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Research Article

Regression Analysis on the Perceived Instructional Management and Self-Directedness of Learners Towards Learning Academic Achievements in Science

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Abstract— The study investigated the relationships and influences of instructional management and self-directedness on students' learning and academic achievement in science among Grade 8 students of the three public secondary schools in the District 1 division of Davao de Oro, School Year 2023-2024. Specifically, it examined the variables that best predict students' academic achievement in science. Correlational and causal-comparative designs were utilized in this study. Moreover, sets of adapted survey questionnaires were used to obtain information from the participants. For students learning academic achievement in science, the study used the students' general average in science. Pearson Product Moment Correlation and Multiple Linear Regression were the statistical tools utilized in the study. The results showed that instructional management and students' self-directedness characteristics have a significant and positive relationship with students' learning academic achievement in science. Moreover, the desire to learn for self-directedness significantly predicted students' academic achievement in science. Thus, nurturing a drive to study can help students be more resilient in academic challenges, resulting in better overall performance in science courses.

Keywords— Perceived Instructional Management, Self-Directedness, Regression, Philippines

1. Introduction

The success of the country's educational pursuits depends on what the learners' foundation brings and builds in the future. As the country progresses towards a highly developed state, initiatives and programs for improvement must be considered. Several professionals were the product of a strong foundation, specifically in education. However, education in the 21st century is regarded as one of the biggest industries that needs concrete attention and must be revisited in addressing students' performance notions. In previous years, the government was continuously fighting the educational crisis with various program initiatives and enhancements, but still, Filipinos flaunt low academic achievements. This was evident based on local, national, and international assessments. Thus, it guides several experts and researchers to dig down and explore the roots of its occurrence.

Accordingly, the global educational systems faced tremendous obstacles and opportunities when the Coronavirus disease (COVID-19) pandemic broke out. Distance education has become a new norm, and its implementation creates anxiety for students as they need to learn and adapt individually to a different learning modality [1]. With this, a complete examination of student self-directedness and motivation, particularly in remote learning. It is a global imperative that they achieve these skills for independent, disciplined, and lifelong learning [2]. The low level of self-directedness in science learning poses challenges, resulting in low academic performance, less sense of responsibility, and a lack of learning skills [3].

Nowadays, junior high school students do not generally excel in science subjects. Over time, their performance in solving science problems and learning tasks has deteriorated. According to the report of the 2018 Program for International Student Assessment (PISA) statistics, 78 percent of 15-year-old junior high school Filipino students in 79 countries have level 2 competence. In science, students in the Philippines scored 357 points, far from the 489 OECD average target. PISA-participating countries and economies had the highest percentage of low achievers in all subjects (mathematics, reading, and science) (78 percent, rank 2/79, 2018). Furthermore, the Philippines finished last out of 58 countries that took scientific and mathematical exams in the 2019 Trends in International Mathematics and Science Study (TIMSS).

On the other hand, teacher instructional management is one of several factors influencing student academic performance in science. It is imperative in the advancement of scientific knowledge. As a result, teachers have been demonstrated to impact students' academic progress and play a vital role in educational attainment [4]. Teachers are ultimately accountable for turning policy into action and values based on experience during interactions with students. Accordingly, science teachers have been identified as critical in increasing student achievement [5]. Various variables influenced poor science performance, including poor science professors, overcrowded classrooms, and a lack of proper science equipment. Similarly, highly qualified/trained professors are critical in helping students improve their academic performance in biology [6]. As a result, well-taught students are more likely to succeed, whereas inadequately trained students are more likely to fail [7].

The findings of this study would help students understand that their performance in science is influenced by various factors, including their self-directedness characteristics and their perceived teacher's instructional management strategies. It would also help them cultivate a positive attitude toward learning scientific problems. Also, the study's results would make the parents aware of the various factors influencing their children's science performance. Most likely, research would assist them in determining what type of support system they can provide to their children, teachers, and the school. Similarly, the teachers could understand the impact of instructional management and self-directedness characteristics on students' science performance. This would also guide them on what to initiate, modify, improve, and how to assess their clientele students to effectively facilitate and suit learning capabilities to enhance students' science performance and develop their scientific ability.

