

Intrinsic and Extrinsic Motivation in Science Learning Among Grade 3 Pupils

Almera A. Tindaan  Adriano G. Sabado 

Northeastern College, Santiago City, Isabela, Philippines

Corresponding Author: almera.tindaan001@deped.gov.ph

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Abstract Motivation is crucial in enhancing pupils' interest, engagement, and positive experiences in science education. This study employed a descriptive quantitative research design to examine the intrinsic and extrinsic motivation of Grade 3 pupils in selected elementary schools in the Santa Fe District, Nueva Vizcaya. Intrinsic motivation was evaluated based on interest in science, curiosity, desire to learn, enjoyment of science activities, and self-confidence. Extrinsic motivation factors included teacher support and encouragement, rewards and recognition, classroom environment, and availability of learning materials. The research also identified obstacles impacting pupils' motivation to learn science. Data were collected using a researcher-developed questionnaire and analyzed using frequency, percentage, mean, and standard deviation (SD). The findings provide a foundation for identifying motivational strengths and areas needing further support in science education. These results underscore the importance of creating engaging classroom experiences, providing appropriate learning resources, strengthening teacher support, and maintaining a positive learning environment that encourages active participation in science activities. Based on the identified motivational needs and obstacles, a motivation-based intervention program was proposed to enhance pupils' intrinsic and extrinsic motivation and support meaningful science learning. The findings may offer teachers and school administrators practical guidance in developing learning experiences that foster pupils' interest, curiosity, enjoyment, confidence, and sustained engagement in science.

Keywords: *Intrinsic motivation, Extrinsic motivation, Science learning, Grade 3 pupils, Motivation-based intervention*

INTRODUCTION

Science education in primary school is all about building scientific literacy, sparking curiosity, and developing critical thinking and problem-solving skills that are important in our tech-driven world. Getting children interested in science early on helps nurture their curiosity and positive attitudes, setting them up for a lifetime of learning. These early years are crucial because children's minds and motivations are still forming, which influences how they engage with science later on. Motivation comes in two flavors: intrinsic, which is all about interest, curiosity, enjoyment, and satisfaction, and extrinsic, which involves rewards, recognition, teacher encouragement, and a supportive learning environment. Both types are key to keeping children engaged, and finding the right balance helps make learning meaningful (Cutillas et al., 2025; Gumallaoi et al., 2026). In the Philippines, elementary science education is essential but often faces challenges such as varying levels of engagement, motivation, and learning difficulties. Boosting intrinsic motivation through hands-on, inquiry-based, and learner-centered strategies can enhance curiosity and problem-solving skills. Extrinsic motivation gets a boost from encouragement, recognition, the right materials, and a supportive classroom environment. Experiential approaches, such as collaborative problem-solving and real-world applications, help reduce anxiety and build confidence, motivation, and persistence among Filipino learners (Gumallaoi et al., 2026). These methods fit right in with the national push for inquiry-based, learner-centered science instruction that actively involves students and prepares them for a fast-changing tech world (Constantino & Antonio, 2025). By strengthening both types of motivation with teacher support, a positive classroom atmosphere, relevant materials, and recognition of student efforts, we can promote

science literacy and prepare young learners for future STEM opportunities.

