***		
	f	*%*	*VI*	*f*	*%*	***VI***
11	*0*	*0.00*	*A*	*49*	*61.25*	***A***
8-10	*1*	*1.25*	*P*	*28*	*35.00*	***P***
5-7	*16*	*20.00*	*AP*	*3*	*3.754*	***AP***
2-4	*52*	*65.00*	*D*	*0*	*0.00*	***D***

0-1	*11*	*13.75*	*B*	*0*	*0.00*	***B***
total	***80***	***100.00***		***80***	***100.00***	

Scale: 11 Advanced (A), 8-10 Proficient (P), 5-7 Approaching Proficiency (AP), 2-4 Developing (D) , 0-1 Beginning (B)

Table 12 shows the pre-test and post-test results, reflecting the performance of students following the intervention. Prior to the intervention, the majority of students, or 65 percent, were designated as developing, indicating that they fell below the level of expected understanding. Only 1.25 percent were at the proficient level, and there were none at the advanced level. Also, 13.75 percent were at the beginning stage, reflecting little mastery of the content. Following the intervention, there was considerable improvement, with 61.25 percent of the students reaching the advanced level and 35 percent at proficient. The developing and beginning categories fell to zero, indicating improved student mastery and a significant decline in learning gaps.

In both pre-test and post-test, students were able to activate pre-existing knowledge and experiences prior to instruction. When reflecting upon the post-test, students were able to communicate a deeper understanding and construct meaning behind their ideas while applying their choice of problem solving strategies differently and accurately. In each lesson, students were far more accurate with their choices of answers on the multiple choice questions, classifying the groups and periods of the periodic table, and developing their scientific knowledge of concepts rather than just facts. Students displayed more self-efficacy when taking the post-test and showed willingness to voice their opinions and knowledge with their peers and me. They implemented their conceptual understanding with more precision as discussed during their group work. It implies an evident development and growth in understanding and applying concepts and self-efficacy in academic performance and test scores.

This notable change in performance also indicates that the instructional or behavioral approach used not only helped learners acquire knowledge but, more significantly, successfully motivated them to achieve better academic outcomes as seen in their post-tests scores. The gap between high motivation and low pre-test scores among students indicates that, though interested in acquiring knowledge, they lacked the required background knowledge or experience. This highlights the importance of specific teaching and guidance, which was skillfully offered, as evident from their significant improvement on the post-test.

Table 13. Students' Science Learning Achievement in terms of Scientific Process Skills

1. Score	*Pre-test*			*Post-test*		
	f	*%*	*VI*	*f*	*%*	***VI***
20-23	*0*	*0.00*	*A*	*44*	*55.00*	***A***
15-19	*2*	*2.50*	*P*	*24*	*30.00*	***P***
10-14	*8*	*10.00*	*AP*	*9*	*11.25*	***AP***
5-9	*35*	*43.75*	*D*	*3*	*3.75*	***D***

0-4	*35*	*43.75*	*B*	*0*	*0.00*	***B***
Total	***80***	***100.00***		***80***	***100.00***	

Scale: 20-23 Advanced (A), 15-19 Proficient (P), 10-14 Approaching Proficiency (AP), 5-9 Developing (D) ,

0-4 Beginning (B)

The results show that there was a remarkable gain in students' achievement in learning science in scientific process skills after the intervention as presented in Table 13. Prior to the intervention, a total of 87.5 percent of students were in the Developing and Beginning levels, each representing 43.75 percent, while none were at the Advanced level and only 2.5 percent were at Proficient. Following the intervention, 55 percent of students were at the Advanced level, and 30 percent were at Proficient. The Beginning category decreased to zero and Developing declined significantly to only 3.75 percent.

The pre-test and post-test data in the appendices reveal a clear trend: students demonstrated substantial progress. The majority achieved notably higher scores on the post-test, indicating they developed key scientific process skills – the very tools scientists employ to explore and make sense of the natural world. This really highlights how science works as a way of exploring things. In this regard, the evaluation was centered on students' comprehension of the periodic table, focusing mainly on the identification of protons, neutrons, and electrons. The positive findings evidently reveal that students comprehended the lesson in an effective way and attained the desired learning outcomes.

This notable improvement also indicates that the instructional approach or intervention used was very effective in closing learning gaps and developing higher-order thinking abilities. It also connotes that with proper support and teaching methodology, students can advance significantly from lower levels of performance to exhibiting advanced science skills.

Table 14. Students' Science Learning Achievement in terms of Scientific Context

1. Score	***Pre-test***			***Post-test***		
	f	*%*	*VI*	*f*	*%*	***VI***
11	*0*	*0.00*	*A*	*2*	*2.50*	***A***
8-10	*4*	*5.00*	*P*	*41*	*51.25*	***P***
5-7	*26*	*32.5*	*AP*	*35*	*43.75*	***AP***
2-4	*46*	*57.5*	*D*	*2*	*2.50*	***D***
0-1	*4*	*5.00*	*B*	*0*	*0.00*	***B***
total	***80***	***100.00***		***80***	***100.00***	

According to the data in Table 14, there was a significant improvement in students' understanding of the scientific context after the intervention. The initial science assessment showed that a large segment of the student population (57.5%) had a developing grasp of concepts (scoring 2-4), and 5% lacked fundamental science knowledge. At that time, only a small fraction (5%) was proficient, and no students were advanced. Following the intervention, substantial gains were evident. The advanced level now includes 2.5% of students, and over half (51.25%) have reached proficiency.

Impressively, no students remained at the beginning level, and the percentage in the developing category plummeted to 2.5%. These improvements clearly demonstrate the positive impact of the intervention on students' ability to understand and apply scientific concepts in various contexts.

The upward shift in score distribution from the pre-test to the post-test shows that more students were able to apply scientific concepts in practical situations. Students improved contextual understanding of science highlights the success of the application of the learning menus. Students were able to answer the post-test questions that focuses on scientific context and students apply their knowledge on real-life situations.

The findings also highlight that targeted and contextualized instruction is vital for improving students' scientific literacy. When science concepts are taught in relation to relevant, real-world contexts, students become more invested and develop a deeper grasp. Effective teaching methods enable students to advance from basic recall to the successful application of knowledge, resulting in better academic achievement in science.