Consequently, the study's findings would inform the Department of Education officials about the best predictors of students' science academic performance. This would assist them in developing or creating an educational program that would improve learners in addressing poor performance in science and an efficient curriculum that fits the demands of the current curriculum at the regional and national levels. The outcome would also give them an idea of what specific intervention should be implemented to improve the learners' science performance.

1.1 Statement of the Problem

The study was geared to determine the significant relationship and impact of perceived teachers' instructional management and learners' self-directedness on Learners' Achievement in Science among grade 8 learners in Montevista District, Davao de Oro division. Indeed, this learning trail was conducted to achieve the following research purposes.

The following research hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship the exists between:
   - 1.1 Perceived instructional management and learners' academic achievement in science, and
   - 1.2 Learners' self-directedness and learners' academic achievement in science.
2. Perceived instructional management and learners' self-directedness do not predict learners' academic achievement in science.

2. Related Work

Instructional Management and Learners' Performance in Science

Teachers' instructional management skills are among the most critical components in obtaining success in teaching-learning. Instructional management has long been recognized as one of the most crucial aspects of educational administration [8]. As a result, instructional management is an act that teachers perform to manage their classrooms. Accordingly, instructional management is also known as classroom management [9]. Furthermore, the authors stated that instructional management emphasizes the learning process rather than the teacher. As a result, purposeful attempts must be made to modify learning resources for students to learn.

Likewise, instructional management collaborates to attain learning objectives quickly and effectively. An instructional plan, learning implementation, and evaluation are all part of the applied instructional management process [10][11]. When implementing and incorporating learning activity plans, the teacher, on the other hand, should concentrate on the classroom's harmony of instructional resources, media, and learning methods. The most crucial educational service that schools provide to students is learning. As a result, before beginning instructional activities, teachers prepare everything required in the classroom to ensure that learning activities are carried out appropriately and that the necessary learning objectives are met [12].

The first indicator under instructional management is teachers' instructional strategies. Teachers' instructional strategies also contribute to students' academic performance. A study of [13] on the relationship between student achievement and teachers' instructional strategies mentioned that students' achievement was higher in classrooms where teachers interacted more with their coaches and in classrooms where teachers had greater trust in the effectiveness of education. The second indicator under instructional management is the learning content efficacy. [14] suggests that teaching content quality and efficacy significantly impact academic performance. According to [15] teaching quality is the most critical factor determining educational achievement. Also, teachers' learning content self-efficacy affects students' goal achievement.

Moreover, instructional management is vital in improving students' performance in the science lesson by offering proper teaching frameworks. The literature suggests that if the teachers are clear on instructional goals, feedback, and

use of multiple instructional approaches, the students' science knowledge & interest will significantly increase [16]. Another component of instructional management is formative and summative including the adjustment learner needs to engage learners successfully. This research showed improved student outcomes using such a [17]. Moreover, instructional management that creates a positive academic climate enhances the learners' interest and commitment, which is one factor that boost science performance [18].

Self-directedness and Learners' Performance in Science

The development of self-directedness of an individual is described as personal, intentional, and developmental. It means to have the initiative, with or without assistance from others to do personal educational activities such as diagnosing own needs in learning, establishing learning objectives, managing learning resources, applying appropriate learning strategies and assessing own learning results. Self-directedness provides the individual the autonomy and obligation in the decision-making for their learning purpose. Using these skills reinforces the person's capability and responsibility for choosing and opportunity for self-actualization [19].

The factors that result in the demand for self-directed learning include the divergence from the rigid traditional school system, less authoritative role of the teachers and the rich opportunities for formal and informal education through online and distance education. There is also emphasis that purposeful means of creating a more flexible learning environment can significantly contribute to the learners' self-directed learning [20]. Hence, communication is essential in developing self-directedness in distance education, aside from having flexibility, being transparent, well-timed, and responsive. By building a learning community with the teachers and the students, learning isolation can be prevented, and they can be given academic and technical support [21].

