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PREDICTORS OF SCIENCE ACHIEVEMENT AMONG GRADE 9 STUDENTS IN MEDINA DISTRICT, MEDINA, MISAMIS ORIENTAL, PHILIPPINES

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ABSTRACT

The dissertation investigates the predictors of Science achievement among Grade 9 students in Medina District, Philippines, for the academic year 2022-2023. The paper addresses the factors influencing Science learning, the level of students' Science achievement, predictors of Science achievement, teacher perceptions on Science teaching support, school preparations for enhancing Science achievement, and proposed improvements based on the findings. Utilizing mixed methods, quantitative data from a survey questionnaire and qualitative insights from Focus Group Discussions and interviews were collected. The study reveals that student motivation, instructional resources, and parental support significantly influence Science achievement. The study's key findings reveal that while students show interest in Science discussions and teachers are well-prepared, there is room for improvement in encouraging students to ask questions and providing adequate laboratory facilities. The majority of students are described as competent with room for improvement in their Science achievement. The perceptions of teachers on Science teaching support indicate that attending seminars and training keeps them updated on instructional methods. However, there are concerns regarding the availability of resources and facilities. Overall, the study sheds light on

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providing valuable insights for educational practitioners to enhance the quality of Science education and elevate academic performance.

Keywords: *Science achievement, Grade 9 students, predictors, mixed methods research, student motivation, teacher characteristics, pedagogy, learning environment, instructional resources, parental support, level of achievement, PISA examination, qualitative and quantitative approaches, focus group discussion, unstructured interviews, teacher perceptions, challenges, preparations, action plan, academic achievement.*

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INTRODUCTION

The global importance of science and technology which dominates every society requires an educational system that provides a venue for the development of scientific knowledge and skills. Evidently, the rapid development of this field of knowledge through scientific inventions and discoveries poses a challenge to educational institutions to contribute their part in this growing demand for scientific inquiry (Imam et al.,2014).

In the Philippines, the study of science is mandatory at all levels of education and the state is mandated to give priority to science and technology. However, the Philippine Educational system is beseeched with challenges even with the tremendous planning and efforts of DepEd as mandated in the K to 12 program. Before the pandemic, there were already worrying signs of an education crisis. The most widely disseminated news about the crisis came from a report of the Program for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD) in 2018 which showed that Filipino students ranked the lowest among 79 countries in Mathematics, Science, and Reading. In Math and Science, Filipino 15-year-old students obtained 353 points and 357 points, respectively, against the 489 OECD average for both categories. The OECD 2018 PISA Country Note for the Philippines stated that fifteen-year-old students in the Philippines scored lower in reading, mathematics, and science than those in most of the countries and economies that participated in PISA 2018 where the Philippines ranked second from the bottom.

The challenge for science teachers has always been the constant derivation of innovative materials and methods to make science more relevant. According to Rogayan and Dollette (2019), science education in the Philippines alone is already fronting a lot of challenges including the curricular approach brought by globalization, industry 4.0, Association of Southeast Asian Nations (ASEAN) integration, and the full implementation of the K to 12 curricula. The K to 12 science curriculum stresses that science and innovation should put in common human issues. In terms of quality of education, particularly in science education, the country is lagging behind in other countries.

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In 2018, the World Economic Forum reports that the Philippines ranked 55th out of 137 participating countries in terms of higher education and ranked 76th out of 137 countries in the quality of math and science education. Science teachers are challenged to be more innovative and creative for higher student achievement and favorable attitudes at the same time (Gernale, Duad, & Arañes, 2015). It was observed that some teachers in science still preferred the traditional way of teaching the subject, making them less effective teachers (Candrasekaran, 2014). Teachers see the conventional method to be the only best teaching method in science. The teachers in the traditional method tend to be the sole purveyor of knowledge and ask students to work individually. This results in boredom because of the lack of engaging tasks, challenging activities, and creative works to be accomplished by the learners.

