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SELF-DETERMINATION AND STUDENTS' GRADE PERFORMANCE IN SCIENCE: BASIS FOR AN ACTION PLAN

VINCENT A. VILLANUEVA[1]*, CLAIRE D. VICO[1]

[1]University of Perpetual Help System DALTA, Las Piñas City, Philippines

***Corresponding Author Email Id:** vincentalba1771@gmail.com

Abstract

This study determined the relationship between self-determination and students' academic performance in Science among junior high school learners. It focused on the three key components of self-determination: autonomy, competence, and relatedness, and how these psychological needs influence students' motivation and achievement in Science. The study was conducted in response to observed low motivation, absenteeism, and poor performance among students in the subject. Using a descriptive-correlational design, data were collected through a structured questionnaire to assess students' self-determination levels and compared with their fourth-quarter Science grades. Findings revealed that students generally demonstrated high levels of autonomy and competence, while relatedness was moderately observed. Despite this, no significant correlation was found between self-determination and Science grades. However, difference in self-determination were evident when students were grouped by age, sex, and academic classification. The study concluded that while students may feel motivated and capable, this does not directly reflect in their academic performance, pointing to other influencing factors. As a result, an action plan was proposed to enhance classroom practices, support individual learning needs, and create more inclusive and engaging learning environments to improve both motivation and academic outcomes in Science.

Keywords: *academic performance, autonomy, competence, junior high school motivation, relatedness, science, self-determination*

Introduction

Globally, there is an increasing emphasis on developing students' self-determination to improve academic outcomes, particularly in science. Countries such as Finland, Japan, and Singapore frequent top performers in international science assessments, have successfully integrated autonomy-supportive teaching methods and personalized learning environments that nurture students' intrinsic motivation, curiosity, and interest in science (Partanen, 2020). These countries emphasize strategies that support students' autonomy, competence, and relatedness, core components of self-determination within their science curricula. Research shows that students with higher levels of motivation and engagement in science learning consistently

outperform their less motivated peers (Howard et al., 2021). Globally, educational systems are turning toward more student-centered approaches that promote ownership of learning, especially in STEM education (Xia et al., 2022).

In the United States, promoting self-determination in science education has become a national priority. Programs and policies encourage schools to support student motivation, engagement, and self-regulation. Self-determined behaviors such as goal-setting, decision-making, and active participation have been connected with higher academic performance in science subjects (Botnaru et al., 2021). Many schools have adopted inquiry-based and project-based learning models that support students' autonomy and competence in exploring scientific concepts (Moore et al., 2020). These efforts aim to increase interest and persistence in science as a foundation for improving national science literacy and performance (Rayner & Papakonstantinou, 2020).Despite these global and national efforts, a persistent issue remains: students continue to exhibit low levels of motivation and interest in science, which negatively impacts their academic performance. In classrooms where learners feel disconnected or lack control over their learning experience, disengagement often leads to poor academic outcomes (Ahmad et al., 2024). In many Philippine schools, educators are concerned with the declining science exam results and students' performance in the subject. Many students perceive science as difficult, irrelevant, or overwhelming, causing further disinterest and decreased effort in learning it (Nalipay et al., 2020). Without sufficient support in fostering self-determination, students struggle to stay engaged and achieve well in science (Guay, 2022). This study addresses this issue by investigating how self-determination influences science grade performance.The researcher was motivated to conduct this study after observing that many students demonstrated low motivation in their studies, which manifested in frequent absenteeism, lack of interest, and minimal parental support. These challenges were reflected in their academic performance, as evidenced by a low mean score of 13.13 on a third-quarter test, indicating poor achievement in Science.

The primary objective of this study is to examine the relationship between self-determination and students' grade performance in Science. Specifically, it seeks to investigate how the key components of self-determination on autonomy, competence, and relatedness influence learners' motivation and academic outcomes in the subject. By identifying the psychological and educational factors that either support or hinder Science achievement, the study aims to provide the foundation for a targeted action plan. This action plan will be designed to increase student motivation and academic performance in Science through the implementation of classroom strategies, the creation of supportive learning environments, and interventions informed by the principles of Self-Determination Theory.

Theoretical Framework

This study was theoretically anchored on the Self-Determination Theory (SDT) developed by Edward Deci and Richard Ryan (1985; updated 2020), which posits that human motivation and behavior are driven by the fulfillment of three innate psychological needs, namely autonomy, competence, and relatedness. According to this theory, individuals are more likely to flourish and achieve success when their learning environment nurtures these three basic psychological needs. Self-Determination Theory emphasizes

that intrinsically motivated students are those inspired by genuine interest or personal meaning that are more likely to achieve academically, engage more deeply in learning, and experience enhanced overall well-being. On the other hand, when these three needs are not met, students are more likely to experience amotivation or extrinsic motivation, which can negatively impact academic performance (Deci & Ryan, 1985; updated 2020).

In the context of this study, Self-Determination Theory offers a valuable perspective for exploring the connection between students' motivation and their academic performance in science. Many students in secondary education experience disengagement or low interest in science, which may be linked to a learning environment that does not sufficiently support autonomy, competence, and relatedness. By applying SDT, this research aims to understand how these needs or the lack thereof affect students' grade performance in science, and how an action plan can be developed to address these motivational deficiencies.