Furthermore, the critical essential elements to the learners' self-directedness in science are the nature of the subject, learning assistance, and motivation from the teachers and prior student knowledge. These are primarily learning and personal factors that ensure the development of the necessary skills. The learning tasks must be open-ended inquiry-based because they will be able to self-plan, monitor, and evaluate their learning. The teachers' motivation to implement self-directed learning is directly affected by how they support them [22]. With these, the highly self-directed students are considered reliable and dependable in learning science, which is evident in their better academic performance in science subjects [23].

In addition, the notion is that learners perform better academically if they can control and manage their educational experience or are self-directed. Teachers have a significant role in creating a condition for the learners to develop self-direction learning skills. This includes the teacher's continual support and encouragement that enhances the learners' effectiveness in their performance level toward the learning task. Self-directedness becomes necessary to shift education from traditional teaching to a more independent, distant, and technology-driven learning mode in 21st-century education [24].

Self-directedness significantly affects developing the students' inquiry and critical thinking skills in blended distance learning. As the teachers explain and set the self-paced learning mode, the learners will eventually rely on self-directed skills and behaviours. This will enhance them to learn the materials more engaging and active, as confirmed through their learning reflections [25].

Learners' Performance in Science

Students' academic performance is the pivot around the entire educational system. The academic performance of its students determines any educational institution's success or failure. Parents and institutions have high expectations of students' academic success because they feel that better academic results will lead to better employment opportunities and future stability.

Accordingly, science performance is described as students' scientific knowledge and skills to succeed in a developing society. Being scientifically proficient means comprehending the scientific problems that drive federal and state policies and expressing scientifically and technologically driven ideas and opinions [26]. Moreover, a scientifically competent learner should evaluate the importance of scientific evidence based on the source and methods used to generate it. Likely, scientifically proficient individuals can: (a) comprehend and apply scientific explanations of the natural world; (b) comprehend the nature and evolution of scientific knowledge; (c) construct and evaluate scientific explanations and arguments; and (d) participate productively in the scientific community's practices and discourse.

Similarly, despite the current level of proficiency that the Filipinos students received from an international assessment such as PISA and TIMSS, Filipinos still cast a shadow of their portion towards improvement. Approximately 22% of students in the Philippines achieved a Level 2 or higher in science. These students can recognize the correct explanation for well-known scientific phenomena and use this knowledge to identify, in simple cases. On the other hand, Filipino students were proficient at Level 5 or 6 or very satisfactory. As a result, students at this level can apply their knowledge of and about science in various situations, including those unfamiliar to them, creatively and autonomously. Moreover, PISA's factors positively associated with academic resilience include parental support, a positive school climate, and a growth mindset (OCED, 2019).

Meanwhile, in science biology, according to [27], students' attitudes toward science are more likely to influence achievements in science courses than achievement to influence attitude. It also agreed with [28] finding that improving students' attitudes toward Biology improve students' performance in the subject. Furthermore, [29] supported a significant relationship between students' attitudes toward biology and their academic performance in

biology. Moreover, students' attitudes toward Biology influence their educational success. Those with a positive attitude were likelier to work hard, as evidenced by their excellent exam results [30].

In contrast, subject matter knowledge in chemistry refers to the teacher's understanding of the core concepts, tools of inquiry, and forms of the discipline(s) he or she teaches, as well as the creation of learning experiences for students to assure content mastery. The quality of education is determined by the quality of its teachers. According to [31], teachers' participation in outreach programs such as science in action helped them gain confidence in their ability to teach science due to their understanding of the scientific method and science content. According to research, teachers' subject matter knowledge influences effective teaching and is a significant predictor of student learning [32].

[33] supported the results that attitude refers to how students act and think. Students who were found to have positive attitudes toward science in their chemistry class were influenced by their teachers' positive attitudes toward science. This is supported by the findings of [34], who discovered that the teachers' interest in teaching science influenced the students' positive attitudes. On the other hand, [35] study on factors influencing chemistry performance in Kenyan public secondary schools found that students' attitudes toward the subject impacted their performance. Students with negative attitudes toward chemistry outperform those with positive attitudes [36].