On April 20, 2022, the Program for International Student Assessment (PISA) conducted by the Institute of Education and Sciences (IES), the Statistics, Research, and Evaluation arm of the United States Department of Education chose Medina National Comprehensive High School to be one of the two schools in Region X to participate in the assessment. PISA is conducted by the IES to measure the reading, mathematics, and science literacy of 15-year-old students. It is an international assessment that emphasizes the functional skills that the students have acquired as they near the end of high school education. Further, the PISA results present the correlation between a student's socioeconomic status and indicators like school environment, discipline, attendance, grade repetition, and resources.

The results of the PISA examination for Medina Comprehensive National High School is alarming. These results give a signal for a need to examine what really are the factors affecting Science achievement among students, particularly in Grade 9. The study will serve as a response to the core objective of science education in the Philippines which is to develop scientifically-literate learners and to better understand what impedes the students from learning Science. It is therefore the purpose of this study to determine the factors serving as predictors of the Science achievement of the students and eventually plan an intervention to improve students' science achievement in particular and quality science education in general.

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METHODOLOGY

The quantitative research design was employed in the study using descriptive method. According to Cristobal (2013), quantitative research is concerned with the use of numbers and statistical analysis. Hence, in this study, quantitative descriptive approach was used to answer the questions on the extent of the factors manifested by the Grade 9 students in learning Science, the perception of the teachers in support of Science teaching, the level of achievement of the students in Science and to determine the predictors of Science achievement among students. Data will be gathered through a survey questionnaire.

The study also collected the qualitative data to gain insights and understanding on the challenges and preparations made by the teachers as well as the school to improve the Science achievement in PISA examination. This was also employed to build quantitative data that lead to the interpretation of the data gathered. Data were gathered through Focus Group Discussion (FGD) and unstructured interviews to students, teachers, and school heads.

This study was conducted in Medina National Comprehensive High School located at Ragot Street, Purok 5, North Poblacion, Medina Misamis Oriental, Portulin National High School, Portulin, Medina, Misamis Oriental and in Don Gregorio Pelaez National High School, Maanas, Medina, Misamis Oriental.

Medina National Comprehensive High School (MCNHS) is located at the heart of the municipality of Medina, Misamis Oriental, and is headed by Principal II. It has 137 Senior and Junior High School Teachers with a total enrollment of 2,248 students for the SY 2022-2023. Figure 2 presents the location of MCNHS. The latitude for Medina Comprehensive High School, Adeeso St, Lagos is: 6.554145 and the longitude is: 3.38409.

Portulin National High School (PNHS) is located 1.5 kilometers from the National Highway with its official address at Portulin, Medina, Misamis Oriental. It has a total of 33 Senior and Junior High School teachers headed by the School Head. It has a total of 987 students enrolled for the SY 2022-2023. Figure 3 presents the location of PNHS.

Don Gregorio Pelaez National High School (DGPNHS) is located in the rear Maanas Elementary School with its official address at the National High-way, Purok 4, Maanas, Medina,

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Misamis Oriental. It has 25 Junior High School Teachers headed by their school head. It has a total of 433 students for SY 2022-2023. Figure 4 presents the location of DGPNHS.

The respondents of the study were the Grade 9 students of the three subject schools, namely Medina Comprehensive NHS, Portulin NHS and Don Gregorio Pelaez NHS all in Medina District. The achievement of the students were represented by their final grades in Science, the teachers on their perceptions on the support given to them in Science teaching and their preparations to improve Science achievement and the school heads to give their actions made in preparation for any Science examination like the PISA. The school heads and teachers were all taken as respondents considering the number while sampling was used using the Slovin's formula used for the students as shown in Table 1. Table 1 shows the distribution of the respondents and the participants for the FGD.

As to the FGD and interview, all the school heads of the three subject schools were participants while the teachers were selected randomly. The total participants in the FGD are shown in the table namely: MCNHS – SH 1; Teachers-5, Portulin National High School- Senior High School 1; Teachers 5 and Don Gregorio National High School- Senior High School 1; Teachers 5. A total of 3 school heads were the respondents and participants, 26 teachers were respondents and 347 students were likewise the respondents. As to the participants in the FGD all the 3 school heads were taken, where as the 12 teachers were chosen at random.

