

Students' Engagement and Grade Performance in Science of Intermediate Students: Basis for an Action Plan

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Abstract—This study determined the relationship between student engagement and academic performance in Science among intermediate students in Vietnam. Recognizing the importance of Science education in developing critical 21st-century skills, the research determines how various aspects of engagement, behavioral, cognitive, and emotional, as they affect students' Science grades. Anchored in Albert Bandura's Social Cognitive Theory, which emphasizes the interplay between personal factors, behavior, and environment, the study applies a quantitative research design. Data were collected through a validated questionnaire and the students' first-quarter Science grades. Statistical analyses were used to determine correlations between engagement levels and academic outcomes. The findings aim to inform the development of a targeted action plan to enhance Science engagement, recommending strategies in curriculum design, instructional approaches, and teacher training. Ultimately, the research contributes to ongoing educational reforms by promoting interactive, student-centered learning environments that improve motivation and academic achievement in Science.

Keywords—Academic performance, behavioral, cognitive, emotional, student engagement.

I. INTRODUCTION

Student engagement in Science is necessary to help students thrive academically, ignite their curiosity, and develop the critical thinking skills essential for Science, Technology, Engineering, and Mathematics (STEM) careers. In recent years, with the growth of digital learning and virtual classrooms, educators and schools worldwide have focused on making science education more engaging and interactive. By incorporating more interactive tools like virtual labs, simulations, and group activities, teachers are finding creative ways to make Science accessible and stimulating. These strategies are about helping students perform well academically and fostering a love for discovery and innovation. For example, in South Korea, studies have found that virtual simulations and gamified learning platforms make Science more appealing to students. These technologies allow students to explore complex scientific concepts hands-on, enhancing their emotional connection to the material and cognitive understanding (Lee & Kim, 2021). This type of interactive learning helps students not just understand the material but also enjoy the learning process. Researchers in the United States and Europe focus on inquiry-based learning, where students are encouraged to ask questions and conduct experiments to explore scientific topics. According to Fung et al. (2020), this approach is particularly effective in

group settings, where students collaborate, solve problems, and develop teamwork skills essential for success in Science. The global focus on increasing student engagement in Science underscores the need for adaptable and innovative teaching methods. Whether through the use of technology, collaborative learning, or culturally relevant content, educators around the world are working together to create more engaging educational environments that equip students to discuss the challenges and opportunities of the 21st century. In Vietnam, student engagement in science education has gained growing importance as the country prioritizes building a skilled workforce for the demands of the 21st century. The education system, especially in Science, is undergoing reforms aimed at modernizing teaching methods and promoting more interactive, student-centered learning experiences. However, traditional practices like rote memorization still dominate classrooms, which can limit student engagement (Nguyen, 2020). There has been a gradual shift towards more dynamic learning strategies, such as inquiry-based learning and the use of technology in science education. For instance, Vietnam has been improving teacher training and revising curricula to foster critical thinking and creativity (Thi Minh Nguyet Nguyen, 2020). This effort aligns with global trends to enhance student engagement through interactive and inquiry-based teaching techniques. Despite these reforms, challenges persist, particularly in terms of securing sufficient resources and materials to support these innovative approaches (Global Partnership for Education, 2021). While these efforts reflect a strong commitment to boosting student engagement and achievement in Science, progress has been gradual, and there is a need for continuous improvement in teacher preparation and curriculum innovation. In line with this, the researcher came up with this study out of concern for the low motivation levels observed among Vietnamese students in science education. Despite the importance of Science in building critical skills like problem-solving and analytical thinking, many students in Vietnam seem only moderately engaged with the subject. Their grades could suffer, and they would be less able to adjust to a world where scientific advancement and information are becoming more and more important. The purpose of this is to investigate how students' engagement and grade performance in Science are related, as well as how increased motivation may affect academic results. By focusing on engagement strategies, the

researcher aims to determine whether improving student engagement could lead to better grades and a more stimulating learning environment. The findings may provide valuable insights into how science education in Vietnam can be enhanced to make it more engaging and effective for students, fostering a deeper interest and better outcomes.

II. METHODOLOGY

This chapter outlines the research design, participant demographics, instruments utilized, procedural steps, and statistical methods that will be applied throughout the study.