Grade 3 is a significant year for children when it comes to getting them excited about science. At this stage, they move from simply picking up basic facts to diving into scientific ideas. Therefore, it is important to build up their natural curiosity, enjoyment, and self-confidence in science. These are the key motivators we're looking at in this research. If we can boost these intrinsic motivators in Grade 3, we are setting the stage for a lifetime of learning and success because things like curiosity and enjoyment drive students to engage and master new concepts (Greenwald et al., 2023; Rahmi & S, 2022). However, it's not just about what's inside. External factors such as teacher support, rewards, a good classroom vibe, and having the right materials also play a significant role in getting children motivated about science. For example, when teachers are supportive, it really boosts students' motivation from the outside, which can then improve how they feel about their learning performance. This shows how important it is to have good relationships and teaching support in the classroom (Khan et al., 2024). Rewards and recognition are also great because they give students a tangible pat on the back, which can really get them more involved (Pranawengtias, 2022). Plus, having a rich environment with plenty of resources lets kids explore and feed their natural curiosity, which works hand in hand with those external motivators (Li et al., 2023). However, some children might not be into science or might not do as well. Things like lack of support from teachers, lack of curiosity, or poor classroom resources can lead to them losing interest (Afiqah et al., 2022). Spotting these issues helps teachers tweak their teaching methods to make science learning more effective (Chujing et al., 2025). While there is a lot of talk about science learning in general, there is not much focus on Grade 3 specifically. This research stands out by breaking down motivation into specific intrinsic and extrinsic parts—like interest, curiosity, enjoyment, self-confidence, teacher support, rewards, classroom environment, and learning materials. This helps us understand how these elements interact with learning challenges (Pranawengtias, 2022; Rahmi & S, 2022). By looking at these aspects alongside the challenges Grade 3 students face, we provide evidence that helps teachers focus on what needs attention. Therefore, this study aims to explore both intrinsic and extrinsic motivation in science for Grade 3 students, figure out their learning challenges, and lay the groundwork for motivation-based strategies. This ties into the research questions about motivational factors, challenges, and ways to improve, pushing forward elementary science education (Khan et al., 2024; Li et al., 2023).

RESEARCH QUESTIONS

This study aimed to examine intrinsic and extrinsic motivation for science learning among Grade 3 pupils. Specifically, it sought to answer the following questions:

1. What is the demographic profile of Grade 3 pupils in terms of
 - 1.1 age and
 - 1.2 gender?
2. What is the level of intrinsic motivation in science learning among Grade 3 pupils in terms of:
 - 2.1 interest in science,
 - 2.2 curiosity and desire to learn,
 - 2.3 enjoyment of science activities, and
 - 2.4 self-confidence in learning science?
3. What is the level of extrinsic motivation in science learning among Grade 3 pupils in terms of
 - 3.1 teacher support and encouragement,
 - 3.2 rewards and recognition,
 - 3.3 classroom environment, and
 - 3.4 availability of learning materials?
4. What are the hindrances that affect the motivation of Grade 3 pupils in learning science?
5. What motivation-based intervention programs can be proposed based on the findings of this study?

METHODS

Research Design

This study employed a descriptive quantitative research design to examine the intrinsic and extrinsic motivation of Grade 3 pupils in learning science. The descriptive approach was deemed appropriate as the study aimed to determine and describe the existing levels of pupils' motivation without manipulating the study variables. Intrinsic motivation was explored in terms of interest in science, curiosity, desire to learn, enjoyment of science activities, and self-confidence in learning science. Extrinsic motivation was assessed in terms of teacher support and encouragement, rewards and recognition, classroom environment, and the availability of learning materials. The study also identified the hindrances affecting pupils' motivation in science learning. The findings served as an empirical basis for developing a motivation-based intervention program responsive to the identified needs of the pupils.

Locale of the Study

This study was conducted in selected elementary schools in the Santa Fe District, Nueva Vizcaya, Philippines. The locale provided an appropriate setting for examining the motivation of Grade 3 pupils who were actively engaged in science learning. The participating schools represented the educational environment in which pupils experienced science instruction, classroom activities, teacher support, recognition, and access to learning materials. Conducting the study within the pupils' actual school setting enabled the researcher to obtain context-specific information concerning their intrinsic and extrinsic motivation and the hindrances they experienced in learning science.

