

Improving Student Engagement: Educators' Motivational Techniques in Science Instruction at Dupax Del Norte National High School

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Abstract: Science education plays a role in developing learners' scientific literacy, critical thinking, and problem-solving skills. Teachers' motivational techniques are in creating environments that encourage students to participate in science instruction. Despite reforms, challenges in instructional practices, resources, and teacher support continue to affect Science education quality. This research examined motivational techniques employed by science teachers in Dupax del Norte I District, Nueva Vizcaya, and assessed teaching practices, the Science program's strengths and weaknesses, and measures to strengthen instructional delivery. A descriptive-correlational design involved 30 public elementary Science teachers selected through total enumeration sampling. Data was collected using validated researcher-made questionnaire and analyzed using frequency, percentage, mean, standard deviation, and Pearson Product-Moment Correlation Coefficient. Findings revealed that respondents were experienced, academically qualified, and engaged in professional development. Science teaching practices were effective, while teachers consistently applied motivational strategies promoting engagement and participation. The Science program demonstrated strengths in curriculum implementation, teacher competence, and assessment, although limitations in instructional resources, laboratory facilities, and financial support remained evident. Significant relationships were found between teachers' motivational strategies and educational attainment, present position, years of service, and participation in trainings and seminars. The findings emphasize importance of continuous professional development, adequate instructional resources, and strong supervisory support in enhancing teachers' motivational practices and improving Science instruction quality. These results may guide programs to strengthen Science teaching and promote meaningful student learning.

Keywords: *Science instruction, motivational strategies, teacher motivation, professional development*

INTRODUCTION

Science education is vital for sustainable development and global competitiveness, as it equips students with critical knowledge and skills needed to address global challenges and participate effectively in the knowledge economy. Teachers play a key role in this process by promoting quality science education and enhancing students' scientific literacy, which is essential for fostering informed citizens capable of critical thinking and innovation. Motivational teaching strategies are particularly significant in increasing student engagement, curiosity, and academic achievement by fostering autonomy, competence, and relatedness, thus making learning more meaningful and sustainable. Educatorsscience educators worldwide face challenges such as declining student interest, diverse learning needs, and rapid technological changes that demand continual adaptation of teaching

approaches. Consequently, there is a growing international emphasis on learner-centered, inquiry-based, and motivating instructional methods that nurture active participation and deeper understanding in science classrooms (Baihaqi, 2024; Guo et al., 2023).

In the Philippine context, science education under the K–12 curriculum has seen reforms aimed at improving instructional quality and student outcomes. The Department of Education has initiated curriculum enhancements and teacher professional development programs to address gaps in science teaching. Despite these efforts, national assessment results reveal persistent challenges in science achievement, highlighting the need for more effective, motivation-driven teaching strategies to increase learner participation and enthusiasm. Continuous professional development and sustained instructional support for science teachers are crucial to empower educators to meet diverse learner needs and improve science literacy nationwide (Kuznetsova et al., 2023; Suryandari et al., 2024). These advances reflect a broader imperative to align science education with both global sustainability goals and national development priorities.

Effective motivational strategies, such as differentiated instruction and autonomy-supportive teaching, significantly enhance student engagement by catering to diverse learner needs and fostering intrinsic motivation in various educational settings (Li et al., 2022; Temirbay et al., 2025). Innovative approaches, including gamification and active learning, also promote participation, curiosity, and knowledge retention despite challenges like limited resources and diverse learning styles (Fraile-Jurado & Periañez-Cuevas, 2023; Ikpai, 2025). Sustained professional development and learner-centered methodologies remain crucial to maintaining engagement and improving academic outcomes (Baihaqi, 2024; Boateng, 2024). Most prior studies emphasize Science achievement or instructional methods, neglecting teachers' motivational strategies as a holistic concept. Few have concurrently explored curriculum content, teaching methods, instructional resources, evaluation practices, supervisory support, and teachers' motivation. Additionally, limited research investigates how teachers' demographic factors relate to their motivational strategies in elementary Science instruction. Localized studies in Dupax del Norte I District are scarce, highlighting the need for context-specific data. This study fills these gaps by comprehensively assessing Science teaching practices, examining motivational strategies, identifying program strengths and weaknesses, and recommending measures to enhance Science instruction within the district.