Table 15. Students' Motivation as to Interest

Indicators	*Pre-survey*			*Post-survey*		
	$\overline{X}$	*SD*	*VI*	$\overline{X}$	*SD*	***VI***
1. I like learning about new scientific discoveries.	*4.61*	*0.61*	*VHI*	*4.48*	*0.67*	***HI***
2. I think science is an exciting subject.	*4.48*	*0.75*	*HI*	*4.41*	*0.72*	***HI***
3. I believe science helps solve real-life problems.	*4.36*	*0.82*	*HI*	*4.24*	*0.77*	***HI***
4. I want to do well in my science classes.	*4.45*	*0.76*	*HI*	*4.56*	*0.67*	***VHI***
5. I enjoy doing science experiments and investigations.	*4.30*	*0.92*	*HI*	*4.26*	*0.79*	***HI***
6. I like studying science because I'm curious about how things work.	*4.40*	*0.84*	*HI*	*4.35*	*0.83*	***HI***
7. I enjoy studying science because I like learning new and challenging ideas.	*4.29*	*0.80*	*HI*	*4.26*	*0.84*	***HI***
8. I like learning new topics in class because they are interesting.	*4.25*	*0.79*	*HI*	*4.36*	*0.78*	***HI***
9. I enjoy learning science by doing experiments and activities.	*4.26*	*0.82*	*HI*	*4.34*	*0.78*	***HI***
10. I prefer learning science with visuals like diagrams and videos.	*3.74*	*0.85*	*HI*	*3.86*	*0.88*	***HI***
Over-all	***4.31***	***0.82***	***HI***	***4.31***	***0.79***	***HI***

Scale: *4.50 – 5.00 Very High Interest (VHI), 3.50 – 4.49 High Interest (HI), 2.50 – 3.49 Moderate Interest (MI), 1.50 – 2.49 Low Interest (LI),*

1.00 – 1.49 Very Low Interest (VLI)

Students' self-reported interest in science, as detailed in Table 15, was consistently high and did not fluctuate between the pre-survey and post-survey. The overall mean score held steady at 4.31, wherein the students are highly interested. The results of the pre-survey indicate that students have a very high interest in learning about scientific discoveries, with a mean of 4.61, where students like learning about new scientific discoveries and post-survey scores slightly dropped to 4.48. The slight decrease likely indicates a small shift in student perception rather than a decline in motivation, with overall interest still remaining strong. Positive trends are observed when students said that they want to do well in their science classes, which rose from 4.45 to 4.56, indicating an increased motivation to perform well in science. Also, when they prefer learning science with visuals like diagrams and videos rose from 3.74 to 3.86, again indicating that students enjoyed the teaching approach employed during the intervention.

This means that the intervention did not change students' overall interest in science significantly but kept them with positive attitudes toward the subject. This also shows that although the cumulative interest in science did not make a dramatic difference, students' motivation to achieve in science class did grow stronger, especially through their interest to do well and interact with learning materials in science.

The intervention was not implemented due to lack of interest but to sustain, boost, and direct the existing interest into more involved learning participation and better academic performance. Interest serves as the foundation, not the end goal, of effective learning. The small gains in some of the questions indicate the success of the intervention in boosting students' academic motivation and positive dispositions towards learning science. Such results validate that students were actually interested in science by virtue of active participation, hands-on experiments, and the use of visual learning materials.

Table 16. Students' Motivation as to Self-efficacy

Indicators	*Pre-survey*			*Post-survey*		
	$\overline{X}$	*SD*	*VI*	$\overline{X}$	*SD*	***VI***

1	***When I believe I can do well in science, it makes me want to work harder.***	*4.05*	*0.78*	*HSE*	*4.05*	*0.93*	***HSE***
2	***If I feel confident in my science skills, I keep trying even with hard tasks.***	*4.04*	*0.85*	*HSE*	*4.03*	*0.91*	***HSE***
3	***I believe I can understand difficult science ideas.***	*3.75*	*0.88*	*HSE*	*3.88*	*0.80*	***HSE***
4	***I believe I can do well in my science class.***	*4.13*	*0.85*	*HSE*	*4.21*	*0.76*	***HSE***
5	***I believe I can do well on my science tests.***	*4.09*	*0.83*	*HSE*	*4.10*	*0.76*	***HSE***
6	***My interest in studying science helps me feel more confident in myself.***	*4.09*	*0.96*	*HSE*	*4.04*	*0.91*	***HSE***
7	***I want to study science because I find it fun and exciting.***	*4.38*	*0.77*	*HSE*	*4.38*	*0.85*	***HSE***
8	***I want to learn science because I know I can learn it.***	*4.30*	*0.77*	*HSE*	*4.30*	*0.74*	***HSE***
9	***I set big goals for myself in science because I believe I can reach them.***	*3.86*	*0.99*	*HSE*	*3.90*	*0.91*	***HSE***
10	***Even when science gets tough, I keep trying my best to succeed.***	*4.33*	*0.81*	*HSE*	*4.46*	*0.71*	***HSE***
Overall		***4.10***	***0.87***	***HSE***	***4.13***	***0.85***	***HSE***

Scale: 4.50 – 5.00 Very High Self-Efficacy (VHSE), 3.50 – 4.49 High Self-Efficacy (HSE), 2.50 – 3.49 Moderate Self-Efficacy (MSE), 1.50 – 2.49 Low Self-Efficacy (LSE), 1.00 – 1.49 Very Low Self-Efficacy (VLSE)

Table 16 shows student self-efficacy in science based on pre- and post-survey data. Both surveys reflect that student had a High Self-Efficacy (HSE) in science with a small increase assessed after teaching. The mean increased from 4.10 (SD = 0.87) for the pre-survey to 4.13 (SD = 0.85) for the post-survey, both in the HSE range (3.50–4.49). This modest growth indicates that confidence and belief of students in being able to do science increased somewhat but remained strongly high throughout the learning process.

As shown on the data above, the most common reason students enjoyed studying science was because it was fun and exciting, and this remained consistent prior to and after the lessons. This indicates that making science enjoyable is an effective means to sustain students' interest. In addition, more students indicated that they would not give up even when science was challenging, indicating they were more determined to succeed, and it could be evidenced on their scores on post-test.

The results show that students consistently demonstrated very high self-efficacy in science before and after the intervention. Despite only a slight improvement, they maintained strong confidence and resilience in facing challenges. This suggests the intervention effectively sustained their motivation, and future strategies should build on this foundation by promoting confidence, perseverance, and a positive outlook toward learning science.

Table 17.

Test of

Metacognitive Awareness	Learning Achievement		
	Scientific Knowledge	Scientific Process Skills	Scientific Context
Self Regulation	0.265*	0.233*	-0.018
Cognitive Awareness	0.307*	0.249*	0.112
Strategic Control	0.291*	0.200	0.032

Significant Relationship Between Metacognitive Awareness and Learning Achievement

***.Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

In relation to the post-test results, the data in Table 17 indicates that students achieved high scores overall, yet their metacognitive awareness was significantly correlated only with scientific knowledge and, to a lesser extent, with scientific process skills. Metacognitive awareness—specifically self-regulation, cognitive awareness, and strategic control—is positively correlated with students' achievement in scientific knowledge and process skills, but not with their performance in scientific context. Self-regulation and cognitive awareness had significant positive correlations, indicating that students who effectively manage and understand their learning perform better in these areas. Strategic control correlated with scientific knowledge but not significantly with process skills.