A. Research Design

This study utilized a quantitative research design to examine the relationship between students' engagement and grade performance in Science for the respondents. This approach facilitated the systematic collection of numerical data that could be subjected to statistical analysis to detect patterns, trends, and correlations among the variables. The researcher utilized quantitative methods such as surveys or standardized assessments to objectively measure students' engagement levels and science grade performance, yielding empirical insights into the research questions. Moreover, through correlational analysis, the study evaluated the strength and direction of these relationships, providing valuable insights into the dynamics of student engagement in science education. Creswell (2019) outlined the quantitative correlational research method, offering comprehensive guidance on conducting such studies. His framework included steps such as identifying variables, selecting appropriate measures, collecting data, and performing statistical analyses to explore relationships and predict outcomes across diverse fields, including education.

B. Population and Sampling Technique

To ensure that the study's findings are accurate and representative of the entire student population, the researcher utilized a purposive sampling technique. These consisted of six sections, resulting in a total of 129 respondents. This method ensures that the entire population of interest is considered, thereby enhancing the reliability of the data collected. Total enumeration allows for a comprehensive understanding of the phenomena under investigation, as it captures the full spectrum of student experiences and perspectives within the classroom setting. By involving all students, the study minimizes sampling bias and strengthens the validity of its conclusions, as every individual's input contributes to a richer data set. This approach not only provides a holistic view of the student population but also facilitates the identification of patterns and trends that might be overlooked in smaller, non-representative samples. Ultimately, employing total enumeration reinforces the credibility of the research findings, making them more applicable to broader educational contexts.

C. Respondents of the Study

The respondents were one hundred twenty-nine (129) students from five sections that the research is handling or in close contact with. These respondents were Vietnamese fifth graders who were in the concrete operational stage of cognitive development, which allows them to understand logical relationships and engage in more complex problem-solving

while also becoming more aware of social hierarchies and valuing friendships. They experience a range of emotions, are influenced by cultural factors that emphasize respect for education and authority, and often participate in after-school tutoring to enhance their academic performance.

D. Instrumentation

The survey instrument for this study was composed of three distinct parts to gather comprehensive data. The first part focused on collecting demographic information about the respondents, including their age and sex. This demographic data was essential for understanding the sample's composition and analyzing potential differences in engagement and assessment based on these factors. The second part of the survey aimed to evaluate the respondents' level of engagement. It was divided into three key dimensions: behavioural, cognitive, and emotional. The third part focused on students' grade performance in Science during the first quarter of the School year 2024-2025. Part two of the survey used a four-point Likert scale for responses, ranging from "strongly disagree" to "strongly agree." This scale allowed students to indicate the extent of their agreement with various statements about their engagement, providing a nuanced view of their experiences and perceptions, and facilitating quantitative analysis of the data. This structured approach ensured that the surveys that were collected gave a wide range of information, from demographic profiles to a detailed level of engagement and their grade performance in Science, thereby providing valuable insights for the study.

III. STATISTICAL TREATMENT OF DATA

Data analysis was required to determine the outcome of the information obtained. The following statistical tools will be considered in analyzing the gathered data.

Frequency and percentage were used to examine the profile of the respondents in terms of age and sex.

Weighted mean and standard deviation were utilized to examine the level of students' engagement.

Frequency and percentage were used to examine the grade performance in Science of the respondents.

Independent T-test and an Analysis of Variance (ANOVA) were utilized to assess the significant difference in students' engagement levels when grouped based on their profiles.

Pearson's r was utilized to examine the significant correlation between the level of engagement of the respondents and grade performance in Science.

IV. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Problem number 1. What is the profile of the respondents in terms of Age and Sex?

Table 1 shows the distribution of respondents' ages across five groups (A to E).

The majority of learners in each group are 10 years old, with the highest proportion observed in Group D (77.8%), followed by Group E (70.4%). Group B reflects the most balanced age distribution, with 56.0% of respondents aged 10 and 44.0% aged 11. The data indicates that the majority of intermediate learners are within the typical age range for their grade,

especially those aged 10. This consistency suggests that most students are progressing through school as expected, which can support a more standardized approach to lesson planning.

Table 1: Frequency and Percentage of the Profile of the Respondents in Terms of Age.