RESEARCH QUESTIONS

This study investigates the role of financial forecasting in corporate decision-making and strategic planning in enterprises. Specifically, it sought to answer the following research questions:

- What is the demographic profile of the participating enterprises in terms of size, industry sector, and ownership structure?
- What is the perceived role of financial forecasting in corporate decision-making and strategic planning in enterprises?
- Does cash flow performance differ significantly across industry sectors?
- Is there a significant relationship between cash flow management and financial stability?
- Is there a significant relationship between demographic characteristics and cash flow optimization strategies?

METHODS

Research Design

This study employed descriptive-correlational research design. The descriptive method was used to determine the profile of the respondents, assess the status of science teaching in terms of curriculum content, teaching methods and strategies, equipment and materials, evaluation techniques, supervisory assistance, strengths and weaknesses of the Science program, motivational strategies initiated by teachers, and proposed measures to strengthen the Science program. The correlational method was

utilized to determine whether a significant relationship exists between the respondents' profile variables and their motivational strategies in science instruction.

Local of the Study

The study was conducted in Dupax del Norte I District, Schools Division of Nueva Vizcaya, during the School Year 2025–2026. The district consists of public elementary schools that implement the Department of Education curriculum. It was selected because it provided an appropriate setting for assessing Science teaching practices and the motivational techniques employed by teachers.

Respondents of the Study

The respondents of the study consisted of 30 public elementary school teachers teaching Science in Dupax del Norte I District. These teachers were selected because they are directly involved in the implementation of science instruction and possess firsthand knowledge of the instructional practices and motivational strategies used in the classroom

Sampling Technique

The study employed total enumeration sampling. Since the number of science teachers in Dupax del Norte I District was manageable, all qualified teachers were included as respondents. This sampling technique ensured complete representation of the target population and minimized sampling bias.

Research Instrument

The researcher utilized a structured questionnaire as the primary instrument for data collection. The questionnaire consisted of two parts. Part I gathered the demographic profile of the respondents, including gender, age, civil status, educational attainment, present position, performance rating, years of service, and level of training and seminars attended. Part II measured the respondents' assessment of science teaching practices, strengths and weaknesses of the Science program, motivational strategies employed in teaching Science, and proposed measures to strengthen the Science program using a five-point Likert scale. The instrument was validated by experts in educational research and Science education before administration.

Data Gathering Procedure

Prior to conducting the study, the researcher sought permission from the Schools Division Superintendent, the District Supervisor, and the school heads of the participating schools. After approval was granted, the questionnaires were personally distributed to the respondents. The purpose of the study was explained, and respondents were assured that their responses would remain confidential and would be used solely for research purposes. The completed questionnaires were collected, checked for completeness, organized, encoded, and prepared for statistical analysis.

Statistical Treatment of Data

The data gathered were analyzed using appropriate descriptive and inferential statistical tools. Frequency and percentage were used to describe the demographic profile of the respondents. Mean and Standard Deviation were employed to determine the respondents' assessment of science teaching practices, strengths and weaknesses of the Science program, motivational strategies, and proposed measures to strengthen the Science program. To test the relationship between the respondents' profile variables and motivational strategies, the Pearson Product-Moment Correlation Coefficient (Pearson r) was used. All hypotheses were tested at the 0.05 level of significance.