3. Theoretical Framework

The study was anchored mainly on the Science Performance Productivity Theory theory, which stated that the more students are engaged, self-directed, and motivated, coupled with supportive and well-designed teachers' instructional management, the better the students' performance in science. It explains that the motivational characteristics of individual students and the perceived effective teachers' instructional management in the learning process influence students' science achievement. This theory emphasizes that a student's motivation significantly impacts their science achievement; though each student has the same academic potential, their motivation may differ. Moreover, the theory also emphasizes that instructional management substantially impacts students' science achievement. Also, it demonstrates that well-designed instructional management assist students in being more focused and at ease when executing school responsibilities, resulting in improved academic achievement [37].

Similarly, instructional management was anchored on Choice Theory which asserts that teachers as managers must work effectively to successfully instruct their students. Teachers' managerial responsibilities include teaching students that strenuous effort and obedience are essential and positively impact their lives. Teachers can assist students in accomplishing this by fostering positive relationships and providing active, relevant learning opportunities that demonstrate mastery and achievement [38]. This research was backed up by Instructional Management Theory, which states that a teacher's ability to use constructive instructional management can influence and shape a student's conduct. It concerns how the instructor demonstrates the desired skills through instructional leadership, which can detect the learners' actions and remain involved in the lesson. To effectively link management and teaching, he also stated that good lesson movement is needed to bridge the pupils' learning using skills taught in the classroom [39].

Moreover, self-directedness is based on [40] Self-directed Learning Model. It stated that motivation factors strongly affect and implicate the level of a person's self-directedness to learn. Motivation stimulates self-responsibility and resourcefulness which results in self-directed learning. This is further supported by some studies which stated that motivation can help improve individuals' self-directed learning [41]. Also, motivation is deemed beneficial and contributes to the skills and assessment part of the student's self-directedness [42]. The student has a high motivation level, the more they are involved and encouraged to develop their self-directed skills and task performance.

Figure 1 below schematically presents the conceptual framework of the study, which includes two variables, known as the independent and dependent variables, and their relationships. The independent variable is the perceived teachers' instructional management level and learners' self-directedness, while the dependent variable is learning academic achievement in science.

Moreover, the first independent variable is the perceived teachers' instructional management. Its domains are taken from [43] identified the indicators of this variable: learning content efficacy, motivational skills, and instructional strategies. Learning content efficacy covers the ability of teachers to present subject content with interactive lessons and challenging activities, as well as integrate lesson activities in a well-organized manner so that students can find them easy to understand. Motivational skills pertain to the action employed by the teachers, both written and verbal, to elicit behaviour or response and desirable outcomes on the assigned tasks. Instructional management skills refer to various techniques teachers utilize to help students become strategic and independent learners. Hence, it can be stipulated that instructional management by teachers improves learners' science proficiency since teachers create purposeful learning environments, that enhance the learning of language skills.

Likewise, self-directedness was the second independent variable that will be used in the study in which its domains such as learning with intention, open-mindedness, self-management, and desire to learn are the indicators identified by [44] Learning with intention refers to the ability of the students to set their own learning goals and objectives for their modular learning in science. Also, open-mindedness pertains to the willingness of the students to apply new learning strategies and resources in their modular learning. Another indicator under this variable is self-management which refers to the excellent management skills of the

students in time, activities, and decisions for their modular learning. Lastly, the desire to learn this pertains to the passion, enjoyment, and satisfaction of the students as they learn science in modular mode. Therefore, the perceived motivation, perceived control, and learners' self-regulation facilitate the formation of scientific proficiency skills by encouraging learners to actively participate in learning science-related concepts.