The framework guides the present study in identifying the key psychological factors that contribute to or hinder science achievement and provides a theoretical foundation for designing interventions that enhance student motivation, learning engagement, and academic outcomes.

Conceptual Framework

Building on the established theoretical framework, the researcher designed an Input-Process-Output (IPO) model, illustrated in Figure 1. This model served as

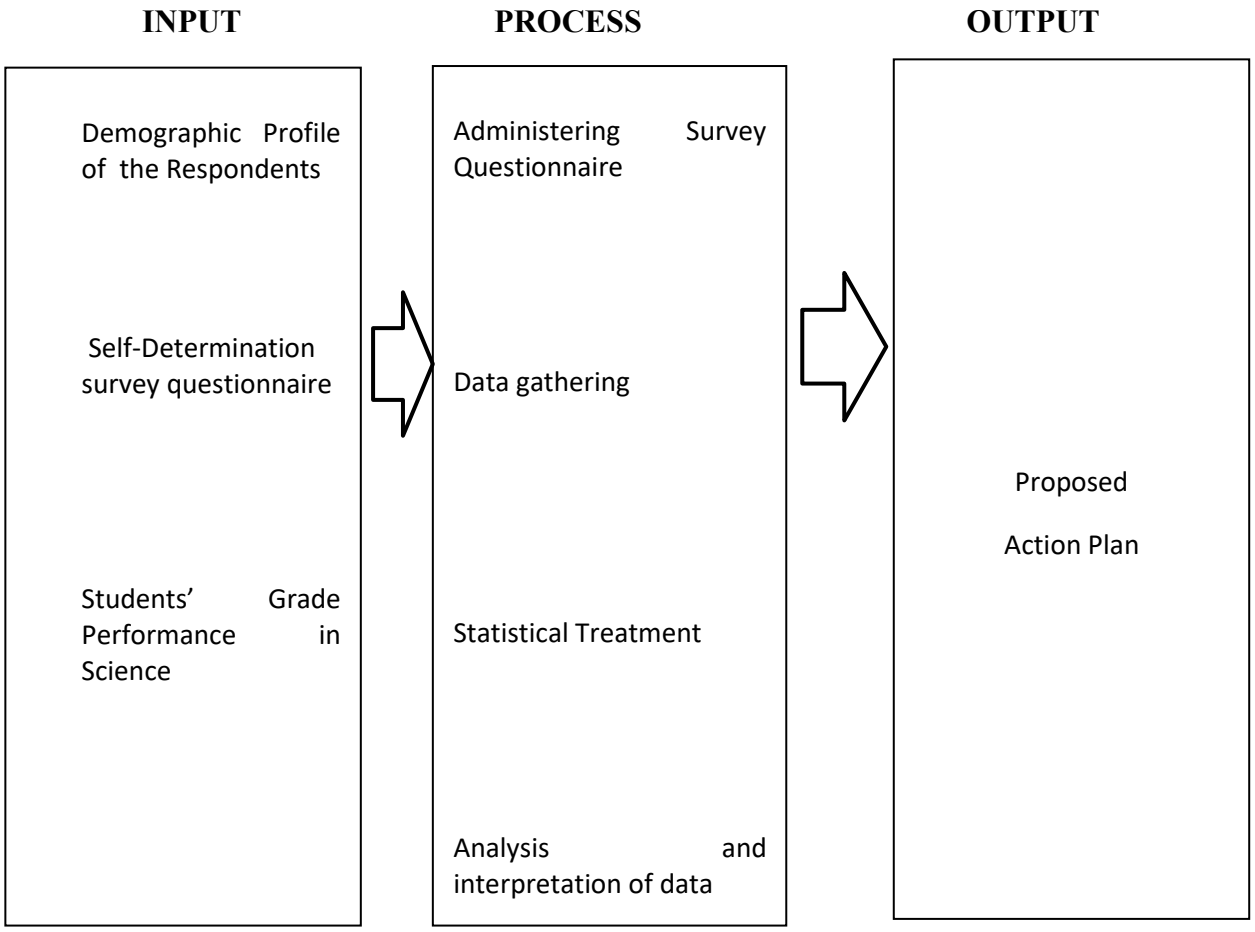

Figure 1. Conceptual Framework

a guiding structure that informed and directed the methodological approach throughout the conduct of the study. In the input phase, the study was composed of the demographic characteristics of the

respondents, the distribution of the self-determination survey questionnaire, and the collection of students' grade performance in Science. During the process phase, the research methodology was executed through a series of steps, including the administration of surveys, data collection, and the application of statistical analysis and interpretation. This structured approach allowed the study to produce key findings aligned with its objectives. In the final output phase, an action plan was developed based on the results, with the goal of enhancing student motivation and academic performance in Science.

Statement of the Problem

The primary goal of this study was to examine how self-determination affects students' grade performance in Science. The study specifically addressed the following research inquiries.

1.What is the demographic profile of the respondents in terms of:

1.1 Age;

1.2 Sex; and,

1.3 Class group?

2. What is the degree of self-determination in Physics class as evaluated by the respondents with respect to:

2.1 Autonomy;

2.2 Competence; and

2.3 Relatedness?

3. What is the students' grade performance in Science based on the fourth quarter?

4. Is there a significant difference in the degree of self-determination in Science class as assessed by the respondents when grouped according to their profile?

5. Is there a significant relationship between the degree of self-determination as assessed by the respondents and students' grade performance in Science based on the fourth quarter?