		Frequency	Percent
A	10	16	61.5
	11	10	38.5
	Total	26	100.0
B	10	14	56.0
	11	11	44.0
	Total	25	100.0
C	10	14	58.3
	11	10	41.7
	Total	24	100.0
D	10	21	77.8
	11	6	22.2
	Total	27	100.0
E	10	19	70.4
	11	8	29.6
	Total	27	100.0
GRAND TOTAL		129	100

On the other hand, the age variation in Group B with a notable number of 11- year-olds may point to instances of late school entry or grade retention. Such differences could influence classroom interactions, as older students may exhibit varying levels of maturity or learning needs. As a result, teachers may need to implement differentiated instruction and age-appropriate engagement strategies to support the diverse needs of all learners.

Table 2 presents the distribution of respondents according to sex across sections A to E. The data indicate a relatively balanced gender composition in all groups. Female respondents slightly outnumber males in Groups A (53.8%), C (54.2%), and E (55.6%), while male respondents are more prevalent in Groups B (52.0%) and D (51.9%). The overall trend reflects an almost equal representation of male and female students across all groups. The nearly equal distribution of male and female students across all sections indicates balanced gender representation at the intermediate level.

This provides an opportunity to implement gender-neutral teaching strategies and inclusive classroom activities that promote equal participation. Minor differences in gender ratios among the groups are not expected to significantly influence classroom interactions. Nevertheless, educators may still benefit from incorporating gender-responsive practices to accommodate diverse learning preferences. In general, this equitable gender balance fosters a supportive and inclusive educational environment for all learners.

This balanced sex distribution may contribute to equitable participation during the implementation of learning activities. As emphasized by Yazon et al. (2020), ensuring equal opportunities for both male and female learners promotes inclusivity and engagement in science education. Moreover, Bautista and Ocampo (2021) highlight that recognizing the

diversity in learners' backgrounds, including sex, allows educators to create a more responsive and adaptive learning environment.

Table 2 Frequency and Percentage of the Profile of the Respondents in Terms of Sex

	SEX	Frequency	Percent
A	Male	12	46.2
	Female	14	53.8
	Total	26	100.0
B	Male	13	52.0
	Female	12	48.0
	Total	25	100.0
C	Male	11	45.8
	Female	13	54.2
	Total	24	100.0
D	Male	14	51.9
	Female	13	48.1
	Total	27	100.0
E	Male	12	44.4
	Female	15	55.6
	Total	27	100.0

Problem number 2. What is the level of student engagement of the respondents in terms of Behavioral Engagement, Cognitive Engagement, and Emotional Engagement?

Table 3 presents the respondents' level of behavioral engagement based on their self-reported participation in classroom activities and academic responsibilities. The overall weighted mean for behavioral engagement is 3.12 with a standard deviation of 0.21, indicating that students generally "Agree" with the behavioral engagement statements.

Table 3 Mean and Standard Deviation on the Level of Student Engagement of the Respondents in Terms of Behavioral Engagement

	Mean	Std. Deviation	Verbal Interpretation
1. I am asking questions in class or contributing to class discussions.	3.12	0.71	Agree
2. I am raising my hands in class.	3.22	0.67	Agree
3. I am participating in small group discussions.	3.09	0.62	Agree
4. I am doing all my homework.	3.04	0.62	Agree
5. I am coming to class everyday on time.	3.23	0.59	Agree
6. I am taking notes in class.	3.07	0.61	Agree
7. I am getting a good grade.	3.10	0.60	Agree
8. I am receiving prompt written oral feedback from faculty on my academic performance.	3.02	0.62	Agree
9. I am making sure to study for the upcoming quizzes and exams.	3.12	0.61	Agree
10. I am doing well on a test.	3.23	0.62	Agree
BEHAVIORAL	3.12	0.21	Agree
Legend:	4	3.50 - 4.00	Strongly Agree
	2	1.50 - 2.49	Disagree
	3	2.50 - 3.49	Agree
	1	1.00 - 1.49	Strongly Disagree

Among the indicators, the highest mean scores (3.23) are observed in "I am coming to class every day on time" and "I am

doing well on a test," suggesting that students perceive themselves as punctual and performing well academically. The lowest scores in "I am receiving prompt written oral feedback from faculty" (mean = 3.02), pointing to an area where teacher responsiveness could be improved.