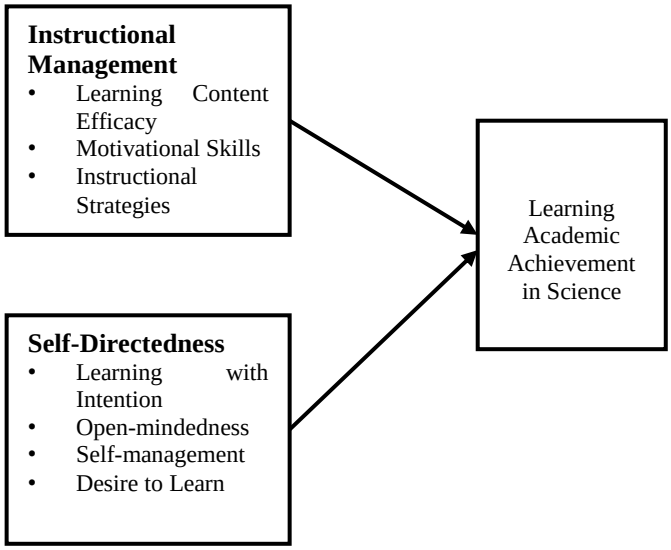

Figure 1. Conceptual Framework of the Perceived Teacher' Instructional Management and Learners' Self-Directedness on Learning Academic Achievement in Science

4. Experimental Method/Procedure/Design

The study utilized quantitative, non-experimental research methods using correlational and causal-comparative research designs. The research aimed to use scientific and pedagogical models, theories, and hypotheses concerning the phenomenon. More specifically, the study focuses on determining the significant relationship and impact of the exogenous variables, including perceived instructional management and learner self-directedness characteristics, and the endogenous variable of learners' academic achievement in science.

In addition, the study was conducted in three (3) public secondary junior high schools in Montevista District, Davao de Oro division: Camansi National High School, Mayaon National High School, and Montevista National High School. The three schools are in the Davao Region, designated as Region XI, located in the southeastern portion of Mindanao. Moreover, the participants of this study were the Grade 8 learners of the three (3) public secondary junior high schools in the Davao de Oro division who are officially enrolled in the last school year 2023-2024.

A stratified random sampling method was utilized to select the respondents in this study. The strata were formed based on the schools. The Raosoft Sample Size Calculator with the confidence evel of 95% and a margin of error of 5% was also used in determining the sample size of respondents from the given total population of 772 grade 8 learners. There were 257 sample respondents needed to conduct the study based on the computation.

The instruments used to collect the data needed to determine the levels of teachers perceived instructional management and self-directedness were the Teaching as an Art and Skill Questionnaires by [43], Self-Directed Learning Readiness Scale (SLRS) by [44] while the learners' average grades for the learners' academic achievement in science. The researcher went to try out 50 samples of non – respondents of the same grade level, the grade 8 public junior high school students, for the school year 2023 – 2024. All the instruments were identified to have excellent reliability and internal consistency as the survey had a Cronbach's alpha value of (0.94) for instructional management and (0.97) for self-directedness, respectively. Because all the given values are more significant than 0.70, it signifies a go signal for administering the questionnaires.

The statistical tools used in the research study are the following: Pearson Product Moment Correlation was utilized to describe and determine the significance of the relationship between identified variables. Multiple Regression was employed to determine what variables from the perceived instructional management and self-directedness influence learners' academic achievement in science.

5. Results and Discussion

Relationship of Instructional Management and Learning Academic Achievement in Science

As shown in Table 1 below, all the indicators under instructional management show a significant relationship with learning academic achievement in science. Learning content efficacy (r=0.234; p-value<0.05), instructional strategies (r=0.164; p-value<0.05), and motivational skills (r=0.267; p-value<0.05). The general result of the r-value with the correlation coefficient, r=0.227, reflected by the p-value less than 0.05, is significant. *The research null hypothesis was rejected states that there is no significant relationship between the perceived teachers' instructional management and students learning academic achievement in science*. It further means that the more the students perceived the level of instructional management strategies from their teachers in the teaching and learning process, the more likely they would perform well and eventually get a higher grade in science.