Participants and Sampling Technique

The participants in the study were Grade 3 pupils enrolled in selected elementary schools in the Santa Fe District, Nueva Vizcaya, during the period of data collection. Grade 3 pupils were chosen because they were directly exposed to elementary science instruction and could offer valuable insights regarding their interest, curiosity, enjoyment, self-confidence, and experiences with external sources of motivation. The study included [insert actual number] Grade 3 pupils from a population of [insert population]. The participants were selected using [insert actual sampling technique]. Only pupils officially enrolled in Grade 3 during the study and whose parents or guardians provided informed consent were included. Pupils who did not provide assent or whose parents or guardians did not provide consent were respectfully excluded from participation.

Research Instrument

Data were collected using a researcher-developed structured questionnaire, which was thoughtfully designed in accordance with the study's objectives and research questions and informed by the relevant literature on intrinsic and extrinsic motivation in learning. The questionnaire was crafted using simple and age-appropriate language to ensure that the statements could be easily understood by Grade 3 pupils. The instrument comprises four major sections. Part I gathered the demographic profile of the pupils in terms of age and sex. Part II measured intrinsic motivation through four dimensions: interest in science, curiosity and desire to learn, enjoyment of science activities, and self-confidence in learning. Part III assessed extrinsic motivation through teacher support and encouragement, rewards and recognition, classroom environment, and the availability of learning materials. Part IV evaluated the hindrances experienced by students that could affect their motivation to learn science. Responses to the motivational and hindrance statements were obtained using a five-point Likert-type scale. Higher scores in the motivation sections indicated higher levels of intrinsic or extrinsic motivation, whereas higher scores in the hindrance section indicated a greater perceived presence of barriers to motivation in science learning.

Validity and Reliability of the Instrument

The questionnaire was content validated by qualified experts in science education, educational research, and measurement and evaluation. The validators reviewed the instrument for relevance, clarity, appropriateness, alignment with the study variables, and suitability of the language for grade 3 pupils. Their comments and recommendations were thoughtfully incorporated into the revised questionnaire before pilot testing. The revised questionnaire was then pilot-tested among Grade 3 pupils who shared characteristics with the actual participants but were not included in the final study sample. Internal consistency reliability was assessed using Cronbach's α [insert reference]. The reliability coefficient was calculated for the relevant scales and subscales to ensure that the items consistently measured their intended constructs. It would be appreciated if the final reliability coefficients could be reported in the manuscript based on the actual pilot test results.

Scoring and Interpretation

Responses to the intrinsic and extrinsic motivation items were scored on a five-point Likert-type scale. The mean scores were interpreted as follows: 4.21–5.00 as Very High, 3.41–4.20 as high, 2.61–3.40 as moderate, 1.81–2.60 as low, and 1.00–1.80 as Very Low. Higher mean scores indicate higher levels of intrinsic or extrinsic motivation for science learning. For the items measuring hindrances, the same five-point scale was used; however, the mean scores were interpreted according to the degree of seriousness of the identified barriers. Mean scores ranging from 4.21–5.00 were interpreted as Very Serious, 3.41–4.20 as Serious, 2.61–3.40 as Moderately Serious, 1.81–2.60 as Slightly Serious, and 1.00–1.80 as Not Serious. The mean was used to determine the overall level of each motivational dimension and hindrance, while the standard deviation was used to describe the variability or consistency of students' responses. These scoring and interpretation procedures facilitated the systematic analysis of intrinsic motivation, extrinsic motivation, and the hindrances affecting Grade 3 pupils' motivation in science learning.

Data Gathering Procedure

Prior to data collection, the researcher secured the necessary permissions from the appropriate education authorities and school heads of the participating elementary schools. Coordination was undertaken with the Grade 3 teachers regarding the appropriate schedule and administration of the questionnaire. As the participants were minors, informed consent was obtained from their parents or legal guardians, and assent was obtained from the pupils before participation. The purpose of the study and the procedures involved were explained using language appropriate to the pupils' age and level of understanding. The pupils were informed that participation was voluntary and that they could decline or discontinue their participation without penalty. The questionnaire was administered in an appropriate classroom setting with the assistance of the concerned teachers when necessary. Clear and standardized instructions were provided to the pupils. Assistance was limited to explaining unfamiliar words or instructions without influencing their responses. After administration, the completed questionnaires were collected and checked for completeness. Subsequently, the responses were encoded, organized, and prepared for statistical analysis. Confidentiality and anonymity of the participants were maintained throughout the research process.