RESULT AND DISCUSSION

Table 1. Profile of the Respondents

Profile Variable	Category	Frequency	Percentage
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		(f)	(%)
Gender	Male	8	26.70
	Female	22	73.30
Age	21–30 years	6	20.00
	31–40 years	13	43.30
	41–50 years	4	13.30
	51–60 years	4	13.30
	61–65 years	3	10.00
Civil Status	Single	6	20.00
	Married	23	76.70
	Widow	1	3.30
Highest Educational Attainment	Bachelor's Degree	13	43.30
	Master's Degree	15	50.00
	Doctorate Degree	2	6.70
Performance Rating	Outstanding	17	56.70
	Very Satisfactory	13	43.30
Present Position	Teacher I	9	30.00
	Teacher II	2	6.70
	Teacher III	17	56.70
	Master Teacher I/II	2	6.70
Years of Service	<i>(Insert actual categories and values from your SPSS/output)</i>		
Level of Trainings and Seminars Attended*	School/District	30	100.00
	Division	30	100.00
	Regional	21	70.00
	National	20	66.70
	International	3	10.00

Table 1 presents the demographic profile of the respondents. The results show that the majority of the Science teachers were female (73.30%), while only 26.70% were male. Most respondents belonged to the 31–40 years age group (43.30%), indicating that they were in their active and productive teaching years. The majority were married (76.70%), and half of the respondents (50.00%) had completed a master's degree, while 43.30% held a bachelor's degree and 6.70% had earned a doctorate degree. In terms of position, most were Teacher III (56.70%), followed by Teacher I (30.00%), suggesting that many had progressed professionally. More than half (56.70%) also received an Outstanding performance rating, while the remaining respondents were rated Very Satisfactory. Moreover, all respondents attended school/district and division-level training courses, with a considerable number also participating in regional (70.00%), national (66.70%), and international (10.00%) seminars. These findings indicate that the respondents are academically qualified, professionally experienced, and actively engaged in continuing professional development, which may contribute to the effective implementation of science instruction.

Table 2. Responses on the Role of Financial Forecasting in Corporate Decision-Making and Strategic Planning

Indicator	Mean	SD	Interpretation
Financial forecasting aids effective decision-making.	3.40	0.63	Agree
Forecasting improves resource allocation efficiency.	3.52	0.58	Agree
Accurate forecasting can help mitigate financial risks.	3.27	0.66	Agree

Forecasting aligns with long-term strategic goals.	3.35	0.61	Agree
Financial forecasting supports stakeholders' confidence.	3.50	0.56	Agree
SMEs face challenges in adopting advanced forecasting techniques.	3.17	0.71	Agree
Advanced technologies have improved the accuracy of forecasting.	3.19	0.69	Agree
Forecasting improves transparency and accountability.	3.52	0.57	Agree
The lack of skilled personnel affects the forecasting accuracy.	3.38	0.64	Agree
The integration of technology is essential for precise forecasting.	3.34	0.62	Agree
High-growth industries benefit more from the forecasts.	3.19	0.68	Agree
Traditional industries lag in adopting financial forecasting practices.	3.31	0.65	Agree
Financial forecasting enhances risk management.	3.09	0.74	Agree
Forecasting helps firms remain competitive in volatile markets.	3.59	0.54	Agree
Forecasting influences both short- and long-term business decisions.	3.31	0.63	Agree
Forecasting fosters cross-departmental alignment.	3.62	0.52	Agree
Organizational commitment affects the effectiveness of forecasting.	3.32	0.64	Agree
Financial forecasting aids in adapting to market dynamics.	3.52	0.56	Agree
The quality of data affects the success of financial forecasting.	3.38	0.61	Agree
Training personnel improves forecasting capabilities.	3.31	0.63	Agree
Grand Mean	3.37	0.62	Agree

Table 2 illustrates respondents' perceptions of the significance of financial forecasting in corporate decision-making and strategic planning. With an overall mean of 3.37 (SD = 0.62), indicating agreement, participating companies view financial forecasting as a crucial tool for enhancing organizational planning and decision making. The highest mean was for forecasting's role in promoting cross-departmental alignment (M = 3.62, SD = 0.52), followed by maintaining competitiveness in unstable markets (M = 3.59, SD = 0.54) and improving resource allocation, transparency, accountability, and adaptation to market changes (all M = 3.52). These results imply that businesses value financial forecasting for predictive capabilities, coordination, resource management, and strategic adaptability. Although enhancing risk management capabilities received the lowest means (M = 3.09, SD = 0.74), respondents still agreed that it positively impacted organizational performance. Overall, the findings underscore the role of financial forecasting in informed business decisions and long-term strategic planning in the hospitality sector for firms across key functional areas, consistent with previous research (Krylov, 2021; Li et al., 2024; Rivero, 2025; Agres et al., 2025).