Table 1. Relationship of Instructional Management and Self-Directedness on Learning Academic Achievements in Science

Variable	r-value	p-value
Instructional Management	0.227**	0.000
Learning Content Efficacy	0.234**	0.000
Instructional Strategies	0.164**	0.008
Motivational Skills	0.267**	0.000
Self-Directedness	0.367**	0.000
Learning With Intention	0.325**	0.000
Open - Mindedness	0.357**	0.000
Self - Management	0.282**	0.000
Desire to Learn	0.481**	0.000

** $p < 0.01$

The findings further emphasized that teachers' ability to effectively plan, organize, and deliver instruction can considerably impact students' comprehension and performance in science topics. This underlines the necessity for professional development programs to improve instructors' instructional management abilities to improve academic achievements. Schools and educational officials might prioritize resources and support for instructional management strategies to create a more conducive learning environment. This link also emphasizes the importance of teacher-student interactions and the necessity to establish instructional strategies that cater to varied learning styles and demands, thereby improving students' engagement and success in science education.

The results support the study of [45] which found a link between teachers' classroom instructional management and students' academic performance. The degree of impartation a teacher obtains among students is determined mainly by the amount of management he maintains in the classroom throughout instruction. According to [5], classroom discipline involves teachers' attitudes and words when interacting with students. As a result, it has been proven that when a teacher is disciplined and well-behaved, students behave better and learn more, which leads to higher academic accomplishment. [46] also discovered that teachers' instructional management competency and students' academic progress have a substantial link.

Additionally, instructional management entails collaborating to attain learning objectives effectively and efficiently. An instructional plan, learning implementation, and learning evaluation are all part of the applied instructional management process [10][11]. On the other hand, the teacher should focus on the harmony of the educational learning resources, media, and learning methods used in the classroom when executing and incorporating learning activity plans. Learning is the most crucial educational service provided by schools to students. As a result, before beginning instructional activities, teachers prepare everything required in the classroom to ensure that learning activities are carried out correctly and that the necessary learning objectives are met [12].

Relationship of Seld-Directedness and Learning Academic Achievement in Science

Meanwhile, table 1 also shows the correlation between self-directedness as an independent variable and students' learning academic achievement in science as a dependent variable. Learning with intention ($r=0.325$; p-value<0.05), open-mindedness ($r=0.357$; p-value<0.05), self-management ($r=0.282$; p-value<0.05), and desire to learn ($r=0.481$; p-value<0.05) respectively. Results also displayed a positive correlation between the two variables as they obtained an r-value of 0.367 with $p<0.05$, which is hence significant. Thus, the results lead to the rejection of the research null hypothesis, which mentioned that there is no significant relationship between self-directedness and students' learning academic achievement in science. This further implies that students will likely perform the tasks when they get more self-directed, motivated, and engaged in learning. Also, when they value learning, they will begin to discover and explore various ways that will allow them to manage their time and eventually reach high self-efficacy, which will lead to improved academic achievement in science.

The findings also show that learners' self-directedness qualities are positively associated with academic accomplishment in science, emphasizing the necessity of encouraging autonomy and self-regulation among learners. This indicates that students who can define their learning objectives, manage their time effectively, and find resources independently are likelier to succeed in science education. Educators should consequently concentrate on developing learning settings encouraging self-directed learning abilities such as critical thinking, problem solving, and independent research. This also suggests that curricula should allow learners to participate in inquiry-based and project-based learning, which promotes curiosity and self-motivation. Furthermore, encouraging self-directed learning can help learners prepare for lifetime learning by giving them the tools to adapt and prosper in a quickly changing environment.

The correlational results of the self-directedness conformed with the propositions of [20] that stated the high self-directedness of the students can be attributed to the divergence of the learning opportunity from the rigid traditional learning system, lesser authoritative role of the teachers and the diverse learning opportunities for both formal and informal learning through distance education. There is also the emphasis that having a purposeful flexible learning environment for the students can help them to have self-directedness. The study of [21] also agrees with the result as it considered that communication and interaction is essential for students to have high self-directedness. The teacher shall build flexible, precise, well-timed, responsive engagements in distance education. Through these, it establishes a learning community with the teacher and the students that will prevent the occurrence of learning isolation and will promote conducive academic support system.