6. Based on the findings of the study, what output may be proposed?

Hypotheses

There is no significant difference in the level of self-determination as evaluated by the respondents when grouped according to their profile.

There is no significant relationship between the level of self-determination as evaluated by the respondents and students' grade performance in Science based on the fourth quarter.

Scope and Limitations of the Study

This study set out to understand how self-determination influences the Science 10 grade performance of students during the fourth quarter of the 2024–2025 academic year in a U.S. secondary school. It explored how students' sense of autonomy, competence, and relatedness, the core components of self-determination affect their academic outcomes in science. By focusing on a specific group within a defined time frame, the research aimed to shed light on how self-motivated learning behaviors impact performance. The goal was to

offer practical insights for educators looking to boost student achievement through motivation-centered strategies, using data gathered from a researcher-designed survey questionnaire.

Significance of the Study

Students. They can gain valuable insights from the study by understanding how motivation, autonomy, competence, and a sense of belonging influence their performance, allowing them to build stronger learning habits and boost their confidence.

Teachers. Teachers can adjust their teaching strategies to more effectively foster student engagement and success. The study may also offer useful insights into developing a more supportive and motivating classroom atmosphere, leading to enhanced teaching practices and improved student outcomes in Science.

Parents. This can assist parents in supporting their child's learning at home by promoting positive habits, building confidence, and fostering effective communication with teachers to improve their child's success in Science.

School Heads. This can help them develop school-wide strategies to create a more supportive and motivating learning environment, enhancing teaching practices and boosting overall student performance in Science.

Future Researchers. This can build to explore new methods for enhancing self-determination across various educational settings, offering valuable insights for ongoing research in educational psychology and teaching strategies.

Definition of Terms

The following terms were the operational definition to enhance understanding of their significance within the scope of this study.

Autonomy. This refers to how much students feel in charge of their learning in Science, whether they can choose how they study, tackle problems, and take part in class activities in ways that work best for them.

Competence. This refers to how confident students feel in their ability to learn and do well in Science, how sure they are that they can handle lessons, solve problems, and meet academic challenges.

Grade Performance in Science. This refers to how well students do in Science, based on their fourth-quarter grades.

Relatedness. This refers to how connected and included students feel with their teachers and classmates in the Science classroom.

Self-determination. This refers to their ability to take charge of their academic growth, set individual goals, and approach tasks with a sense of control, without depending too much on external pressures or rewards.

Methodology

This paper presented the study's research design, sampling techniques, respondents, survey instruments used, data collection, validation and reliability procedures, and data gathering process. It also outlined the statistical analysis methods and the ethical considerations observed during the research.

Research Design

This study employed a descriptive quantitative research design to evaluate students' grade performance in Science and their level of self-determination. Descriptive research aimed to portray respondents in their natural context, offering an accurate depiction of their existing characteristics without any manipulation. The quantitative approach involved the systematic collection and analysis of numerical data to explore patterns, relationships, and trends within the selected research environment. This methodology strives to provide objective insights into the research topic and is commonly used for hypothesis testing, measuring variables, and making statistical inferences about the population (Siedlecki, 2020).

Population and Sampling Technique

This study employed a simple random sampling technique to ensure that each student in the target population had an equal chance of being selected, thereby minimizing the risk of selection bias. The target population consisted of Grade 10 students from six (6) classes at a secondary school in the United States, comprising both male and female students. The class distribution was as follows: 31 students in the first class, 32 in the second, 34 in the third, 32 in the fourth, 30 in the fifth, and 29 in the sixth, making a total of 187 students, including those from honor, regular, and co-teach classes. To obtain a representative sample from this population, the researcher utilized the Raosoft Calculator, a standard tool that considers the total population size and a specified margin of error. Based on the calculated sample size, 126 students were randomly selected to participate in the study. This method provided a balanced and manageable group for data collection, thereby improving the accuracy, reliability, and generalizability of the results. Overall, the sampling approach contributed to a rigorous and objective research process.

Respondents of the Study

The respondents of this study consisted of 126 Grade 10 students from a secondary school in the United States of America who were enrolled in the Science subject during the final quarter of the 2024–2025 academic year. This high school was recognized for its diverse student population and strong commitment to academic excellence, particularly in core subjects such as Science, Mathematics, and English. Grade 10 students at this institution typically ranged in age from 15 to 16 years old and were at a crucial stage of their secondary education, where foundational scientific concepts were further explored and applied in more complex contexts. All selected respondents were enrolled in Science, making them appropriate participants for the study. They came from various academic sections, including honors classes with grades above 85 percent, regular classes composed of diverse learners, and co-teach classes that included students with lower comprehension levels. Their active engagement in Science aligned with the research objectives, particularly in examining relevant skills and self-determination as they relate to academic performance. The participation

of these students ensured that the study's findings were grounded in real classroom experiences and reflective of the academic dynamics within the school.

Instrumentation

This study utilized a self-determination questionnaire anchored in Self-Determination Theory (SDT), a framework designed to assess an individual's level of self-determination or intrinsic motivation across various aspects of life. Self-Determination Theory, developed by Deci and Ryan in the 1980s as cited by Chiang 2024, asserts that individuals have inherent psychological needs for autonomy, competence, and relatedness. When these needs are fulfilled, individuals are more likely to experience enhanced well-being, motivation, and positive outcomes. A four-point Likert scale was employed in the questionnaire. However, to better suit the needs of the respondents, the researcher modified the survey tool to align with the specific requirements of the study. Analyzing responses using this four-point Likert scale enabled the assessment of varying levels of self- determination among the participants and provided valuable insights into how their perceived self-assurance influenced their grade performance in Science.