The negative, non-significant relationship between self-regulation and scientific performance indicates low practical significance and could be moderated by individual differences. Results from student surveys emphasized students' competence in cognitive awareness, and it was this area that directed the design of learning activities. High post-test scores was most probably a result of a blend of metacognitive effort and extrinsic instructional support, but not necessarily metacognitive knowledge alone. Teacher guidance, systematic instruction, and exposure to test formats were significant in enabling recall of content and the establishment of basic skills. Metacognition facilitated comprehension of scientific principles but the process of utilizing them within academic contexts was more tied to both internal processes and external sources, highlighting their collaborative effect on general academic progress.

Despite already high metacognitive awareness, instruction should still be tailored to individual needs to deepen learning, reinforce habits, support skill transfer, and promote overall academic success—recognizing that a strong foundation is just the starting point. This idea is supported by Özçakmak et al. (2021), they showed that while "thinking about thinking" (metacognition) is helpful, it's not enough on its own. To truly help students learn and do well, teaching needs to be personalized to their unique needs. Even students with great thinking skills still benefit from instruction that fits them.

Table 18. Test of Significant Relationship Between Classroom Behavior Practices and Learning Achievement

Classroom Behavior Practices	***Learning Achievement***		
	Scientific Knowledge	*Scientific Process Skills*	***Scientific Context***
Behavior Reminder	*0.144*	*0.050*	***0.099***
Academic Adjustment	*0.192*	*0.048*	***0.057***
Environmental Adjustment	*0.139*	*0.085*	***0.186***
Warning	*0.104*	*0.110*	***0.133***
Time-out	*0.133*	*-0.084*	***-0.131***
Response Cost	*0.143*	*0.166*	***0.232****
Behavioral Conference	*0.086*	*0.052*	***-0.079***
Defusing Techniques	***0.148***	***0.053***	***0.034***

**.

Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 18 indicates that most classroom behavior practices do not significantly correlate with students' science achievement in scientific knowledge, process skills, or contextual understanding. Yet, response cost is an exception, presenting a significant positive correlation with students' understanding of scientific contexts. This suggests that some disciplinary approaches, such as response cost, might have indirect effects to improve learning by fostering more attention and responsibility.

Interestingly, time-out even had negative correlations with scientific process skills and context, implying that exclusionary practices may be deterring students from hands-on and applied scientific learning. Even though behavior practices are essential for helping to sustain an effective learning environment, their effect on academic achievement could be indirect and very context-dependent on how they are delivered and merged with teaching. Behavior strategies should be informed by academic objectives and not independently used, in order to have a greater impact on learning outcomes.

Responsibility-based strategies, like response cost, are generally superior to exclusion-based methods, like time-out, because they take a student's contributions towards learning and engage, rather than disrupt, the engagement that happened in the first place, (Reiber & McLaughlin, 2016). Surveys also revealed that students with behaviors problem are significantly more engaged in voluntary activities when compared to their participation in the required activities. Therefore, defining a student's behavioral difficulties in terms of them at being less engaged in voluntary acts than required ones, points out the necessity to create behavior problem interventions that contribute to both discipline and to active learning.

Science Literacy	***Pretest***		***Posttest***		***t***	***df***	***Sig. (2-tailed)***
	Mean	*SD*	*Mean*	*SD*			

Table 19. Test of Significant Difference in the Students' Science Learning Achievement as to Science literacy

Scientific Knowledge	*3.19*	*1.76*	*10.28*	*1.19*	*-31.284*	*79*	***0.000***
Scientific Process Skills	*5.76*	*3.46*	*18.66*	*3.84*	*-25.856*	*79*	***0.000***
Scientific Context	***4.23***	***1.89***	***7.54***	***1.76***	***-12,481***	***79***	***0.000***

Table 19 reveals a statistically significant difference in students' science learning achievement across all areas of science literacy—scientific knowledge, scientific process skills, and scientific context—from the pre-test to the post-test. The substantial increase in mean scores in all three categories demonstrates the significant positive impact of the implemented teaching strategies on students' science literacy. The large differences in pre- and post-test means, with connected low p-values, confirm that any change in performance cannot be caused by chance.

Particularly, scientific understanding of the students grew from a low original pre-test mean to a significantly high post-test mean, indicating better understanding of key concepts. Similarly, process skills in science grew significantly through the mean scores, indicating better ability to undertake investigations and scientific procedures. The context scores on science as well grew significantly, though the improvement relatively smaller than in the other domains. The gain still achieved statistical significance despite this.

The instructional design not only challenged students' confidence in science but also equipped them with practical, real-world skills essential for meaningful learning. Scientific literacy, as clarified by Zeidan et al. (2015), is not merely situational but involves a combination of experiential knowledge and processing skills that enable individuals to interpret and apply science in everyday contexts. Aydın Ceran et al. (2022) further support this by showing that strengthening process skills can significantly enhance scientific literacy, particularly where knowledge and skill gaps exist. Similarly, Bauer (2015) emphasized that scientific literacy empowers individuals to personally engage with science-related issues and make informed decisions. Together, these insights highlight that true scientific literacy arises from the integration of knowledge acquisition, skill development, and contextual understanding.

Table 20. Test of Significant Difference in the Students' Science Learning Achievement as to Motivation

Motivation	Pretest		Posttest		t	df	Sig. (2-tailed)
	Mean	SD	Mean	SD			
Interest	4.31	0.82	4.31	0.79	0.031	79	0.488
Self-Efficacy	4.10	0.87	4.13	0.85	0.712	79	0.239

According to the findings in Table 20, there is no statistically significant difference between the pre-test and post-test scores in students' motivation, specifically interest and self-efficacy. The Overall means on both indicators of motivation were stable throughout the intervention. These stable mean scores indicate that students were highly motivated before the unit began and this high motivation was maintained. Therefore, the consistency on these measures suggests that while the instructional intervention may have contributed to students' motivation to sustain their current motivation, it did not significantly improve students' levels of motivation.

This also suggests that although the intervention was effective at increasing students' science learning performance, it made little difference in terms of levels of motivation among students—possibly because the students were already well-motivated at the initial measurement. Subsequent interventions should perhaps aim less to increase still higher levels in this way in the short term and more to sustain or perhaps enrich these existing levels through constant reinforcement and exercise.