The data gathering tool was a questionnaire adapted from the study of Sadara and Torres (2020) on the challenges encountered by junior high school students in learning Science. Since the study of Sadara and Torres called for challenges, the items per indicator were stated in the negative sense. These items were then revised and were changed to positive statements and were submitted to the adviser and to the Division Science supervisor for validation. The questionnaire is composed of two parts. Part I includes the independent variables namely: student motivation; teacher characteristics; pedagogy; learning environment; instructional resources and parent support. Each variable is measured in terms of 5 indicators using the Likert Scale and each indicator is quantified according to the following rating scale: Strongly Agree (5); Agree (4); Neutral (3); Disagree (2) and Strongly disagree

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(1). Part II includes the perception of the teachers on the support of Science teaching considering science seminars attended; Laboratories and facilities; and Participation in Science-related activities.

A permission letter was secured from the schools division superintendent. After the approval, it was used as an attachment to the letter for school heads of the subject schools. The schedule for gathering of data was indicated per school.

After the approval by the school heads, the researcher proceeded to the respective schools following the indicated schedule for the gathering of data. This was done for three consecutive weeks to cover the three schools in the district of Medina. The researcher personally gathered the data with the assistance of one teacher from the school who is not a respondent of the study. The researcher requested the school head to convene the teachers in a room for the distribution and accomplishment of the questionnaire. A break was provided after accomplishing the questionnaire, after which the participants of the FGD was organized.

The location for FGD was identified and proceedings were given. The FGD started with the moderator welcoming the participants and a briefing followed. The moderator requested simple "icebreaker" questions to help participants get used to the process to help reduce any anxiety and at the same time to help the moderator develop a rapport with the participants. The session shifted to an in-depth interview of the participants' perspectives on the issues relative to the problems at hand.

The respondents were grouped in a room and was given a maximum of 1 hour to accomplish the questionnaire. The questionnaire was read first to the students to give them a clear understanding of what to accomplish. The researcher explained some terms that are not familiar to the students. The same procedure was followed in all schools.

The secondary data were obtained from the 1st quarter grades of the students in Science. The analysis and interpretation of data followed immediately.

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RESULTS AND DISCUSSION

Challenges the Schools in Science instruction

There are several science challenges faced by the schools today. Most of the schools lack the resources needed to provide students with a high-quality science education. This includes access to science laboratories, science equipment, and qualified science teachers.

According to the Mathematics and Science coordinator, one of the biggest challenges is poor accessibility to free internet connection since the school has not provided computer platform modality of learning via online. Thus, quality of learning outcomes in science is at consistently low. Likewise, parents' participation was seen to be a challenge to both students and teachers. Only very few parents are joining science-related activities. Unavailability of updated instructional resources are seen to be a hindrance considering that then schools lack instructional resources for the students and teachers to use in the teaching and learning process.

School head A also confirmed the statement of the other school heads and added that the lack of facilities and instruments in Science laboratory were also identified as one of the causes. Too many students in a class is another challenge that the Science teacher sometimes escape performing experiments to apply the theories discussed in the classroom instruction.

Preparations of the schools to improve Science achievement most particularly in PISA examinations

In response to these challenges, PISA Coordinator states that the *"school encourages the teachers to keep on educating themselves through continued education so that the teachers can acquire new technologies suited to this new normal of education. The school put up a science laboratory rooms with the help of the DepEd central office."*

According to one of the head teachers, reading section will be given much priority in their campus. Remediation/ reading time is given during the last period. Television is used in

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every classroom to motivate the interest of listening and comprehension and involve them in the activities.