Consequently, self-directed learners obtain higher academic outcomes because they are better at setting goals, self-monitoring, and using appropriate study strategies [47]. For example, [48] discovered that students with more self-directed learning preparedness performed better in science courses due to proactive learning habits. Furthermore, the ability to self-direct learning is associated with higher intrinsic motivation, which improves engagement and persistence in scientific studies [49]. Self-directed learning skills can thus play an essential role in improving scientific education outcomes [50].

Moreover, the nature of science, the learning assistance and motivation from teachers and prior knowledge are critical for the learners to achieve self-directedness in science learning. With these, the highly self-directed students are considered reliable and dependable in learning science, which is evident in their better academic performance in science subjects [23]. Self-directed learning highlights the significance of

motivation and drive in learners' initial and ongoing attempts to attain the goals. [52].

Regression Analysis of Instructional Management and Self-Directedness on Students' Learning Academic Achievement in Science

From the model summary, the R^2 value is 0.228, indicating that 22.8% of the variation in the dependent variable (learning academic achievement in science) is caused by the explanatory variables (perceived teachers' instructional management and learners' self-directedness characteristics) included in the model summary. The remaining 77.2% is explained by variables that are not included in the model but nonetheless influence the dependent variable. The result shows that the explanatory variables explain 22.8% of the variation in the model.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.481[a]	.231	.228	2.537

a. Predictors: (Constant), Desire_To_Learn

b. Dependent Variable: Science_Grades

Also, the value from the ANOVA table used to test statistical significance is 0.000b, which is less than the P value of 0.05. This implies that the perceived teachers' instructional management and learners' self-directedness characteristics significantly affect learning academic achievement in science.

Table 3. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	493.975	1	493.975	76.735	.000[b]
	Residual	1641.550	255	6.437		
	Total	2135.525	256			

a. Dependent Variable: Science_Grades

b. Predictors: (Constant), Desire_To_Learn

Moreover, table 4 below displays the regression analysis results of instructional management and self-directedness on learning academic achievement in science. It can be noticed that among all independent variables included in the regression analysis, the significant predictors were *Desire to Learn* for self-directedness. As a result of this finding, *the researcher rejects the null hypothesis, which claims that no variables significantly predict learning academic achievement in science*. It can be gleaned that the factor has a p-value < 0.05. Thus, this factor significantly influences students' learning academic achievement in science. The result can be concluded that for every unit increase in the learner's desire to learn there is a corresponding increase in the students' learning academic achievement in science by 0.481, respectively. Moreover, the regression equation can be formulated as $(Y) = 82.431 + 1.898(X_1)$.

Table 4. Regression Analysis of Instructional Management and Self-Directedness on Students' Learning Academic Achievement in Science

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	82.431	.958		86.080	.000
	Desire_To_Learn	1.898	.217	.481	8.760	.000

The findings further revealed that learners' self-directedness characteristics considerably influence academic accomplishment in science, highlighting the importance of strengthening students' abilities to regulate their learning processes. This conclusion suggests that educational practices should prioritize developing skills such as goal planning, time management, and independent problem solving to improve learners' science success. Educators may want to incorporate more student-centred approaches, such as project-based learning and self-assessment, to encourage these self-directed learning features. Furthermore, instilling self-direction in learners increases academic achievement and prepares them for lifetime learning and flexibility in various disciplines.

More specifically, the table also explains that the variable included as predictor of students' learning academic achievement in science has a positive standardized beta. This means a direct positive impact of desire to learn characteristics on the students' learning academic achievement in science. The desire to learn is a essential factor influencing academic performance in science education. This intrinsic motivation drives students to engage more deeply with scientific concepts, leading to better comprehension and retention. Therefore, the more students who strongly desire to learn are more likely to persist through challenges and adopt effective study strategies, resulting in higher academic achievement. Thus, fostering a desire to learn can significantly enhance students' success in science.