These results are consistent with the idea that students' motivation, especially interest and self-efficacy, could be more enduring characteristics and less responsive to short-term instructional measures. As González, Hernández, and Pino (2020) note, although motivation is essential for science attainment, deep-seated changes tend to involve extended and tailored interventions that transcend classroom teaching. Likewise, Zimmerman and Schunk (2016) pointed out that self-efficacy gains are most likely when students are provided with multiple opportunities for success and for reflection over time.

5. Conclusions

The study found that metacognitive awareness is significantly correlated with certain areas of science learning, but not with the understanding of scientific context. While most classroom behavior practices did not show a significant relationship with science learning achievement, the response cost strategy stood out with a statistically significant positive effect. Additionally, students demonstrated significant gains in science literacy between the pre- and post-tests. However, there was no significant change observed in their motivation based on the pre- and post-survey results.

6. Recommendations

Enhancing metacognitive skills through targeted activities and applying real-world science instruction can improve both literacy and motivation. Since students already showed high motivation, more focused strategies are needed to further develop their interest and self-efficacy. Among behavior strategies, only response cost positively influenced science achievement, suggesting the importance of involving students with behavioral challenges in future research. Long-term approaches should also be explored to strengthen motivation and learning strategies across different educational settings.

Acknowledgements

This research would not have been possible without the guidance, support, and aid of many institutions and people. The researcher would like to take this opportunity to express her sincerest gratitude to the following:

To God, for granting the wisdom, strength, and perseverance needed to complete this academic endeavor. His constant guidance and unwavering presence made it possible to overcome every challenge encountered throughout this journey..

Dr. Mario R. Briones, University President, for your valuable contribution to the institution and the meaningful impact you have made in the lives of countless students.

Atty. Rushid Jay S. Sancon, Vice President for Academic Affairs For his unwavering support and guidance in leading the endeavors of Graduate Studies and Applied Research students, which enables her to persevere despite numerous challenges.

Mr. Joel M. Bawica, Campus Director, for his steadfast support and uplifting words of encouragement.

Dr. Edilberto Z. Andal, Dean of Graduate Studies and Applied Research, for your leadership, insight, and guidance, which have been instrumental in the successful completion of this thesis.

Dr. Elisa N. Chua, research adviser, for her invaluable insights, constant encouragement, and unwavering support throughout the conduct of this research. Her expertise, patience, and thoughtful contributions have been essential in shaping the direction of this study.

Dr. Albert Andry E. Panergayo, for the invaluable support in refining and enhancing the technical content of this research.

Mrs. Angela L. Reginaldo, statistician, for generously sharing her time, knowledge, and expertise in statistics, which made the process more manageable; her patience, dedication, and insightful suggestions greatly contributed to the integrity of this study.

Ms. Cyrell N. Ate, subject specialist, for her precious expertise and advice in this research, her deep knowledge and insights have immensely helped the depth and accuracy of this study.

Mrs. Shillem I. Mitra, Teacher III, Officer-in-Charge, Science Department of Recto Memorial National High School, for indispensable support in the evaluation and validation of the research instrument.

Mrs. Alona F. Cometa and Mrs. Marilyn M. Abueva, Master Teacher I of Recto Memorial National High School, whose knowledge and critical evaluation ensured the reliability, validity, and appropriateness of the tools used in this study.

Mrs. Mary Grace V. Maranan and Mrs. Charise A. Hernandez, Teacher III of Recto Memorial National High School, for the gift of their time and effort in validating the research instrument.

Mrs. Jessa Jean D. Amante and Mrs. Ritchel D. Bonsol, Teacher III of Recto Memorial National High School for extending their helping hand and sharing valuable knowledge during the validation of the research instrument.

Mr. Jessie V. Vasquez, Principal III, Recto Memorial National High School, for allowing this study to be conducted in the school.

Mr. Ray Jay T. Dipasupil, Mr. Ray Jay T. Dipasupil, for his support and assistance in the successful pursuit of this study.

The Grade 8 students of Recto Memorial National High School, who served as respondents, for generously offering their time and willingly participating in the surveys and interviews, which provided valuable data essential to this study.

Co-teachers, whose generosity in sharing their insights, experiences, and expertise has significantly enriched this research. Their encouragement, meaningful conversations, and motivating words have been a constant source of support, particularly during the most challenging moments of this journey.

Arlene A. Suaze and Maritoni M. Fuentes, for their unwavering companionship, inspiration, and support throughout the research process. Their shared experiences, long study sessions, and encouraging words have been a true source of motivation and inspiration.

The researcher's family—Rosalinda and Mauricio Brion, her sisters, in-laws, and husband, Kit Mark—is deeply appreciated for their unwavering love, emotional support, encouragement, and understanding throughout her academic journey. This achievement would not have been possible without their steadfast belief and unconditional support.

Finally, heartfelt thanks to everyone who, in any way, contributed to the completion of this research—your kindness, encouragement, and support are truly appreciated. Thank you for being an important part of this journey.

References

Akturk, A. O., & Sahin, I. F. (2011). Literature on metacognition in learning. Journal of Educational Psychology, 3(1), 14–23.

Anthonysamy, L., Koo, A., & Hew, S. (2020). Self-regulated learning strategies and non-academic outcomes in higher education blended learning environments: A one decade review. Education and Information Technologies, 25, 3677–3704. https://doi.org/10.1007/s10639-020-10134-2

Arnold, J., Kremer, K., & Mayer, J. (2014). Understanding students' experiments—What kind of support do they need in inquiry tasks? International Journal of Science Education, 36(15), 2719–2749. https://doi.org/10.1080/09500693.2014.930209

Bahri, A., & Corebima, A. D. (2015). The contribution of learning motivation and metacognitive skill on cognitive learning outcome of students within different learning strategies. Journal of Baltic Science Education, 14(4), 487–500.

Bahri, A., & Corebima, A. D. (2015). The impact of metacognitive strategy implementation on learning. Educational Research and Reviews, 10(16), 2303–2311.

Bauer, M. W. (2015). Scientific literacy and the public understanding of science. Public Understanding of Science, 24(1), 21–26. https://doi.org/10.1177/096366251557802

Bernardo, A. B., Cordel, M. O., Calleja, M. O., Teves, J. M. M., Yap, S. A., & Chua, U. C. (2023). Profiling low-proficiency science students in the Philippines using machine learning. Humanities and Social Sciences Communications, 10(1), 1–12.

Bishop, P. A. (2024). Middle grades teacher practices during the COVID-19 pandemic. In Dialogues in Middle Level Education Research (Vol. 3, pp. 20–50). Routledge.