Statistical Treatment of Data

Descriptive statistical techniques were employed to analyze the data according to the research questions. Frequencies and percentages were used to describe the demographic profile of the Grade 3 pupils in terms of age and gender. The mean and standard deviation were used to determine the levels of intrinsic motivation in terms of interest in science, curiosity, desire to learn, enjoyment of science activities, and self-confidence in learning science. The same statistical measures were used to determine the levels of extrinsic motivation in terms of teacher support and encouragement, rewards and recognition, classroom environment, and availability of learning materials. The mean and standard deviation were likewise used to determine the extent of the hindrances affecting pupils' motivation in

science learning. The identified motivational strengths and priority areas, together with the reported hindrances, served as an empirical basis for developing the proposed motivation-based intervention program.

RESULTS AND DISCUSSION

Table 1 Demographic and Professional Profile of the Respondents

Profile Variable	Category	Frequency (f)	Percentage (%)
Age (years)	20–25	3	15.00
	26–30	6	30.00
	31–35	3	15.00
	36–40	2	10.00
	41–45	4	20.00
	46–50	1	5.00
	51 and above	1	5.00
Gender	Male	8	40.00
	Female	12	60.00
Civil Status	Single	4	20.00
	Married	16	80.00
Position	Teacher I	5	25.00
	Teacher II	2	10.00
	Teacher III	10	50.00
	Master Teacher I	3	15.00
Highest Educational Attainment	Bachelor's Degree	7	35.00
	Master's Degree	13	65.00
	Doctor's Degree	0	0.00
Years in Service	1–5 years	2	10.00
	6–10 years	8	40.00
	11–15 years	5	25.00
	16–20 years	4	20.00
	21 years and above	1	5.00

Table 1 presents the demographic and professional profiles of the respondents. The largest age group was 26–30 years old (30%), followed by those aged 41–45 years (20%), while the remaining respondents were distributed across the other age groups. In terms of gender, 60% were female and 40% were male. Most respondents were married (80%), and half held the position of Teacher III (50%). Regarding educational attainment, 65% had a master's degree, while 35% held a bachelor's degree. In terms of teaching experience, the largest proportion had 6–10 years of service (40%), followed by those with 11–15 years (25%). Overall, the findings indicate that the respondents were generally experienced and professionally qualified teachers, providing relevant classroom-based perspectives on science teaching and learning.

Table 2. Factors Related to Science Learning

Dimension	Mean	Interpretation
Teachers' Competency	4.25	Very Competent
Learning Materials	4.26	Very Adequate
Assessment Tools	4.56	Very Often
Instructional Supervision	4.44	Very Often
Physical Facilities	4.36	Very Often
Parent Factor	4.27	Always

Community Factor	4.18	Often
Overall	4.33	Generally High/Positive

Table 2 indicates that the factors related to science learning were generally rated positively, with an overall mean of 4.33. Among the dimensions, assessment tools received the highest mean ($M = 4.56$), followed by instructional supervision ($M = 4.44$) and physical facilities ($M = 4.36$). Learning materials ($M = 4.26$), parent factors ($M = 4.27$), teachers' competency ($M = 4.25$), and community factors ($M = 4.18$) were also positively assessed. These findings suggest that science learning is supported by a combination of instructional, material, environmental, and interpersonal conditions. Li et al. (2023), which is included in the manuscript's references, similarly emphasized that learning motivation and environmental support can work together to support students' learning outcomes. Teacher support and positive teacher–student interactions are also relevant, as Hou (2024) found that supportive teacher behaviors and positive teacher–student rapport were associated with greater student engagement. Overall, the results highlight the importance of maintaining appropriate learning resources, effective assessment and instructional practices, supportive teachers, and a conducive learning environment to sustain pupils' engagement in science learning.