The desire to learn is a critical motivator of academic achievement in science education, with significant implications for student engagement and success. According to [53], students with a strong intrinsic motivation to learn are more likely to actively participate in science sessions, leading to better knowledge and memory of scientific concepts. This intrinsic motivation encourages tenacity, allowing students to overcome obstacles and put-up constant effort, resulting in better academic performance [54]. Furthermore, a drive to study stimulates curiosity, helping pupils to investigate and comprehend complicated scientific concepts beyond the school curriculum [55].

According to research, intrinsically driven students use more effective learning strategies including critical thinking and self-regulation, which correlate to improved academic accomplishment in science [56]. Furthermore, the intrinsic drive to study is associated with good attitudes toward science, which increases students' enthusiasm and interest in the topic and promotes academic performance [57]. This

positive feedback loop between motivation, engagement, and performance emphasizes the value of instilling a desire to study in science education. Teachers and educators serve an essential part in nurturing this desire through establishing supportive and engaging classrooms that encourage curiosity and exploration [58]. Giving opportunities for hands-on experiments, practical applications, and teamwork can significantly boost students' intrinsic motivation and engagement with science [59]. Finally, cultivating a strong desire to learn in students can lead to sustained academic success and a lifelong interest in science.

6. Conclusion and Future Scope

The findings demonstrated that perceived instructional management strongly associated with students' learning and academic achievement in science. This suggests that the more instructional management strategies students observe from their teachers during the teaching and learning process, the better their odds of performing well and earning a higher grade in science. Accordingly, a teacher's instructional management abilities have been reported to be one of the most critical components in obtaining success in the teaching-learning process [42].

Additionally, the findings revealed that students' self-directedness is significantly related to their academic progress in science. This indicates that when students grow more self-directed, driven, and immersed in their studies, they are more likely to complete their assignments. Furthermore, when they value learning, they will discover and explore new ways to manage their time, eventually leading to high self-efficacy and higher academic accomplishment in science. Self-directed learners obtain superior academic outcomes because they are better at setting goals, self-monitoring, and using appropriate study strategies [29]. [30] discovered that students with higher self-directed learning preparedness performed better in scientific classes due to their proactive learning activities. Furthermore, the ability to self-direct learning is associated with higher intrinsic motivation, which improves engagement and persistence in scientific studies [31]. Self-directed learning skills can thus improve scientific education outcomes [32].

Moreover, desire to learn was the best predictor of students' learning academic achievement in science. The desire to learn is a essential factor influencing academic performance in science education. This intrinsic motivation drives students to engage more deeply with scientific concepts, leading to better comprehension and retention. Therefore, the more students who strongly desire to learn are more likely to persist through challenges and adopt effective study strategies, resulting in higher academic achievement. Thus, fostering a desire to learn can significantly enhance students' success in science.

Teachers can use various instructional management strategies to improve student performance in science. Clear and planned lesson plans with stated learning objectives help students grasp expectations and stay on track. Encourage active learning through hands-on experiments and collaborative projects to increase engagement and understanding of scientific concepts. Furthermore, providing timely and constructive feedback enables students to identify areas for improvement while building on their strengths.

Educators should encourage goal-setting and self-monitoring activities to improve scientific learning performance by empowering students to be self-directed. Giving students abilities and strategies for time management and independent research promotes autonomy and accountability in learning. Furthermore, incorporating chances for reflective practice, such as self-assessment and writing, can help students establish metacognitive skills and a better grasp scientific concept.

Conflict of Interest

The ethical committees' approval was granted, and consent forms were distributed. The study's presentation does not disclose a conflict of interest.

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Authors' Contributions

Concerning the role and responsibilities of the author in the research, the author contributed immensely in various ways. The author had the overall responsibility for the study, that included the definition and the planning of the study that followed the research objectives that were set and were realistic. Additionally, the author was responsible for data collection and analysis where appropriate scientific methods were used to produce the outcomes. Also, author contributed to the interpretation of the results and writing of the manuscript, offering substantial edits and reviewing the last version of the paper. A total commitment to the work assured efficiency, thoroughness, and overall soundness in the study's findings.

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