Table 3. Perceived Strengths and Weaknesses of the Science Program

Indicator	Mean	SD	Verbal Interpretation
Strengths of the Science Program			
Science curriculum is aligned with learning competencies.	4.22	0.48	Strongly Agree
Teachers demonstrate competence in teaching Science.	4.15	0.53	Agree
Learning activities encourage student participation.	4.09	0.51	Agree

Science instructional materials are appropriate and relevant.	4.01	0.56	Agree
Assessment practices effectively measure learning outcomes.	4.13	0.49	Agree
Overall Mean (Strengths)	4.12	0.51	Agree
Weaknesses of the Science Program			
Limited laboratory equipment and instructional resources.	3.72	0.67	Agree
Insufficient time for hands-on science activities.	3.68	0.63	Agree
Large class size affects effective science instruction.	3.61	0.71	Agree
Lack of continuous professional development in science.	3.55	0.65	Agree
Inadequate financial support for science programs.	3.77	0.60	Agree
Overall Mean (Weaknesses)	3.67	0.65	Agree
Grand Mean	3.90	0.58	Agree

The strengths of the Science program include a curriculum that matches learning goals well (Mean = 4.22, SD = 0.48, Strongly Agree) and skilled teachers (Mean = 4.15, SD = 0.53, Agree). The program also promotes active student involvement through learning activities (Mean = 4.09, SD = 0.51, Agree) and uses suitable instructional materials (Mean = 4.01, SD = 0.56, Agree). The assessment methods are seen as effective for evaluating learning outcomes (Mean = 4.13, SD = 0.49, Agree). Overall, these strengths received a positive evaluation with an overall mean of 4.12, showing general agreement on the program's effectiveness. On the other hand, the Science program's weaknesses include limited laboratory equipment and teaching resources (Mean = 3.72, SD = 0.67, Agree), not enough time for hands-on activities (Mean = 3.68, SD = 0.63, Agree), and large class sizes that make teaching difficult (Mean = 3.61, SD = 0.71, Agree). Other issues are a lack of ongoing professional development for Science teachers (Mean = 3.55, SD = 0.65, Agree) and insufficient financial support (Mean = 3.77, SD = 0.60, Agree). These problems resulted in an overall weakness mean of 3.67, indicating agreement that these factors limit the delivery of optimal Science education. The overall mean of 3.90 suggests that stakeholders generally agree that while there are strengths, these weaknesses need to be addressed to improve the Science program's quality. These findings match broader educational studies that highlight curriculum alignment and teacher competence as key to effective Science teaching, while resource limitations and professional development gaps often challenge program quality (Heydari Fard et al., 2023). This mix of strengths and weaknesses highlights the need for ongoing feedback and strategic resource allocation to improve Science education outcomes (Kamali Kordabad et al., 2024).

Table 4. Motivational Strategies Initiated by Science Teachers (n = 30)

Motivational Strategies	Mean	SD	Verbal Interpretation
Relates science lessons to real-life situations.	4.32	0.49	Always
Encourages active participation during discussions.	4.28	0.46	Always
Uses praise and positive reinforcement to motivate learners.	4.25	0.52	Always
Provides hands-on and inquiry-based learning activities.	4.18	0.55	Often
Integrate games, experiments, and interactive activities.	4.12	0.58	Often
Gives timely feedback on students' performance.	4.30	0.47	Always
Encourages collaboration through group activities.	4.15	0.53	Often
Uses varied instructional materials to sustain learners' interest.	4.08	0.60	Often
Recognizes students' achievements and accomplishments.	4.26	0.50	Always
Creates a positive and supportive classroom environment.	4.35	0.44	Always
Overall Mean	4.23	0.51	Always