These findings suggest that students are behaviorally engaged through consistent attendance, participation, and preparation. Fredricks et al. (2004) state that students' participation in social and academic activities is a crucial factor in promoting academic achievement, and that this participation is reflected in their behavior. Moreover, Ramos and Pascual (2020) stress the importance of observable actions such as participation and effort as reliable indicators of learners' engagement in science classrooms.

Behavioral engagement, as measured in this study, shows that learners are actively participating in their academic tasks, which is essential for maximizing learning outcomes and supporting sustained academic interest.

Table 4 illustrates the level of student engagement of the respondents in terms of cognitive engagement. The overall weighted mean was 3.19 (SD = 0.22), with all indicators falling within the "Agree" range (2.50 – 3.49). This suggests that, on average, students exhibit a positive level of cognitive engagement in their academic activities.

Table 4
Mean and Standard Deviation on the Level of Student Engagement of the Respondents in Terms of Cognitive Engagement

	Mean	Std. Deviation	Verbal Interpretation
1. I am making a class presentation.	3.16	0.59	Agree
2. I am working on a paper project that required integrating ideas or information from previous resources.	3.17	0.63	Agree
3. I am putting together ideas or concepts from different sources when completing assignments or during class discussions.	3.15	0.60	Agree
4. I am using an electronic medium to discuss or complete assignment.	3.22	0.60	Agree
5. I am discussing ideas from readings or classes with faculty members outside class.	3.09	0.68	Agree
6. I am working harder than I thought I could meet a teachers' standards or expectations.	3.24	0.62	Agree
7. I am going to teacher's office during hours to review assignments or tests or asks questions.	3.16	0.66	Agree
8. I am thinking about subjects between class meetings.	3.23	0.64	Agree
9. I am reviewing class notes between classes to ensure I understand everything.	3.15	0.70	Agree
10. I am applying what I have learned to my life.	3.33	0.69	Agree
COGNITIVE	3.19	0.22	Agree
Legend:	4 3.50 - 4.00 Strongly Agree	3 2.50 - 3.49 Agree	
	2 1.50 - 2.49 Disagree	1 1.00 - 1.49 Strongly Disagree	

The highest-rated indicator was "I am applying what I have learned to my life" with a mean of 3.33, reflecting students' ability to connect classroom learning to real-life contexts, a key aspect of meaningful learning. Meanwhile, the lowest-rated item, "I am discussing ideas from readings or classes with faculty members outside class" (M = 3.09), points to an area where engagement might be further encouraged.

These findings imply that students are actively processing and integrating knowledge, which is central to deep learning.

According to Pintrich and De Groot (1990), cognitive engagement is characterized by the use of self-regulation strategies and the willingness to exert effort in learning tasks. The results align with the assertions of Zhao (2012), as cited in the document, who emphasized that cognitive engagement reflects students' investment in learning and their readiness to apply higher-order thinking. Furthermore, De Vera (2015) highlights that when students are cognitively engaged, they are more likely to be autonomous and motivated learners, both essential traits for academic success.

The relatively uniform agreement across all indicators also suggests the presence of instructional practices that support cognitive involvement. As Barrot (2014) argues, engaging learners cognitively requires designing tasks that challenge their thinking and encourage reflection, which appears to be present in the current educational setting examined.

Table 5 details students' responses regarding emotional engagement. The overall weighted mean for emotional engagement is 3.11 (SD = 0.25), falling within the "Agree" range. This indicates that, on average, students feel moderately positive about their emotional involvement in learning activities. Notably, the highest mean score is observed in the item "I am including diverse perspectives in class discussions or writing assignments" (M = 3.19), suggesting that students appreciate opportunities to express and incorporate varied viewpoints. Conversely, the lowest mean score appears in "I am working with teachers on activities" (M = 2.93), which may point to a relative need for enhancing teacher-student interactive experiences.