Blazar, D., & Kraft, M. A. (2015). Exploring teacher effects on students' attitudes and behaviors. Educational Evaluation and Policy Analysis, 37(2), 146–170.

Bolliger, D., & Martin, F. (2018). Instructor and student perceptions of online student engagement strategies. Distance Education, 39(4), 568–583. https://doi.org/10.1080/01587919.2018.1520041

Branje, S. J. T., & Morris, A. (2021). The impact of the COVID-19 pandemic on adolescent emotional, social, and academic adjustment. Journal of Research on Adolescence, 31(3), 486–499.

Bray-Garretson, H., Tingstrom, D. H., & Baltodano, H. M. (2022). Using academic interventions to address challenging behavior: A practical guide for educators. Intervention in School and Clinic, 57(3), 131–140.

Briesch, A. M., Chafouleas, S. M., & Riley-Tillman, T. C. (2021). Time-out reconsidered: Integrating research and best practices for effective use. School Psychology Review, 50(2-3), 232–249.

Brophy, J. (2022). Classroom management that works: Research-based strategies for every teacher. ASCD.

Castañer, X., & Oliveira, N. (2020). Collaboration, coordination, and cooperation among organizations: Establishing the distinctive meanings of these terms through a systematic literature review. Journal of Management, 46(5), 1001–965. https://doi.org/10.1177/0149206320901565

Cetin-Dindar, A. (2015). Student motivation in constructivist learning environment. Eurasia Journal of Mathematics, Science and Technology Education, 12(2), 233–247.

Conel, A. (2021). The influence of attitudes, values, and skill acquisition on students' interest in learning science.

Connor, A., Karmokar, S., & Whittington, C. (2015). From STEM to STEAM: Strategies for enhancing engineering & technology education. International Journal of Engineering Pedagogy, 5(2), 37–47. https://doi.org/10.3991/ijep.v5i2.4458

Cooper, J. O., Heron, T. E., & Heward, W. L. (2019). Applied behavior analysis (3rd ed.). Pearson.

Cromley, J., & Kunze, A. (2020). Metacognition in education: Translational research. Translational Issues in Psychological Science, 6(1), 15–20.

Danley, A., & Williams, C. (2020). Choice in learning: Differentiating instruction in the college classroom. InSight: A Journal of Scholarly Teaching, 15, 83–104.

Darling-Hammond, L., Flook, L., Cook-Harvey, C. M., Barron, B., & Osher, D. (2019). Implications for educational practice of the science of learning and development. Applied Developmental Science, 24(2), 140–197. https://doi.org/10.1080/10888691.2018.1537791

De Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC. Journal of Computer Assisted Learning, 32(3), 218–231.

Demirbag, M., & Gunel, M. (2014). Integrating argument-based science inquiry with modal representations: Impact on science achievement, argumentation, and writing skills. Kuram Ve Uygulamada Eğitim Bilimleri, 14(1), 386–391. https://doi.org/10.12738/estp.2014.1.1632

Dent, A. L., & Koenka, H. M. (2016). The relationship between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. Educational Psychology Review, 28(3), 425–474.

Dignath, C., & Büttner, G. (2018). Teachers' direct and indirect promotion of self-regulated learning. Metacognition and Learning, 13(2), 127–157.

Dignath, C., & Veenman, M. V. J. (2021). Cognitive awareness and metacognitive skill development.

Doménech-Betoret, F., Abellán-Roselló, L., & Gómez-Artiga, A. (2017). Self-efficacy, satisfaction, and academic achievement: The mediator role of students' expectancy-value beliefs. Frontiers in Psychology, 8, 1193. https://doi.org/10.3389/fpsyg.2017.01193

Dotger, S., & Causton-Theoharis, J. (2010). Differentiation through choice: Using a think-tac-toe for science content. Science Scope, 33(6).

Eom, S. (2019). The effects of student motivation and self-regulated learning strategies on student's perceived e-learning outcomes and satisfaction. Journal of Higher Education Theory and Practice, 19(7).

Erskine, H. E., Flora, C. A., & Watling, R. (2023). Creating sensory-friendly classrooms: A practical guide for teachers. Journal of Autism and Developmental Disorders, 53(4), 1456–1470.

Evertson, C. M., & Poole, I. R. (2020). Classroom management for elementary teachers (11th ed.). Pearson Education.

Foster, A., & Kinzel, M. (2021). Estimating COVID-19 exposure in a classroom setting: A comparison between mathematical and numerical models. Physics of Fluids.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). How to design and evaluate research in education (10th ed.). McGraw-Hill Education.

Fuchs, L. S., Fuchs, D., & Vaughn, S. (2014). Response to intervention: How to best support students with learning difficulties. Pearson.

Garcia, T., & Pintrich, P. R. (2017). Cognitive awareness and its role in science learning. Educational Psychology, 57(5), 595–609.

Garrett, T. (2014). Effective classroom management: The essentials. Teachers College Press.

Gifted Guru. (n.d.). Making choice menus better. Retrieved from www.giftedguru.com

Gillaco, M. (2014). Descriptive developmental methodology. Internet Public Library. Retrieved from https://www.ipl.org/essay/Descriptive-Developmental-Methodology-PKJQXCSK6C486

González, A., Hernández, F., & Pino, M. (2020). Motivational factors in science education: A systematic review. International Journal of Science Education, 42(4), 553–574.

Gregory, G. H., & Kaufeldt, M. (2015). The motivated brain: Improving student attention, engagement, and perseverance. ASCD.

Hamzah, M. A., Abdullah, M. K., & Jamil, H. (2022). The role of metacognition in developing higher-order thinking skills: A study in the context of classroom teaching. International Journal of Education and Learning, 12(3), 15–30.

Harrison, G. M., & Vallin, L. M. (2018). Evaluating the metacognitive awareness inventory using empirical factor-structure evidence. Metacognition and Learning, 13, 15–38.

Hasni, A., & Potvin, P. (2016). Student interest in science and technology and its relationships with teaching methods, family context, and self-efficacy. International Journal of Environmental and Science Education, 11(6), 1283–1308.

Hasnine, M., Liew, J., Li, M., Tan, H., & Qin, W. (2023). The impacts of learning motivation, emotional engagement, and psychological capital on academic performance in a blended learning university course. Frontiers in Psychology. https://doi.org/10.3389/fpsyg.2023.XXXXXX

Heacox, D., & Cash, R. M. (2014). Differentiation for gifted learners: Going beyond the basics. Free Spirit Publishing.

Hertzog, C., & Dunlosky, J. (2011). Metacognition in cognitive aging. Annual Review of Psychology, 62, 223–246.