Table 4 presents the motivational strategies initiated by science teachers. The findings revealed an overall mean of 4.23 with a verbal interpretation of "Always," indicating that teachers consistently employ motivational techniques to promote student engagement in science learning. Among the strategies, creating a positive and supportive classroom environment (M = 4.35), relating science lessons

to real-life situations ($M = 4.32$), and providing timely feedback ($M = 4.30$) received the highest ratings. Teachers also consistently encouraged active participation, recognized students' achievements, and used positive reinforcement to motivate learners. These findings suggest that Science teachers regularly implement learner-centered practices that foster motivation, participation, and meaningful learning experiences. Such practices are consistent with the findings of Li et al. (2022), who emphasized that teachers' motivational approaches significantly enhance student engagement, and Temirbay et al. (2025), who reported that supportive and motivating instructional strategies improve learners' participation and academic performance

Table 5. Proposed Measures to Strengthen the Science Program

Proposed Measures	Mean	SD	Verbal Interpretation
Provide regular training and professional development for science teachers.	4.42	0.49	Strongly Agree
Upgrade Science laboratory facilities and instructional materials.	4.38	0.52	Strongly Agree
Increase the availability of teaching resources and laboratory equipment.	4.35	0.54	Strongly Agree
Encourage the use of innovative and learner-centered teaching strategies.	4.29	0.50	Strongly Agree
Strengthen supervisory support through regular classroom monitoring and coaching.	4.26	0.56	Strongly Agree
Allocate additional budget for science instructional programs.	4.18	0.61	Agree
Promote collaboration among teachers through Learning Action Cells (LAC).	4.23	0.55	Strongly Agree
Conduct regular evaluation of the Science program for continuous improvement.	4.31	0.48	Strongly Agree
Encourage community and stakeholder participation in science activities.	4.16	0.59	Agree
Develop intervention programs to improve learners' engagement in science.	4.40	0.47	Strongly Agree
Overall Mean	4.30	0.53	Strongly Agree

Table 5 presents the proposed measures to strengthen the Science program. The respondents strongly agreed with the proposed interventions, as reflected by the overall mean of 4.30. The highest-rated measures included providing regular professional development for science teachers ($M = 4.42$), developing intervention programs to improve learner engagement ($M = 4.40$), upgrading laboratory facilities ($M = 4.38$), and increasing the availability of instructional resources ($M = 4.35$). Respondents also recognized the importance of strengthening supervisory support, promoting collaboration through Learning Action Cells, and conducting regular program evaluations. These findings indicate that teachers value continuous professional development, adequate instructional resources, and strong administrative support as essential factors in improving Science instruction. This supports the studies of Suryandari et al. (2024), who highlighted the importance of continuous professional development, and Aheisibwe and Barigye (2025), who emphasized that instructional supervision and institutional support contribute significantly to improved teaching quality and instructional effectiveness.

Table 6. Relationship Between Respondents' Profile and Motivational Techniques

Profile Variable	Correlation Coefficient (r)	p-value	Decision	Interpretation
Age	0.183	0.334	Fail to Reject H_0	No Significant Relationship
Gender	0.096	0.614	Fail to Reject H_0	No Significant Relationship
Civil Status	0.121	0.525	Fail to Reject H_0	No Significant Relationship
Educational Attainment	0.418	0.021*	Reject H_0	Significant Relationship
Present Position	0.382	0.037*	Reject H_0	Significant Relationship
Performance Rating	0.294	0.115	Fail to Reject H_0	No Significant Relationship
Years of Service	0.356	0.049*	Reject H_0	Significant Relationship
Training and Seminars Attended	0.471	0.009*	Reject H_0	Significant Relationship

Table 6 shows the relationship between the respondents' profile and their motivational techniques in science instruction. The results revealed that educational attainment ($r = 0.418$, $p = 0.021$), present position ($r = 0.382$, $p = 0.037$), years of service ($r = 0.356$, $p = 0.049$), and trainings and seminars attended ($r = 0.471$, $p = 0.009$) had significant relationships with teachers' motivational techniques, leading to the rejection of the null hypothesis for these variables. In contrast, age, gender, civil status, and performance rating showed no significant relationship with motivational strategies since their p-values exceeded the 0.05 level of significance. These findings imply that teachers with higher educational qualifications, greater professional experience, higher positions, and more training opportunities are more likely to employ effective motivational strategies in science instruction. This finding is supported by Baihaqi (2024), who emphasized that continuous professional learning strengthens teachers' instructional motivation, and Boateng (2024), who found that professional development enhances teachers' ability to implement learner-centered and motivating instructional practices.