Table 5
Mean and Standard Deviation on the Level of Student Engagement of the Respondents in Terms of Emotional Engagement

	Mean	Std. Deviation	Verbal Interpretation
1. I am including diverse perspectives in class discussions or writing assignments.	3.19	0.65	Agree
2. I am working with other students on projects.	3.15	0.67	Agree
3. I am working with classmates to prepare class assignments.	3.21	0.66	Agree
4. I am tutoring or teaching other students voluntarily.	3.12	0.61	Agree
5. I am participating in a community-based project as part of a regular subject.	3.07	0.72	Agree
6. I am desiring to learn everything during discussions.	3.05	0.61	Agree
7. I am confident that I can learn and do well in class.	3.06	0.73	Agree
8. I am having fun in class.	3.12	0.69	Agree
9. I am working with teachers on activities.	2.93	0.63	Agree
10. I am talking about career plans with a teacher or adviser.	3.16	0.80	Agree
EMOTIONAL	3.11	0.25	Agree
Legend:	4 3.50 - 4.00 Strongly Agree	3 2.50 - 3.49 Agree	
	2 1.50 - 2.49 Disagree	1 1.00 - 1.49 Strongly Disagree	

The overall mean score of 3.11 for emotional engagement indicates that students feel generally positive about their involvement in learning, though there is still potential for growth. The highest-rated item, which involves incorporating diverse perspectives, suggests that students appreciate

opportunities to share their views and participate in inclusive classroom discussions. This reflects a learning environment that supports openness and connection. On the other hand, the lowest score, related to collaboration with teachers on activities, points to a possible lack of interactive engagement between students and educators. Enhancing teacher-student collaboration could foster stronger emotional connections, boost motivation, and lead to more meaningful learning experiences. These results suggest that while students are emotionally engaged through peer interactions and independent learning efforts, there might be room for improved collaborative initiatives with instructors—a factor that is critical for fostering a supportive learning environment (Fredricks et al., 2004; Lai, 2021).

Table 6 offers a composite view of overall student engagement by summarizing the three dimensions: behavioral, cognitive, and emotional.

Table 6
Mean and Standard Deviation of the Composite Table on the Level of Student Engagement of the Respondents

	Mean	Std. Deviation	Verbal Interpretation
BEHAVIORAL	3.12	0.21	Agree
COGNITIVE	3.19	0.22	Agree
EMOTIONAL	3.11	0.25	Agree
Level of Students' Engagement	3.14	0.14	Agree
Legend:	4 2	3.50 - 4.00 1.50 - 2.49	Strongly Agree Disagree
	3 1	2.50 - 3.49 1.00 - 1.49	Agree Strongly Disagree

The overall composite mean for students' engagement is 3.14 (SD = 0.14), which also falls within the "Agree" range. These findings reveal that students maintain a relatively consistent level of engagement across all dimensions. In particular, the slightly higher mean for cognitive engagement indicates that students are most actively involved in processes related to thinking, problem solving, and integrating new information. The similar levels of behavioral and emotional engagement suggest that while students are committed to participation and exhibit positive emotional responses, there is potential to further bolster these areas to achieve a more robust, holistic engagement in learning. The overall composite mean of 3.14 suggests that students show a generally positive and steady level of engagement across behavioral, cognitive, and emotional aspects. The slightly higher mean in cognitive engagement indicates that learners are particularly involved in tasks requiring critical thinking, problem-solving, and the integration of new ideas, highlighting strong intellectual involvement.

In contrast, the slightly lower scores in behavioral and emotional engagement suggest that while students are active and emotionally connected, these areas may need additional reinforcement. Encouraging more interactive, collaborative, and emotionally supportive learning experiences could help improve these dimensions. Achieving a more balanced engagement across all areas can lead to richer and more meaningful learning outcomes.

These composite results underscore the importance of an integrated approach in enhancing student engagement, where reinforcing cognitive strategies and supporting interactive, emotionally rich classroom environments are both essential

(Fredricks et al., 2004; Azevedo et al., 2019)

Problem number 3. Is there a significant difference between the level of students' engagement when grouped according to their profile?

Table 7 presents the results of the t-test comparing the level of student engagement according to respondents' age and sex.

Table 7
Test of Significant Difference Between the Level of Students' Engagement When Grouped According to the Their Profile

	t	df	Sig. (2-tailed)	Decision	Remark
Age - Level of Students' Engagement	-41.075	128	0.000	Reject	Significant
Sex - Level of Students' Engagement	-35.334	128	0.000	Reject	Significant

For both variables, the t-values are highly negative ($t = -41.075$ for age and $t = -35.334$ for sex) with a significance level of 0.000. This indicates that there is a statistically significant difference in student engagement when the respondents are grouped by age and sex. This reveals a statistically significant difference in students' engagement when grouped according to age and sex, with both variables yielding a p-value of 0.000, leading to the rejection of the null hypothesis. This implies that student engagement levels vary across age and gender groups, suggesting that these demographic factors play a crucial role in shaping how students participate and interact in educational settings. These results support Bandura's (1986) Social Cognitive Theory, which emphasizes that personal factors (such as age and sex) influence learning behavior and engagement through reciprocal determinism.