Validation and Test of Reliability of Instrument

This study utilized a self-determination questionnaire grounded in Self-Determination Theory (SDT), a theoretical framework developed by Deci and Ryan in the 1980s, as cited by Chiang (2024). The questionnaire was designed to assess levels of self-determination across various areas of life. Prior to its administration, the instrument was validated by four experts in the same field, three from the high school where the researcher was teaching and one from the University of Perpetual Help System-Dalta to ensure content relevance and clarity. Its reliability was also tested using Cronbach's Alpha, resulting in 0.929. A pilot test was conducted with 30 students who were not included in the final sample to refine the instrument. The final survey used a four-point Likert scale. To ensure its alignment with the study's focus on self-determination in Science learning, specifically in Physics, the researcher made necessary modifications to the questionnaire. Respondents rated each item using the following scale: (1) Very Low Self-Determination – students felt little to no autonomy or engagement, driven mostly by external demands; (2) Low Self-Determination – students rarely felt in control and heavily depended on teachers or peers; (3) Moderate Self-Determination – students showed some independence and motivation but still relied on external guidance; and (4) Very High Self-Determination – students strongly perceived autonomy, motivation, and active control in their Physics learning. The analysis of responses provided insights into the different levels of self-determination and how students' self-perceptions influenced their academic performance in Science.

Data Gathering Procedure

To ensure the smooth implementation of the research, a formal letter was submitted to the principal of a junior high school in one of the states in America, the designated research site. This letter requested the necessary authorization to conduct the study. The primary data-gathering tool was a researcher-made survey questionnaire checklist. Respondents' confidentiality was prioritized, and an initial orientation session was

conducted to provide clear instructions and guidance. The survey was made easily accessible to the respondents to facilitate convenient completion.

Additionally, the researcher obtained students' Science grades from the final quarter of the academic year to examine possible correlations between self-determination and academic performance in Science. Special attention was given to securing informed consent since respondents were asked to share their academic records. After data collection, the gathered information underwent comprehensive statistical analysis and interpretation, which played a key role in addressing the research questions. Based on the results, the researcher developed a detailed action plan.

Statistical Treatment of Data

The data gathered in this study were analyzed using the following statistical methods:

Frequency and Percentage were used to determine the demographic profile of the student-respondents

Mean and Standard Deviation were used to assess the level of self-determination of the student-respondents.

Frequency and Percentage were used to identify the Academic Performance in Science of the student-respondents for the final quarter of the school year.

One-way Analysis of Variance (ANOVA) was used to examine whether there is a significant difference in the level of self-determination of the student-respondents when grouped according to their profile.

Pearson's r correlation was used to determine whether there is a significant relationship between the level of self-determination and the grades of the student-respondents in the last quarter of the school year.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

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

Table 1

Frequency and Percentage of the Profile of the Respondents

		Frequency	Percentage
Age	14	0	0.0%
	15	52	41.3%
	16	57	45.2%
	17 and above	17	13.5%
Sex	Male	48	38.1%
	Female	78	61.9%
Class	Honor	18	14.3%
	Co Teach	33	26.2%
	Regular	75	59.5%

The data revealed that the majority of the respondents were aged 16 and 15, with a small proportion aged 17 and above. This aligns with the expected age distribution of students in a secondary-level educational setting. The distribution of respondents by sex shows that females significantly outnumber males. Additionally, most respondents were classified as Regular students, followed by those in Co-Teach programs and a smaller group identified as Honor students. These statistics suggest that the learning population is largely composed of students within a normative age bracket and diverse academic groupings, which may influence their learning dynamics and motivational needs.

From the perspective of self-determination theory (SDT), understanding these demographic patterns is essential because students' motivation and engagement are deeply influenced by their sense of autonomy, competence, and relatedness (Ryan & Deci, 2020). For instance, regular students who represent the majority may benefit more from structured motivation-enhancing strategies than honor students, who are often intrinsically motivated (Almukhambetova & Hernández-Torrano, 2020). Likewise, the higher number of female respondents suggests that gender-specific pedagogical approaches may be necessary, especially considering how sex-based motivational orientations can impact academic performance and classroom engagement (Howard et al., 2021). These findings highlight the importance of tailoring interventions and instructional methods that align with the profiles and psychological needs of distinct student groups.

The implications of these demographic findings extend to curriculum planning, where educators and administrators must foster learning environments that support both autonomous and controlled motivations depending on students' academic categories and personal backgrounds. According to Bureau et al. (2022), motivation is not static but shaped by various antecedents, including age, gender, and learning context. Recognizing the distribution of student profiles enables schools to adopt SDT-informed strategies that enhance learner autonomy,

particularly for those in regular and co-teach classes who may lack intrinsic academic drive. As Gagné et al. (2022) emphasized, aligning educational approaches with students' motivational drivers ensures improved engagement and potentially stronger academic outcomes.

Problem number 2. What is the degree of self-determination in Physics class as evaluated by the respondents with respect to Autonomy, Competence, and Relatedness?