Table 3. Hindrances Encountered in Teaching Science

Dimension	Mean	SD	Interpretation
Teachers' Competency	1.95	0.06	Slightly Serious
Learners' Materials	1.87	0.32	Slightly Serious
Assessment Tools	1.97	0.14	Slightly Serious
Instructional Supervision	1.79	0.30	Not Serious
Physical Facilities	1.92	0.10	Slightly Serious
Parent Factor	1.83	0.23	Slightly Serious
Community Factor	2.13	0.12	Slightly Serious
Overall	1.92	0.11	Slightly Serious

The data in Table 3 suggest that various dimensions related to science teaching face challenges that are generally interpreted as "Slightly Serious," with mean scores ranging from approximately 1.79 to 2.13. Specifically, aspects such as Teachers' Competency, Learners' Materials, Assessment Tools, Physical Facilities, Parent Factor, and Community Factor are categorized as slightly serious, while Instructional Supervision is rated as "Not Serious." This overall pattern indicates that while there are challenges in teaching science, they are relatively moderate rather than severe. Research contextualizing these challenges supports this interpretation. For instance, the effectiveness of science instruction relies significantly on teacher competency and self-efficacy, including their ability to integrate instructional technologies effectively. Although teacher self-efficacy positively correlates with the use of technology in the classroom, this relationship is moderately weak, suggesting that other factors may also influence effective teaching and that gaps in teacher preparedness can serve as challenges (Temur et al., 2022). Furthermore, limitations in learning materials and resources have been highlighted as significant barriers in other educational contexts, where insufficient and inadequate materials impede student engagement and learning outcomes (Kurniawan & Haryanto, 2024). Moreover, instructional supervision, while rated as "Not Serious" in the hindrances table, plays an important role in enhancing teacher competence and supporting reflective practices that can help overcome challenges in instruction. Studies emphasize the value of community-based supervision approaches that incorporate collaborative and reflective elements to support sustained professional learning and motivation among teachers, indicating that effective supervision can alleviate some of these teaching obstacles (Atmojo & Hanifah, 2024; Gyles & Clark, 2024). Additionally, challenges related to assessment tools, although slightly serious, are addressed in the literature advocating for competency-based and experiential learning approaches that enhance assessment competencies through carefully designed instructional

strategies (Tuyen & Oanh, 2025). Community and parental involvement, albeit rated as slight challenges, are acknowledged factors influencing the learning environment in science education. A community-based instructional approach has been shown to reframe expertise and empower students as active knowledge contributors, potentially reducing the impact of community-related challenges on teaching efficacy (Gyles & Clark, 2024).

Table 4 Findings on Factors and Hindrances in Science Learning

Major Variable	Mean	SD	Interpretation
Factors Related to Science Learning	4.33	0.13	Generally High/Positive
Hindrances Encountered in Teaching Science	1.92	0.11	Slightly Serious