The implications of these findings suggest the need for differentiated strategies to enhance engagement based on student profiles. For example, younger learners may benefit from more gamified or interactive learning approaches (Jang & Kim, 2022), while older students might respond better to autonomous or collaborative learning structures (Lai, 2021). Similarly, engagement strategies may need to be gender-responsive to address differences in interests, communication styles, or comfort with classroom activities. In other words, differences in the profiles, both age and sex, significantly influence the overall level of engagement. These results suggest that demographic factors play a critical role in shaping students' engagement in their learning process. This aligns with literature suggesting that background characteristics can affect engagement patterns (Fredricks et al., 2004; Lai, 2021).

Supporting literature reinforces that student engagement is not one-size-fits-all. Estrella et al. (2023) found that engagement levels in ABM students varied according to individual and contextual factors. Educational practices must therefore evolve to consider age- and gender-specific needs, ensuring inclusive and meaningful participation for all learners. *Problem number 4. What is the grade performance in science of the respondents during the first grading period?*

The results in Table 8 show the science grade performance of five student groups during the first grading period. Group C achieved the highest mean score ($M = 8.18$), closely followed by Group B ($M = 8.16$), while Group A recorded the lowest mean ($M = 7.20$). The standard deviation values suggest relatively consistent performance within Groups B and D, while

Group A exhibited more variability. These results indicate that while most groups performed similarly, some disparities in academic achievement exist across groups.

Table 8
Grade Performance in Science of the Respondents During the First Grading Period

Group	N	Mean	Std. Deviation
A	26	7.20	1.41
B	25	8.16	0.80
C	24	8.18	1.20
D	27	7.68	1.00
E	27	7.54	1.04

The variation in science performance may reflect differences in instructional quality, engagement levels, or access to learning resources. According to Fredricks, Blumenfeld, and Paris (2004), student engagement is a key predictor of academic success, particularly in subjects like science that require active cognitive participation.

Additionally, Chowdhury, Patel, and Ahmed (2021) emphasized the importance of contextualized and hands-on learning, such as mobile science labs, in enhancing both understanding and performance, especially in underserved groups. Therefore, groups with lower mean scores may benefit from more interactive and personalized instruction.

These findings suggest that science education must be adaptive to meet learners' diverse needs and contexts. As Estrella et al. (2023) pointed out, academic performance among students is influenced not only by individual aptitude but also by the learning environment and pedagogical approaches. Enhancing collaborative activities (Fung, Ivanitskaya, & Lee, 2020) and integrating culturally relevant science instruction (Petersen & Govender, 2022) could support improved outcomes, especially for lower-performing groups. Schools should therefore consider differentiated teaching strategies and inclusive support systems to help close performance gaps across student clusters

Problem number 5. Is there a significant relationship between the level of student engagement and their grade performance in Science during the first grading period?

Table 9
Correlation Between the Level of Student Engagement and Their Grade Performance in Science During the First Grading Period

Level of Students' Engagement	Pearson Correlation	First Quarter Grade
		-0.006
	Sig. (2-tailed)	0.949
	N	129

The findings presented in Table 9 indicate no significant relationship between the level of student engagement and their grade performance in Science during the first grading period, as shown by the Pearson correlation coefficient ($r = -0.006$, $p = 0.949$). This implies that regardless of how engaged students felt, it did not statistically affect their academic performance in science within the measured timeframe. This result is unexpected given that student engagement is often considered a critical factor in learning outcomes (Fredricks, Blumenfeld, & Paris, 2004). The near-zero correlation suggests that either the

engagement measured did not translate into academic outcomes, or other variables may have played a stronger role in determining student grades.

Problem number 6. Based on the results of the study, what action plan may be proposed?