Hiller, S. E., & Kitsantas, A. (2014). The effect of a horseshoe crab citizen science program on middle school student science performance and STEM career motivation. School Science and Mathematics, 114, 302–311. https://doi.org/10.1111/SSM.12081

Hooshyar, D., Ahmad, R., Yousefi, M., Fathi, M., Abdollahi, A., Horng, S., & Lim, H. (2016). A solution-based intelligent tutoring system integrated with an online game-based formative assessment: Development and evaluation. Educational Technology Research and Development, 64, 787–808. https://doi.org/10.1007/s11423-016-9433-x

Huang, Y., Gan, X., Jin, X., Wei, Z., Cao, Y., & Ke, H. (2023). The healthy context paradox of bullying victimization and academic adjustment among Chinese adolescents: A moderated mediation model. PLOS ONE, 18.

Institute for the Professional Development of Adult Educators. (2022). Webinar workbook: January 19, 2022. Florida IPDAE. https://www.floridaipdae.org/dfiles/resources/webinars/011922/Webinar_Workbook_011922.pdf

Jaleel, S., & Premachandran, P. (2016). A study on the relationship between metacognition and academic achievement of secondary school students. International Journal of Research in Humanities and Social Sciences, 4(6), 25–32.

Jamil, N. L., & Mahmud, S. N. D. (2019). Self-efficacy relationship on science achievement amongst national secondary school students. Creative Education, 10(11), 2509–2527.

Jennings, J. L., & DiPrete, T. A. (2010). Teacher effects on social and behavioral skills in early elementary school. Sociology of Education, 83(2), 135–159.

Jensen, J. L., Kummer, T. A., & Godoy, P. D. M. (2015). Improvements from a flipped classroom may simply be the fruits of active learning. CBE—Life Sciences Education, 14(1), 1–12. https://doi.org/10.1187/cbe.14-08-0129

Jeong, H. (2022). Intrinsic motivation and self-directed learning: Their effects on student performance in science education. Journal of Educational Psychology, 114(3), 547–563.

Jiang, F., & McComas, W. F. (2015). The effects of inquiry teaching on student science achievement and attitudes: Evidence from propensity score analysis of PISA data. International Journal of Science Education, 37(3), 554–576.

Johnson, M. (2023). Student engagement strategies: Best practices for the classroom. Learning Innovations Journal, 15(1), 27–39.

Jufrida, J., Basuki, F. R., Kurniawan, W., Pangestu, M. D., & Fitaloka, O. (2019). Scientific literacy and science learning achievement at junior high school. International Journal of Evaluation and Research in Education, 8(4), 630–636.

Jufrida, J., Basuki, F. R., Kurniawan, W., Pangestu, M. D., & Fitaloka, O. (2019). Scientific literacy and science learning achievement at junior high school. International Journal of Evaluation and Research in Education, 8(4), 630–636.

Kaplan, S. N., & Gould, M. (2022). Differentiated instruction made practical: Engaging the extremes in all classrooms. Free Spirit Publishing.

Kenwright, K. (2023). Clickers in the classroom. TechTrends.

Kern, L., & Clemens, N. H. (2007). Antecedent strategies to promote appropriate classroom behavior. Psychology in the Schools, 44(1), 65–75. https://doi.org/10.1002/pits.20206

Kisac, I., & Slave, M. (2013). The role of metacognition in learning processes. International Journal of Learning and Development, 3(4), 22–36.

Koriat, A., & Goldsmith, M. (2019). Monitoring and control processes in the strategic regulation of memory accuracy. Psychological Review, 126(5), 663–687. https://doi.org/10.1037/rev0000153

Kosie, J. E., & Lew-Williams, C. (2024). Open science considerations for descriptive research in developmental science. Infant and Child Development, 33(1), e2377.

Krach, S. K., McCreery, M. P., & Rimel, H. (2017). Examining the efficacy of a digital behavior management system in the classroom. Journal of Educational Technology Systems, 45(3), 307–328. https://doi.org/10.1177/004723951665061

Kremer, K., Specht, C., Urhahne, D., & Mayer, J. (2014). The relationship in biology between the nature of science and scientific inquiry. Journal of Biological Education, 48, 1–8. https://doi.org/10.1080/00219266.2013.788541

Lane, K. L., Menzies, H. M., Ennis, R. P., & Oakes, W. P. (2015). Comprehensive, integrated, three-tiered (Ci3T) models of prevention: Supporting academic, behavioral, and social competencies. Guilford Press.

Lane, K. L., Menzies, H. M., Ennis, R. P., & Oakes, W. P. (2019). Designing and delivering effective precorrection strategies. Intervention in School and Clinic, 54(3), 131–139.

Lee, J., & Reigeluth, C. M. (2014–2024). The impact of learning menus on student choice and engagement in personalized learning environments. Educational Research and Innovation.

Lei, H., Cui, Y., & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. Social Behavior and Personality, 46, 517–528. https://doi.org/10.2224/SBP.7054

Lewin, K. (2009). Field theory in social science: Selected theoretical papers. Harper & Row.

Lewis, R. (2020). The power of positive classroom management: Strategies for a truly inclusive classroom. Routledge.

Lin, M. H., Chen, H. C., & Liu, K. S. (2017). A study of the effects of digital learning on learning motivation and learning outcome. Eurasia Journal of Mathematics, Science and Technology Education, 13(7), 3553–3564.

Loeng, S. (2020). Self-directed learning: A core concept in adult education. Education Research International. https://doi.org/10.1155/2020/3816132

Louca, L. (2008). Metacognition and theory of mind: A literature review. Educational Research Review, 3(1), 1–15.

Maher, M., Latulipe, C., Lipford, H., & Rorrer, A. (2015). Flipped classroom strategies for CS education. In Proceedings of the 46th ACM Technical Symposium on Computer Science Education (pp. 297–302). https://doi.org/10.1145/2676723.2677252

Malik, R. H., & Rizvi, A. A. (2018). Effect of classroom learning environment on students' academic achievement in mathematics at secondary level. Bulletin of Education and Research, 40(2), 207–218.

Markula, A., & Aksela, M. (2022). The key characteristics of project-based learning: How teachers implement projects in K-12 science education. Disciplinary and Interdisciplinary Science Education Research, 4. https://doi.org/10.1186/s43031-021-00042-x

Martin, D. M. (2017). Using menus as a differentiation technique in small multilevel life science and physical science classrooms. [Journal or publisher name missing – please provide for complete citation]

McEwen, B., Gray, J., & Nasca, C. (2015). 60 years of neuroendocrinology: Redefining neuroendocrinology: Stress, sex and cognitive and emotional regulation. The Journal of Endocrinology, 226(2), T67–T83. https://doi.org/10.1530/JOE-15-0121

McGinnis, E., & Goldstein, A. P. (2014). Skillstreaming in the elementary school: New strategies and perspectives for teaching prosocial skills (3rd ed.). Research Press.