Table 2 Mean and Standard Deviation on the Degree of Self-determination in Physics Class as Evaluated by the Respondents with Respect to Autonomy

	Mean	Std. Deviation	Verbal Interpretation
1. I feel that I have the freedom to choose how I learn Science.	3.52	0.50	Strongly Agree
2. I prefer to make decisions about how I study Science on my own.	3.49	0.52	Agree
3. I often feel that my learning in Science is controlled by others.	3.51	0.52	Strongly Agree
4. I enjoy having the ability to set my own goals in Science.	3.51	0.52	Strongly Agree
5. I feel encouraged to take charge of my own learning in Science.	3.57	0.50	Strongly Agree
Autonomy	**3.52**	**0.43**	**Strongly 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 Disagre

The data show that respondents expressed a high level of autonomy in their Physics class, with an overall mean score of 3.52, interpreted as Strongly Agree. Notably, students strongly agreed that they are encouraged to take charge of their learning, and they enjoy setting their own goals in science. This suggests that students generally perceive a supportive learning environment that nurtures their independence and decision-making in academic tasks, which are key components of self-determination theory (SDT). According to Guay (2022), autonomy-supportive environments allow students to feel more in control of their learning experiences, resulting in enhanced academic engagement and internal motivation.

These findings are consistent with studies emphasizing the critical role of autonomy in science learning. For example, Botnaru et al. (2021) found that students who perceive themselves as having autonomy in STEM classes tend to display more positive academic behaviors and outcomes. Similarly, Ahmad et al. (2024) reported that motivation in science subjects is closely linked to students' ability to make autonomous choices in their learning strategies. The current results indicate that even in a traditionally challenging subject like Physics, autonomy is present and serves as a protective factor that sustains student interest and engagement.

Implications for classroom practice include reinforcing autonomy through student-centered instructional methods, such as allowing students to choose project topics or problem-solving approaches. Partanen (2020) highlights that student-centered strategies in science education significantly influence learners' sense of control and academic enjoyment. Furthermore, Nalipay et al. (2020) assert that

autonomy-supportive teaching benefits students across different cultural contexts, making it a universally effective approach. Given the strong ratings across autonomy indicators in this study, it is recommended that Physics educators continue fostering autonomy as a central component of their pedagogy, thereby enhancing motivation, performance, and overall well-being in science learning environments.

Table 3 Mean and Standard Deviation on the Degree of Self-Determination in Physics Class as Evaluated by the Respondents With Respect to Competence

	Mean	Std. Deviation	Verbal Interpretation
1. I feel capable of mastering Science tasks on my own.	3.51	0.50	Strongly Agree
2. I am confident in my ability to perform well in Science.	3.51	0.52	Strongly Agree
3. I feel that I have the necessary skills to succeed in Science.	3.55	0.52	Strongly Agree
4. I often feel challenged by Science tasks, but I enjoy overcoming them.	3.56	0.50	Strongly Agree
5. I usually seek to improve my Science skills on my own.	3.54	0.53	Strongly Agree
Competence	**3.53**	**0.47**	**Strongly 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 findings show that respondents strongly agreed with all indicators of competence in their Physics class, resulting in an overall mean of 3.53. Students particularly reported feeling challenged by science tasks yet enjoying the process of overcoming them, and they expressed confidence in their skills and abilities to succeed in the subject. This high perception of competence reflects the presence of a supportive academic environment that allows students to feel effective in their learning efforts, an essential psychological need under self-determination theory (Ryan & Deci, 2020). When students believe they are capable of mastering tasks, their intrinsic motivation increases, which can lead to sustained academic engagement and performance.

From the SDT lens, perceived competence is crucial in fostering autonomous motivation, especially in STEM subjects like Physics, which are often viewed as challenging. Botnaru et al. (2021) emphasized that students who feel competent in science are more likely to show persistence and academic resilience, especially when facing complex tasks. Likewise, Ahmad et al. (2024) found a strong link between students' confidence in their abilities and improved science achievement at the secondary level. The results of this study support these claims, suggesting that respondents not only feel capable but are also willing to take initiative in improving their science skills, which may be a key driver of their positive learning outcomes.

The implications of these findings call for the continued use of competence-enhancing strategies in the classroom. This includes clear feedback, achievable challenges, and opportunities for independent practice, all of which contribute to a student's growing sense of mastery. According to Howard et al. (2021), the consistent fulfillment of the competence need predicts better academic results, stronger emotional well-being, and reduced dropout intentions. Educators, therefore, should integrate structured tasks that are challenging but attainable, paired with encouragement and recognition of progress. These practices not only promote self-determined learning but also build students' academic identity and long-term motivation in science education.

Table 4 Mean and Standard Deviation on the Degree of Self-Determination in Physics Class as Evaluated by the Respondents with Respect to Relatedness

	Mean	Std. Deviation	Verbal Interpretation
1. I feel supported by my teachers when learning Science.	3.40	0.62	Agree
2. I feel a sense of belonging in my Science class.	3.45	0.59	Agree
3. I enjoy working with my classmates on Science activities.	3.45	0.57	Agree
4. I feel that my classmates and I share a common goal in learning Science.	3.48	0.53	Agree
5. I feel encouraged by others to pursue my goals in Science.	3.42	0.60	Agree
Relatedness	**3.44**	**0.47**	**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

Based on the results in Table 4, the respondents rated their level of relatedness in Physics class with an overall mean of 3.44, interpreted as Agree. Students agreed that they feel a sense of belonging, enjoy collaborative work with peers, and receive encouragement and support from both teachers and classmates. These results suggest that while relatedness is generally present in the classroom, it is not as strong as autonomy and competence. This indicates a potential area for improvement, as fostering deeper connections can further enhance motivation and engagement in science learning.