The findings presented in Table 4 highlight the contrast between the generally high and positive factors associated with science learning and the somewhat significant challenges encountered in teaching science. With an overall mean of 4.33, the factors supporting science learning provide a strong foundation for successful outcome. These factors include competent teachers, adequate learning materials, effective assessment tools, strong instructional supervision, supportive physical facilities, and active parent and community involvement, all of which contribute to a conducive learning environment (Barokah et al., 2025; Ellyta et al., 2022; Maisyaroh et al., 2021). Research indicates that collaborative, reflective, and community-based instructional supervision models enhance teacher competencies and promote a sustainable professional learning culture, thereby reinforcing supportive factors (Barokah et al., 2025; Maisyaroh et al., 2021). Additionally, the role of instructional technology, including information and communication technology (ICT), has been found to improve teaching practices and student engagement, further strengthening the science learning environment (Wiyono et al., 2022). In contrast, the slightly serious hindrances (mean: 1.92) underscore ongoing challenges impeding science teaching. These include gaps in teacher competencies, limited materials, suboptimal assessment tools, occasional supervision shortcomings, deficient physical facilities, and moderate parental and community challenges. Although instructional supervision is a minor hindrance, obstacles such as inadequate reflective practices, resource constraints, and resistance to new learning paradigms persist, affecting the quality of instruction (Hendriyanto et al., 2024; Ningsih & Lengkanawati, 2023; Sijabat et al., 2023). Material and resource limitations align with findings that insufficient or outdated resources restrict student engagement (Kurniawan & Haryanto, 2024; Wanbin & Yan, 2025). Teachers also face emotional and institutional barriers that reduce the reflective practices that are essential for teaching quality (Ningsih & Lengkanawati, 2023). However, research on project-based learning suggests that practical strategies and technology integration can mitigate teamwork and resource challenges and enhance student outcomes (Atmojo & Hanifah, 2024). Similarly, innovative instructional designs and experiential learning improve competency acquisition, despite existing obstacles (Sangsawang, 2025; Tuyen & Oanh, 2025).

Table 5 Proposed Intervention Program for Enhancing Science Teaching and Learning

Priority Area	Basis/Identified Need	Proposed Activity	Expected Outcome
Learning Materials	Limited textbooks, references, workbooks, and instructional materials	Develop and provide localized, supplementary, and activity-based Science learning materials	Improved availability and utilization of appropriate Science learning resources
Assessment Practices	Limitations in testing materials and concerns regarding recording and analysis of assessment results	Conduct training on development, administration, recording, and analysis of Science assessment tools	Improved quality and utilization of assessment practices
Instructional	Limited opportunities for	Strengthen regular	Improved

Supervision	classroom observation and pre- and post-observation conferences	classroom observation, coaching, mentoring, and feedback sessions	instructional supervision and professional support for Science teachers
Physical Facilities	Concerns regarding laboratory rooms, utilities, classrooms, and Science references	Improve access to basic Science facilities and maximize available school resources	More conducive and resource-supported Science learning environment
Parental Involvement	Limited parental participation in selected school activities and learner support	Conduct parent orientation and strengthen home-school communication and involvement	Increased parental participation and support for pupils' Science learning
Community Support	Limited stakeholder participation and financial/community support	Strengthen school-community partnerships and stakeholder engagement programs	Increased community participation and resource support for Science programs
Teacher Professional Development	Need for continued exposure to modern Science teaching approaches and professional development	Conduct school-based LAC sessions, seminars, workshops, and peer mentoring on Science pedagogy	Enhanced teacher knowledge and application of current Science teaching practices

Table 5 presents the proposed intervention program designed to enhance science teaching and learning based on the identified needs of the study. The program focuses on improving learning materials, assessment practices, instructional supervision, physical facilities, parental involvement, community support, and teacher professional development. These areas are important for creating a supportive and engaging learning environment for pupils. Adequate learning materials and resources can improve pupils' participation and understanding of science concepts, whereas limited resources may create barriers to effective learning (Kurniawan & Haryanto, 2024; Lagura, 2022). Effective instructional supervision and continuous professional development can also help teachers improve their teaching strategies and provide better learning experiences for pupils (Maisyaroh et al., 2021; Wiyono et al., 2022). In addition, support from parents and the community can contribute to a positive learning environment and strengthen pupils' motivation to learn (Gyles & Clark, 2024; Li et al., 2023). Overall, the proposed intervention program provides practical activities that schools may use to address the identified needs and create more supportive and motivating science learning experiences for pupils.