McIntosh, K., Barnes, A. C., Strickland-Cohen, M. K., & Hosp, J. L. (2022). Positive behavioral interventions and supports: A practical guide. Guilford Press.

McLaughlin, J. E., Roth, M. T., Glatt, D. M., Gharkholonarehe, N., Davidson, C. A., Griffin, L. M., … & Mumper, R. J. (2014). The flipped classroom: A course redesign to foster learning and engagement in a health professions school. Academic Medicine, 89(2), 236–243. https://doi.org/10.1097/ACM.0000000000000086

McMillan, J. H., & Schumacher, S. (2014). Research in education: Evidence-based inquiry. Pearson.

Mi, Z., Cao, W., Diao, W., Wu, M., & Fang, X. (2023). The relationship between parental phubbing and mobile phone addiction in junior high school students: A moderated mediation model. Frontiers in Psychology.

Morin, A. (2021). Time-out as a behavior intervention for children. Understood.org. https://www.understood.org

Morrison, G. R., Ross, S. J., Morrison, J. R., & Kalman, H. K. (2019). Designing effective instruction. John Wiley & Sons.

Morton, C., Saleh, S. N., Smith, S. F., Hemani, A., Ameen, A., Bennie, T. D., & Toro-Troconis, M. (2016). Blended learning: How can we optimise undergraduate student engagement? BMC Medical Education, 16. https://doi.org/10.1186/s12909-016-0716-z

O'Neill, R. D., & Abedi, J. (2018). The role of self-regulation in science learning. Journal of Educational Psychology, 110(3), 389–402.

OECD. (n.d.). Science literacy. Retrieved from https://www.oecd.org/en/topics/science-literacy.htm

Özçakmak, H., Sezgin, F., & Duran, A. (2021). The effect of metacognitive awareness on academic success. International Journal of Contemporary Educational Research, 8(1), 20–28. https://files.eric.ed.gov/fulltext/EJ1297101.pdf

Özmen, M., & Özkubat, A. (2021). The effects of metacognitive strategies on learners with and without learning disabilities in mathematics. International Journal of Special Education, 36(4), 45–55.

Palmer, D., Rangel, B., & Bagchi, S. (2014). Metacognition and learning: An introduction. Educational Sciences: Theory and Practice, 14(4), 1448–1452.

Pas, E. T., Cash, A. H., O'Brennan, L., Debnam, K. J., & Bradshaw, C. P. (2015). Profiles of classroom behavior in high schools: Associations with teacher behavior management strategies and classroom composition. Journal of School Psychology, 53(2), 137–148.

Pedone, R., Semerari, A., Riccardi, I., Procacci, M., Nicolò, G., & Carcione, A. (2017). Development of a self-report measure of metacognition: The Metacognition Self-Assessment Scale (MSAS). Instrument description and factor structure. Clinical Neuropsychiatry, 14(3), 185–194.

Peng, K.-L., Peng, K., Au, W., Qiu, H., & Deng, C. D. (2023). Digital menus innovation diffusion and transformation process of consumer behavior. Journal of Hospitality and Tourism Technology.

Perry, N. E. (2018). Self-regulation in learning: Building on cognitive theories. Educational Psychology Review.

Pianta, R. C., & Hamre, B. K. (2020). Enhancing student achievement through classroom management: A review of the literature. International Journal of Classroom Management, 21(1), 44–59.

Pintrich, P. R. (2016). The role of strategic control in learning and education. Journal of Educational Psychology, 108(1), 1–15.

Pirker, J., Riffnaller-Schiefer, M., & Gütl, C. (2014). Motivational active learning: Engaging university students in computer science education (pp. 297–302). https://doi.org/10.1145/2591708.2591750

Rahmat, A. D., Kuswanto, H., Wilujeng, I., & Perdana, R. (2023). Implementation of mobile augmented reality on physics learning in junior high school students. International Journal of Emerging Technologies in Learning, 18(10), 1–12.

Reiber, C., & McLaughlin, T. F. (2016). Classroom management strategies for difficult students: Promoting change through relationships. International Journal of Humanities and Social Science, 6(2), 31–35.

Rief, S. F. (2016). The ADD/ADHD checklist: An easy reference for parents and teachers (2nd ed.). Jossey-Bass.

Rogel, R. I. (2012). Academic behavior and performance of third year students of General Emilio Aguinaldo National High School, Division of Cavite (Master's thesis). [Publisher or University name if available].

Sampson, V., Grooms, J., & Walker, J. P. (2019). Argument-driven inquiry as a way to help students learn how to participate in scientific argumentation and craft written arguments: An exploratory study. Science Education, 103(5), 1145–1174.

Santi, A. M., & Hart, A. J. (2021). The role of self-efficacy and interest in self-directed learning environments. Teaching and Teacher Education, 105, 103420. https://doi.org/10.1016/j.tate.2021.103420

Santi, M., & Hart, D. (2021). Visible learning for literacy, grades K–12: Implementing the practices that work best to accelerate student learning. Corwin Literacy.

Schimmer, T. (2016). Grading from the inside out: Bringing accuracy to student assessment through a standards-based mindset. Solution Tree Press.

Schraw, G. (2017). Metacognitive strategies and self-regulation. In D. H. Schunk & J. A. Greene (Eds.), Handbook of research on learning and instruction (pp. 173–189). Routledge.

Schraw, G., & Moshman, D. (2020). Metacognition and learning: Implications for instruction and assessment. Educational Psychologist, 55(2), 113–132. https://doi.org/10.1080/00461520.2020.1721584

Schulz, R. M. (2014). Philosophy of education and science education: A vital but underdeveloped relationship. In N. G. Lederman & S. K. Abell (Eds.), Handbook of Research on Science Education (pp. 1259–1316). Springer. https://doi.org/10.1007/978-94-007-7654-8_39

Simonsen, B., & Freeman, J. (2015). Classroom management strategies for increasing instructional time and student engagement. Guilford Press.

Simonsen, B., Freeman, J., Myers, D., Dooley, K., Maddock, E., Kern, L., & Sugai, G. (2020). A review of evidence-based practices in classroom behavior management. Education and Treatment of Children, 43(4), 491–510. https://doi.org/10.1353/etc.2020.0022

Siswati, S., & Corebima, A. D. (2016). The effects of metacognitive strategies on science learning outcomes. Journal of Education, 11(2), 45–56.