According to Ryan and Deci (2020), relatedness, feeling connected and valued by others, is a fundamental psychological need within self-determination theory (SDT). When students perceive a strong sense of support from peers and instructors, their intrinsic motivation tends to increase. This aligns with the findings of Bureau et al. (2022), who emphasized that positive social interactions are predictive of autonomous motivation and well-being in academic settings. Similarly, Chiu (2022) highlighted the significance of social connection in online science learning, suggesting that relatedness plays a vital role even in remote or hybrid formats.

The implications of these findings highlight the importance of cultivating a more socially supportive classroom environment. Teachers may enhance relatedness by encouraging peer collaboration, recognizing group efforts, and establishing trust and inclusivity. As noted by Almukhambetova and Hernández-Torrano (2020), feelings of isolation or lack of connection can lead to disengagement or even underachievement, especially among gifted or high-potential students. Thus, strengthening classroom relationships and promoting shared learning goals may contribute to a more cohesive and motivated learning community in Physics and other STEM disciplines.

Table 5 Mean and Standard Deviation of the Composite Table on the Degree of Self-Determination in Physics Class as Evaluated by the Respondents

	Mean	Std. Deviation	Verbal Interpretation
Autonomy	3.52	0.43	Strongly Agree
Competence	3.53	0.47	Strongly Agree
Relatedness	3.44	0.47	Agree
Level of Self-Determination of the Students	**3.50**	**0.41**	**Strongly 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 findings from the composite table suggest that the students exhibit a high degree of self-determination in their Physics class, particularly in the domains of autonomy and competence, with both receiving the highest verbal interpretation of "strongly agree." This implies that students feel they have meaningful control over their learning process and perceive themselves as capable learners. According to Ryan and Deci (2020), satisfying these core psychological needs enhances intrinsic motivation and persistence, both of which are critical in complex subjects like Physics. Likewise, Botnaru et al. (2021) emphasized that competence and autonomy are predictive of positive academic outcomes in STEM courses, reinforcing that these aspects are essential for student success.

Although the relatedness domain scored slightly lower with a rating of "agree," it still indicates a generally positive perception of social connection within the learning environment. Relatedness, while not as strong as the other two components, remains an important element for fostering motivation and engagement. Bureau et al. (2022) pointed out in their meta-analysis that feeling connected to others enhances autonomous motivation, which in turn supports better learning behaviors and outcomes. Ensuring stronger peer and teacher connections could elevate this component further, thus strengthening overall self-determination.

The implications of this composite assessment are significant for curriculum planners and educators. Chiu (2022) highlights that structured, autonomy-supportive learning environments—where students feel both capable and socially connected—lead to greater academic engagement. Therefore, to sustain and improve self-determination in Physics, schools may consider implementing teaching strategies that reinforce student autonomy and competence while also fostering collaborative and inclusive classroom environments. This holistic support can enable learners to thrive not only in science but across their educational experiences.

Problem number 3. What is the students' grade performance in Science based on the fourth quarter?

Table 6: Mean and Standard Deviation of the Students' Grade Performance in Science Based on the Fourth Quarter

Group	N	Mean	Std. Deviation
Honor	18	80.33	13.00
Co Teach	33	73.94	12.20
Regular	75	79.60	10.00

The data from Table 6 shows varying performance levels in Science among the three student groups during the fourth quarter. The honor group demonstrated the highest average performance, followed closely by the regular group, while the co-teach group recorded the lowest mean score. This suggests that students in specialized or advanced academic programs perform better in Science, possibly due to higher intrinsic motivation, better foundational knowledge, and more structured support systems. Ahmad et al. (2024) emphasized that students who are more motivated and engaged in science subjects often outperform their peers academically, highlighting the role of individual drive and classroom environment.

These differences may also point to disparities in the support and autonomy afforded to each group. According to Botnaru et al. (2021), students' academic motivation and final performance are significantly influenced by how much autonomy and competence they perceive in their learning environment. Co-teach groups, which may include learners with varying academic needs, could benefit from more tailored instructional approaches that foster these psychological needs. A lack of alignment between teaching style and learners' motivational drivers could hinder performance in this group, despite the availability of instructional support.

In terms of educational implications, this pattern underscores the importance of integrating self-determination theory into classroom practices, especially for students who may struggle with traditional instructional models. Guay (2022) explains that autonomy-supportive teaching, recognition of competence, and fostering of relatedness are critical for improving student motivation and performance. By adopting inclusive and differentiated strategies that build motivation and engagement across all student groups, particularly in co-teaching settings, educators can help reduce performance gaps and promote more equitable academic outcomes.

Problem number 4. Is there a significant difference in the degree of self-determination in Science class as assessed by the respondents when grouped according to their profile?