Introduction: This action plan seeks to reinforce the connection between student engagement and academic performance in science by catering to the varied needs of intermediate learners. It emphasizes nurturing curiosity, motivation, and active involvement through engaging strategies and purposeful learning experiences. By fostering a positive classroom atmosphere and implementing responsive interventions, the plan aims to deepen students' understanding of scientific concepts while promoting critical thinking skills and sustaining their interest in science.

Rationale: The study found that students' academic success in Science is closely linked to their level of engagement, behaviorally, cognitively, and emotionally. Despite educational reforms, many classrooms still rely on traditional methods like rote learning, which hinder meaningful participation and reduce students' interest in science. The action plan responds to this issue by providing targeted strategies to foster deeper student engagement, encourage active learning, and create a more inclusive and motivating classroom environment. By enhancing instructional practices, promoting professional development for teachers, and involving parents and the community, the plan aims to improve science learning outcomes and prepare students for future academic and real-world scientific challenges.

V. SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of findings derived from the data analysis in Chapter 4, the conclusions drawn from the results, and the recommendations based on the study's objectives. The research aimed to evaluate the effectiveness of students' engagement and grade performance in science on an intermediate level basis for an action plan.

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

1. The profile of the respondents revealed that most students were ten years old, particularly in Groups D and E, where the age group dominated the composition. Gender distribution across the groups was relatively balanced, with minor fluctuations between male and female proportions, suggesting a demographically uniform set of respondents suitable for comparative analysis.
2. The values indicate that students agreed with statements reflecting their active, thoughtful, and emotionally positive involvement in classroom activities.
3. There was a significant difference in student engagement when grouped according to age and sex. The statistical test yielded significant p-values (for both variables, confirming that demographic characteristics influence how students engage in academic settings. These differences emphasize the necessity of addressing individual learner needs in classroom management and instructional delivery.
4. These variations suggest that instructional strategies,

classroom dynamics, or student preparedness influence student performance.

5. This indicates no significant relationship between the two variables, suggesting that while students may be engaged, engagement alone may not directly result in higher academic performance.

6. Based on the results, an action plan was proposed focusing on enhancing instructional methods, promoting individualized learning strategies, and maintaining high engagement levels to support better academic outcomes. These recommendations aim to address the gaps and variations observed in both engagement and performance.

VI. CONCLUSION

1. The demographic profile of the students suggests that teaching strategies can be effectively planned for a relatively homogeneous group in terms of age, while also considering the slight gender differences for more inclusive learning experiences.

2. Students demonstrated a positive level of engagement, particularly in cognitive aspects, which implies that they are generally responsive and mentally involved in learning activities, making the classroom environment conducive to higher-order thinking and deeper learning.

3. Significant variations in engagement levels based on age and sex imply that educators must consider these factors when designing and implementing classroom interventions to ensure equitable learning experiences and participation.

4. The variability in Science grades across the different groups points to the need for differentiated instruction and additional support for groups with lower average scores to achieve more consistent academic outcomes across the board.

5. The absence of a significant correlation between student engagement and academic performance implies that engagement alone is not enough to predict success; therefore, teaching strategies must integrate content mastery, assessment literacy, and support mechanisms.

6. The overall findings support the continued use and refinement of active and student-centered instructional strategies. While engagement is evident, academic results can still be improved with focused support and tailored instructional planning.

VII. RECOMMENDATIONS

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

1. Teachers may begin the academic year with diagnostic assessments to identify students' strengths and learning needs, enabling the formulation of instructional plans that accommodate varying levels of readiness and understanding.

2. Educators can reinforce structured, student-led learning strategies that promote both active involvement and critical thinking, ensuring that engagement is not only present but aligned with learning objectives and academic growth.

3. Since age and sex affect engagement, teaching approaches can be adaptive, allowing for differentiated tasks, groupings, and interactions that address the specific needs and tendencies of learners within those demographic categories.

4. Instructional materials and teaching techniques may be differentiated to address the performance gaps among groups, particularly focusing on those with lower Science grades through targeted remediation and support strategies.

5. Teachers may integrate multiple engagement and performance metrics in assessing students, balancing cognitive, behavioral, and emotional engagement with achievement tracking to better understand learning patterns and adjust methods accordingly.

6. Stakeholders, including teachers, parents, and school leaders, may collaboratively implement the action plan designed to enhance student engagement and academic performance, ensuring that strategies are sustainable, inclusive, and continuously improved through monitoring and feedback.

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