Skiba, R. J., Arredondo, M. I., & Williams, N. T. (2023). Zero tolerance and exclusionary discipline in schools: A critical review. Policy Insights from the Behavioral and Brain Sciences, 10(1), 18–25.

Smith, A. B. (2025). Implementing learning menus across a year: A teacher's case study. Educational Leadership Review.

Smith, T. J., Lee, A. K., & Turner, D. P. (2021). Tracking metacognitive development in middle school students: A descriptive developmental study. Journal of Educational Psychology, 113(4), 689–703.

Song, J. H., Loyal, S., & Lond, B. (2021). Metacognitive awareness scale, domain specific (MCAS-DS): Assessing metacognitive awareness during Raven's progressive matrices. Frontiers in Psychology, 11, 607577.

Stebner, F., Schuster, C., Weber, X. L., Greiff, S., Leutner, D., & Wirth, J. (2022). Combining self-regulation and metacognition in educational settings. Learning and Instruction.

Steinmayr, R., Weidinger, A. F., Schwinger, M., & Spinath, B. (2019). The importance of students' motivation for their academic achievement – Replicating and extending previous findings. Frontiers in Psychology, 10, 464340.

Styers, M., Van Zandt, P. A., & Hayden, K. L. (2018). Active learning in flipped life science courses promotes development of critical thinking skills. CBE–Life Sciences Education, 17. https://doi.org/10.1187/cbe.16-11-0332

Sugai, G., & Horner, R. H. (2020). School-wide positive behavior interventions and supports: History, defining features, and misconceptions. APBS Journal, 6(1), 3–12.

The Teaching Factor. (2022). Tag: Choice menu boards. WordPress. https://theteachingfactor.wordpress.com/tag/choice-menu-boards/

Tomlinson, C. A., & Moon, T. R. (2013). Assessment and student success in a differentiated classroom. ASCD.

Utami, B., Saputro, S., & Masykuri, M. (2016, January). Scientific literacy in science lesson. In Proceedings of the International Conference on Teacher Training and Education (Vol. 1, No. 1).

VanTassel-Baska, J., & Little, C. A. (2017). Navigating the complex world of gifted education programming: Research-based best practices. Prufrock Press.

Veenman, M. V. J. (2017). Learning to self-monitor and self-regulate. In R. Mayer & P. Alexander (Eds.), Handbook of research on learning and instruction (2nd ed., pp. 197–218). Routledge.

Veenman, M. V. J., & Van Cleef, D. (2014). The role of cognitive awareness in self-regulated learning. [Full source missing]

Venet, A. S. (2015). Identify the essential in classroom management. Edutopia. https://www.edutopia.org

Wehby, J. H., Sutherland, K. S., & Lane, K. L. (2022). Preventing and responding to behavior problems in schools: Evidence-based practices. Guilford Press.

Weil, L. G., Fleming, S. M., Dumontheil, I., Kilford, E. J., Weil, R. S., Rees, G., & Blakemore, S. J. (2013). The development of metacognitive ability in adolescence. Consciousness and Cognition, 22(1), 264–271.

Werf, G. V. D., Galton, M., & Simon, B. (2023). Progress and performance in the primary classroom. European Journal of Education.

Westphal, L. E. (2021). Differentiating instruction with menus: Math (Grades 6–8). Routledge.

Wettstein, A., Jenni, G., Schneider, S., Kühne, F., Holtforth, M. G., & La Marca, R. (2023). Teachers' perception of aggressive student behavior through the lens of chronic worry and resignation, and its association with psychophysiological stress: An observational study. Social Psychology of Education.

Wieman, C. (2014). Large-scale comparison of science teaching methods sends clear message. Proceedings of the National Academy of Sciences, 111, 8319–8320. https://doi.org/10.1073/pnas.1407304111

Wiggins, G., McTighe, J., & Kiernan, L. (2017). Understanding by design (2nd ed.). ASCD.

Winne, P. H. (2021). Cognition, metacognition, and self-regulated learning. In Oxford Research Encyclopedia of Education. https://doi.org/10.1093/acrefore/9780190264093.013.70

Wut, T., Xu, J., Lee, S., & Lee, D.-S. (2022). University student readiness and its effect on intention to participate in the flipped classroom setting of hybrid learning. Education Sciences, 12(6), 426.

Ye, R., Chen, P., Mao, Y., Wang-Lin, A., Shaikh, H., Zavaleta Bernuy, A. M., & Williams, J. (2022). Behavioral consequences of reminder emails on students' academic performance: A real-world deployment. In Proceedings of the 23rd Annual Conference on Information Technology Education.

Yoon, S. A., Anderson, E., Koehler-Yom, J., Evans, C., Park, M., Sheldon, J., Schoenfeld, I., Wendel, D., Scheintaub, H., & Klopfer, E. (2016). Teaching about complex systems is no simple matter: Building effective professional development for computer-supported complex systems instruction. Instructional Science, 45, 99–121. https://doi.org/10.1007/s11251-016-9388-7

Yusnaeni, E., & Corebima, A. D. (2017). Development of metacognitive awareness in learning. Asia-Pacific Forum on Science Learning and Teaching, 18(2), 15–21.

Zeidan, A., & Jayosi, M. (2015). Enhancing scientific literacy: The importance of integrating content knowledge and scientific process skills. International Journal of Science Education, 37(15), 2475–2492. https://files.eric.ed.gov/fulltext/EJ1409679.pdf

Zepeda, C. D., Richey, J. E., Ronevich, P., & Nokes-Malach, T. J. (2019). Direct instruction of metacognition benefits adolescent science learning, transfer, and motivation: An investigation of real-world classrooms. Journal of Educational Psychology, 111(4), 535–550. https://doi.org/10.1037/edu0000296

Zhai, X., & Tan, A. L. (2021). A systematic review of science education research about the use of ICTs in secondary school science learning. Studies in Science Education, 57(1), 73–110.

Zimmerman, B. J. (2015). Self-regulated learning and academic achievement: An overview. Educational Psychologist.

Zimmerman, B. J. (2018). Developing self-regulation of learning. Educational Psychologist, 53(3), 126–141.

Zimmerman, B. J., & Schunk, D. H. (2016). Self-regulated learning: Theories, measures, and outcomes. Springer. Aydın Ceran, B., & Esen, M. (2022). Improving the science process skills and science literacy of primary school pre-service teachers with different parental education levels. Journal of Education and Learning, 11(2), 45–58. https://www.researchgate.net/publication/366674230_Improving_the_Science_Process_Skills_and_Science_Literacy_of_Primary_School_Pre-service_Teachers_with_Different_Parental_Education_Levels