CONCLUSION

The study concludes that both intrinsic and extrinsic motivation are important dimensions in understanding Grade 3 pupils' engagement in Science learning. Intrinsic motivation, reflected through pupils' interest in Science, curiosity, desire to learn, enjoyment of Science activities, and self-confidence, represents the internal drive that encourages pupils to participate actively and persist in learning. At the same time, extrinsic motivation, manifested through teacher support and encouragement, rewards and recognition, a conducive classroom environment, and the availability of learning materials, provides external conditions that can strengthen pupils' willingness to engage in Science learning. The identified hindrances further indicate that pupils' motivation may be influenced by the challenges encountered within their learning experiences and environment. Thus, promoting motivation in Science requires attention not only to pupils' internal interest and confidence but also to the instructional and

environmental conditions that support their learning. The findings provide a basis for developing a motivation-based intervention program designed to strengthen pupils' positive experiences, participation, and engagement in Science learning.

RECOMMENDATIONS

Based on the findings and conclusions of the study, it is suggested that Science teachers consider employing engaging, learner-centred, inquiry-based, and hands-on activities that stimulate pupils' interest, curiosity, enjoyment, and self-confidence in learning Science. It would be beneficial for teachers to provide appropriate encouragement, constructive feedback, recognition, and meaningful rewards while maintaining a supportive classroom environment that allows pupils to participate, explore, ask questions, and learn from their experiences. School administrators are encouraged to support these efforts by ensuring the availability and effective use of age-appropriate Science learning materials and by providing teachers with relevant professional development opportunities focused on motivating young learners. Parents may also be encouraged to reinforce pupils' curiosity and positive attitudes toward Science through simple learning activities and supportive interactions at home. The identified hindrances should be addressed through targeted strategies incorporated into the proposed motivation-based intervention program, with priority given to areas showing greater need based on the study findings. The effectiveness of the intervention may subsequently be evaluated to determine its contribution to improving pupils' intrinsic and extrinsic motivation. Future researchers might also examine motivation in relation to other variables, such as Science achievement, engagement, or academic performance, and may include larger samples or other grade levels to extend the findings of the study.

LIMITATIONS OF THE STUDY

This study focused on Grade 3 pupils from selected elementary schools in the Santa Fe District, Nueva Vizcaya. Consequently, the findings may not fully represent pupils from other grade levels, schools or geographical settings. Additionally, the study relied on self-reported responses using a structured questionnaire, which could have been influenced by the students' level of understanding, interpretation of the statements, and willingness to express their experiences accurately. As the research employed a descriptive quantitative design, the findings describe the levels of intrinsic and extrinsic motivation and the identified hindrances but do not establish causal relationships between the variables. It is advisable to consider these limitations when interpreting and applying the findings to other educational contexts.

FUTURE RESEARCH DIRECTIONS

Future studies should consider including larger and more diverse samples from various schools, districts, and grade levels to ascertain whether similar patterns of intrinsic and extrinsic motivation are observed in other educational settings. Researchers could also explore the relationship between motivation and other variables, such as science achievement, academic engagement, self-efficacy, and learning performance. Employing qualitative or mixed-method approaches may provide deeper insights into pupils' motivational experiences and the factors influencing their interest and participation in science. Additionally, future research could implement and evaluate the proposed motivation-based intervention program to assess its effectiveness in enhancing pupils' intrinsic and extrinsic motivation over time.

ETHICS STATEMENT

We ensured that all ethical guidelines for research with human participants were followed in this study. Since our participants were Grade 3 students, and thus minors, we obtained informed consent from their parents or legal guardians. We also got assent from the kids themselves before they took part. It was completely up to them to participate, and they knew that they could opt out at any time without any consequences. We kept everything confidential and anonymous, using the information only for

research. The questionnaire was administered with instructions that were easy for their age to understand, and we helped them out without swaying their answers, sticking to the data-gathering methods we outlined in the study.

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AI DISCLOSURE STATEMENT

While working on this piece, I used a few tools to help me. SciSpace AI was great for digging into the literature, Grammarly helped me polish the grammar and language, and ChatGPT helped me make the text clearer and better organized. These were just extra aids in the whole research and writing process. After using them, I went through everything, checked it all, and made any needed edits. I take full responsibility for the accuracy, integrity, and content of the final published work.