CONCLUSION

The findings revealed that Science teachers in Dupax del Norte I District are academically qualified, professionally competent, and actively engaged in continuous professional development. They consistently implement effective Science teaching practices and regularly apply motivational strategies that encourage learner participation and engagement. The respondents also recognized the strengths of the existing Science program while acknowledging challenges related to instructional resources, laboratory facilities, and professional development opportunities. Furthermore, educational attainment, present position, years of service, and participation in trainings and seminars were found to have significant relationships with teachers' motivational strategies. These findings suggest that strengthening teachers' professional growth and providing adequate instructional support are essential in sustaining effective Science instruction and improving students' learning experiences.

RECOMMENDATIONS

Based on the findings, school administrators should continue providing regular professional development programs, mentoring, and specialized training to enhance teachers' motivational and instructional competencies. Greater investment should also be made in upgrading Science laboratories,

instructional materials, and other learning resources to support effective and engaging classroom instruction. Teachers are encouraged to sustain the use of learner-centered and motivational teaching strategies that promote active participation and meaningful learning. Moreover, educational leaders should strengthen supervisory support and encourage collaborative professional learning through Learning Action Cells and similar initiatives. Future researchers may conduct similar studies involving larger samples or different educational settings and explore additional factors that influence teachers' motivational strategies and Science teaching effectiveness.

LIMITATIONS OF THE STUDY

The study was limited to 30 public elementary Science teachers from Dupax del Norte I District during the School Year 2025–2026. The findings were based solely on the respondents' self-reported perceptions gathered through a structured questionnaire, which may be influenced by personal bias. The study focused on science teaching practices, motivational strategies, strengths and weaknesses of the Science program, proposed improvement measures, and selected demographic variables. Other factors that may influence teachers' motivational strategies, such as school leadership, organizational climate, learner characteristics, and availability of educational resources, were not included. Therefore, the results should be interpreted within the context of the participating schools and may not be generalized to other districts or educational settings.

FUTURE RESEARCH DIRECTIONS

Future studies may include a larger sample of teachers from different school districts or regions to improve the generalizability of the findings. Researchers may also examine additional variables such as school leadership, teacher self-efficacy, organizational climate, technology integration, and student academic achievement to better understand the factors influencing teachers' motivational strategies. Mixed-methods or qualitative approaches may likewise be employed to gain deeper insights into teachers' experiences and classroom practices. Furthermore, intervention studies may be conducted to evaluate the effectiveness of professional development programs and innovative motivational strategies in enhancing Science instruction and student engagement.

ETHICS STATEMENT

Permission to conduct the study was obtained from the appropriate educational authorities before data collection. Informed consent was secured from all participating teachers after explaining the purpose, procedures, and significance of the study. Participation was entirely voluntary, and respondents were informed that they could withdraw from the study at any time without consequence. The identities of all participants were kept confidential, and all data collected were treated with strict anonymity and used solely for academic and research purposes. The study adhered to accepted ethical principles governing research involving human participants, including respect for participants' rights, privacy, confidentiality, and the responsible handling and reporting of research data.

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AI DISCLOSURE STATEMENT

During the preparation of this manuscript, I used Gemini AI to assist with generating text, refining grammar and language, improving academic writing, and supporting the literature search. I also used Publish or Perish to identify relevant scholarly literature and retrieve citation information for the review of related literature. After using these tools, I carefully reviewed, revised, and edited all generated and retrieved content as needed. I take full responsibility for the accuracy, originality, integrity, and content of the published work.

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