The findings from Table 7 reveal a statistically significant difference in the degree of self-determination in Science class when students are grouped according to age, sex, and class. This suggests that demographic and contextual factors shape students' perceptions of autonomy, competence, and relatedness. For instance, younger students or those in different class settings may experience varying levels of support and engagement, which directly influences their motivation

Table 7 Test of Significant Difference on the Degree of Self-Determination in Science Class as Assessed by the Respondents When Grouped According to Their Profile

	t	df	Sig. (2-tailed)	Decision	Remarks
Age - Level of Self-Determination of the Students	-10.883	125	0.000	Reject	Significant
Sex - Level of Self-Determination of the Students	-33.603	125	0.000	Reject	Significant
Class - Level of Self-Determination of the Students	-14.354	125	0.000	Reject	Significant

(Ahmad et al., 2024). Recognizing these differences is essential in tailoring educational interventions that consider the unique motivational needs of each subgroup.

These results align with self-determination theory, which asserts that motivation is influenced by how well students' psychological needs are met within their environment (Ryan & Deci, 2020). The significant impact of sex and class may point to differential classroom experiences, instructional styles, or peer dynamics that either promote or hinder motivation. As Bureau et al. (2022) emphasize, the pathways to student motivation are not uniform, and autonomy-supportive contexts can vary widely depending on socio-cultural and classroom variables. This highlights the importance of inclusive teaching strategies that foster equitable motivational climates for all students.

The implications for educational practice are profound. Teachers should adopt differentiated and culturally responsive approaches that support the needs of diverse learners, especially when clear disparities are observed across profiles. Chiu (2022) notes that adapting instructional design through the lens of self-determination theory can increase student engagement and self-directed learning, particularly in mixed-ability settings. By acknowledging these significant differences, educators can make informed adjustments

to their pedagogy and classroom management to support the self-determination and academic success of all students, regardless of age, sex, or class group.

Problem number 5. Is there a significant relationship between the degree of self-determination as assessed by the respondents and students' grade performance in science based on the fourth quarter?

The data in Table 8 shows that there is no significant relationship between the degree of self-determination and the students' Science grades for the fourth quarter, as indicated by a very weak positive correlation and a high p-value. This suggests that students who reported higher levels of autonomy, competence, and

relatedness did not necessarily achieve better academic outcomes in Science. Although self-determination theory posits that internal motivation enhances performance (Ryan & Deci, 2020), this result highlights the complexity of academic

Table 8 Correlation Between the Degree of Self-Determination as Assessed by the Respondents and Students' Grade Performance in Science Based on the Fourth Quarter

		Level of Self-Determination of the Students
4th Quarter Science Grade	Pearson Correlation	0.037
	Sig. (2-tailed)	0.677
	N	126

achievement and suggests that other factors, such as instructional quality, test anxiety, or external supports, may have played a stronger role.

This finding echoes the work of Botnaru et al. (2021), who emphasize that while motivation is a key predictor, its effects can be moderated by classroom behavior, assessment strategies, and contextual influences. Similarly, Almukhambetova and Hernández-Torrano (2020) noted that even highly motivated or gifted students may underperform when structural or emotional barriers are present. Hence, it's important not to rely solely on self-reported motivation but to consider a broader framework that includes learning conditions and individual student needs.

The implication for educators is to adopt a more holistic approach to fostering achievement. While nurturing intrinsic motivation remains valuable, it should be paired with clear instructional scaffolds, regular feedback, and mental health support to fully realize its potential effects. As Howard et al. (2021) explain, student motivation alone is not a universal solution but a dynamic construct influenced by numerous variables. Teachers, therefore, must balance motivational strategies with evidence-based teaching practices that support diverse learning needs and academic success.

Problem number 6. Based on the findings of the study, what output may be proposed?

MATRIX

Areas of Concern	Objective	Strategies /Activities	Person Responsible	Budgetary Requirements	Time Frame	Success Indicator
Autonomy	To foster self-determined motivation in science by promoting autonomy, ownership of learning, and respect for diverse learning preferences.	Science Learning Choice Board (students select how they want to study or demonstrate mastery of a given science topic. The board presents a variety of learning tasks and output options aligned to the lesson objectives, allowing students to decide which method best suits their interests and strengths.)**How it works:** ✅ Teacher prepares a 3×3 grid (or more) of activities, such as: *Create a poster explaining a concept. *Write a short essay or reflection. *Conduct a simple experiment and record observations. *Make a digital presentation. *Lead a group discussion or mini-	Principal Guidance Counselor Teachers Staff Students Parents	USD 500	Quarterly	At least 80% of students demonstrate increased self-motivation and engagement in science, as evidenced by their active participation, completion of chosen tasks, and positive feedback on having autonomy in their learning process.

		teaching session. *Solve a set of higher-order thinking questions. *Students are required to pick **at least one activity from each row/column**, ensuring a balance of skills and coverage of key concepts.				
Competence	To strengthen students' sense of competence by enabling them to work independently, progress at their own pace, and demonstrate mastery of science concepts and skills.	Science Mastery Challenges (Students take on a set of progressively challenging, self-paced science tasks designed to build confidence and demonstrate mastery. Each student begins by selecting a *challenge level* (easy, moderate, advanced) that they feel capable of completing independently, with opportunities to move to higher levels as they succeed. **Steps:** ✅ Teacher prepares three tiers of tasks on the current science topic, aligned with Bloom's taxonomy (e.g.,	Principal Guidance Counselor Teachers Staff Students Parents	USD 800	Monthly	At least 80% of students successfully complete their chosen science tasks independently, showing measurable improvement in accuracy and confidence as reflected in their outputs and self-assessment scores.

		knowledge/comprehension, application/analysis, synthesis/evaluation). ✅ Students choose their starting level, complete the tasks, and submit their work. ✅ After completing one level, students are encouraged to "level up" to the next challenge to further build competence. ✅ Teacher provides feedback highlighting students' progress and areas of strength.				
Relatedness	To enhance students' sense of relatedness by fostering a supportive, caring, and connected learning environment with their teacher and peers during science lessons.	Science Support Circles (Students meet with the teacher in small groups to discuss their progress, challenges, and successes in learning science. The teacher facilitates the session, actively listens, offers guidance, and provides words of encouragement to ensure every student feels heard and supported. **Steps:** ✅ Schedule 20–30 minute sessions bi-weekly, rotating groups	Principal Guidance Counselor Teachers Staff Students Parents	USD 1000	Twice a week	At least 85% of students report feeling supported, valued, and connected to their teacher and classmates in science, as reflected in post-activity surveys and increased participation in collaborative

		so every student participates. ✅ Use a simple guide: students share one thing they've learned, one thing they're proud of, and one thing they're struggling with. ✅ Teacher provides immediate, positive feedback and specific suggestions for overcoming challenges. ✅ End with a motivational message and, optionally, peer-to-peer encouragement within the group.)				learning activities.

EVALUATION

The effectiveness of this action plan can be assessed by examining its ability to improve students' autonomy, competence, and relatedness, along with its influence on their engagement and achievement in science. This evaluation may involve administering pre- and post-intervention motivation surveys, monitoring classroom participation, and analyzing science performance data before and after the plan's implementation to gauge its success in promoting self-determined and resilient learners.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This paper presents the summary of findings, conclusions, and recommendations explored in the study titled "Self-Determination and Students' Grade Performance in Science: Basis for an Action Plan." The study aimed to examine how students' autonomy, competence, and relatedness relate to their academic performance and what measures can be taken to enhance Science learning in junior high school.

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

1. The respondents were generally in their mid-adolescent years, with female students slightly outnumbering males. Most were from the Regular class group, with others coming from the Co-Teach and Honor sections, reflecting the typical demographic composition of a junior high school population.

2. The degree of self-determination in the Science class was rated highly by the respondents. Students strongly agreed with statements relating to autonomy and competence, while relatedness received slightly lower but still positive ratings, interpreted as "Agree."
3. In terms of Science performance, students from the Honor group obtained the highest average fourth-quarter grades, followed closely by the Regular group. Co-Teach students recorded the lowest academic performance in Science.
4. Significant differences were found in students' level of self-determination when grouped according to age, sex, and class. Older students, females, and those in the Honor class group showed higher levels of autonomy, competence, and relatedness.
5. The correlation between students' self-determination and their Science grade performance was positive but not statistically significant. This indicates that while motivation is present, it may not directly predict achievement without other academic and environmental supports.
6. Based on the results, an action plan was developed that focuses on linguistic, psychological, and environmental factors. The plan includes strategies that aim to enhance autonomy, competence, and relatedness through vocabulary building, motivation workshops, peer collaboration, and inclusive instructional methods.

Conclusions

1. The demographic characteristics suggest that findings are most applicable to typical junior high school learners aged 15 to 16, especially those in the Regular class group and female students.
2. The study underscores the importance of designing targeted interventions and recommendations that align with the specific needs and characteristics of junior high school learners, particularly mid-adolescents, female students, and those in the Regular class group, to effectively enhance their learning experiences and outcomes.
3. Strengthening students' sense of connection with peers and teachers through improved social interactions and collaborative learning is essential to fully support their self-determination in the science classroom.
4. The variation in learners' perceptions of self-determination across age, sex, and class groupings emphasizes the importance of adopting differentiated instructional strategies to better cater to students' diverse needs, rather than relying on uniform teaching methods.
5. Self-determination helps keep students engaged in learning, but it doesn't always lead to higher academic performance in science, suggesting that other external factors also shape their success.
6. Creating and carrying out a thoughtful, adaptable action plan shaped by students' voices and grounded in what truly motivates them can go a long way in improving their motivation, engagement, and success in learning science.

Recommendations

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

1. Students may participate in targeted programs tailored to their specific needs and characteristics, particularly for mid-adolescents, Regular class group members, and female learners, as these programs can enhance their motivation, engagement, and overall success in science.
2. Teachers can design differentiated instructional strategies that consider students' diverse profiles, including age, sex, and class grouping, instead of relying on one-size-fits-all approaches, to ensure that all learners are effectively supported.
3. Teachers may foster stronger social connections in the classroom by incorporating more collaborative and interactive activities, peer-learning opportunities, and teacher-student bonding moments to enhance students' sense of relatedness.
4. Parents are encouraged to actively support their children's learning by recognizing external factors that may affect their academic performance, such as stress or lack of confidence, and by collaborating with teachers and availing of support services like mentoring, counseling, or enrichment programs to complement classroom initiatives and foster their child's motivation and success in science.
5. The principal may involve students in planning and decision-making by regularly gathering their feedback and incorporating their perspectives into lesson design and classroom activities, making learning more meaningful and motivating for them.
6. Future researchers may explore the effectiveness of flexible and responsive action plans by conducting longitudinal or intervention studies that incorporate ongoing student feedback and account for dynamic classroom contexts, providing deeper insights into strategies that sustainably enhance motivation, engagement, and science learning outcomes.

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