One school head is hopeful that they will be able to address the challenges in their school. He said, "*I think the preparations will be effective because it does not only enhance and widen the students' learning skills but orient and expose those students on how to use laboratory tools, and somehow prepare them on how to be a scientist someday."*

Most of the school heads said that they are trying to have a good connectivity to the internet so the teachers can integrate technology in their teaching-learning process. *"Downloaded video lessons outsourced from the internet for class viewing draws learners' interest towards the lessons. Shifted the presentation of the lesson to more clarity, simplicity, attractive and ease to conceptualize learning of the lesson. It is found effective of improving the learners' score in formative and summative assessment.*

Reduction of teachers' workload through minimal burden of paper works except those vital like DLL and School Forms on which teachers are the most knowledgeable to do it. The SDO gradually has addressed lack of teachers so by it teachers would not be handling more loads. Thereby have more time of lesson preparation and to provide quality science teaching. Home visits were found to be effective to encourage the learners of irregular attendance and the SARDOS to report to school *regularly*, thus improving academic achievement,*"* declared another school head.

Further, when asked about the school participation in PISA, one coordinator said that upon knowing that Medina NCHS was chosen by the central office as one of the schools that would participate in the PISA, action plan was crafted together with the schedules of face-to-face class reviews. *"Regional and Division DepEd personnel visited the school for technical assistance, meeting of persons involved in the preparation of PISA conducted twice a week to evaluate the on-going reviews and do feed backings for the development of PISA preparations. Teacher-advisers help monitor the students who participate the PISA by checking their attendance to see to it that students are present in every class reviews."*

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Another head stated that "*the action plan we have implemented successfully for teachers and students alike intended for PISA participation was focus on PISA 2022 Familiarization utilizing PISA – science adapted items and PISA -related lessons. We organized teachers and the select qualified learners to engage PISA familiarization practice test. Coaching took place on well-prepared convenient schedule and venue with free snacks and lunch and refundable transportation expenses to assure 100% attendance and participation. We were regularly supervised and monitored by the teams of DepEd supervisors both the Division and regional office on how we managed the review and mock test of the whole duration of PISA preparation.*"

PISA Coordinator: "*Yes, the school is very much confident using the previous PISA because we believed that the kind of questions be given to students if not the same at least was the pattern to the existing questions based on the previous PISA questions. We also believed that by introducing the previous PISA questions the students-participant will be able to be acquainted to the kind of PISA questionnaire looks like.*"

Another School Head said, "*Yes for sure. After series of practice to familiarize the PISA test items and PISA - related science lessons, as required by DepEd regional office, three online digital mock test were conducted, the test results were gathered, tabulated and interpreted and reported to us by the designated regional examiners in a formal forum, we found it promising and leap improving, sure better performance than the 2018 PISA.*"

Further, the School Head also added that "*yes. I think the result would be better because we were oriented then about the preparation and about the test itself. The region and division supervisory levels were with us during that time and gave their full support; visiting our school once or twice a week to make sure everything was fine and good.*"

"*The school focused on PISA Familiarization Practice Test to be conducted by the science teachers. As of the moment, the school is on-going of its development of PISA-like questions that will be used in every quarter. The school principal encourages the teacher to make PISA-like questions during quarter examination.*"

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One school head stated that, *"the school will focus on PISA Familiarization Practice Test to be conducted by the PISA familiar science teachers. We will do emphasis on the application of knowledge to various contexts. We will present a context for using knowledge through a situation, requiring learners to use their critical thinking and problem solving skills to select the best probable answer. We will train learners of digital communication to get familiar of computer – based assessment of PISA in order to maximize operation of the features of PISA assessment. Other feature of PISA questions of multiple sources of information to answer one item in accomplishing subsequent tasks will be studied further in details to improve result. We will request support of school's stakeholders mainly the school PTA and LGU. The school upon completion of requirements will request financial and technical support from the Division and Regional office of DepEd."*

"The use of PISA- like item tests may be of great help so that the students would be oriented/ familiarized beforehand. On the other hand, the use of laptops- simple clicking/pressing of keys, reading of instructions, exploring on online and offline exam, typing the answers, time-bounded test awareness, were some of the important points to consider during the assessment."

The feeling of the students to be motivated whenever they have laboratory activities (2.98) and interpreted as often manifested while item 4 on enjoying learning Science concepts with the help of my classmates (2.08) and interpreted as somewhat manifested. The results show that the the students usually felt motivated in laboratory activities which could be a factor to exhibit independent learning. However, the students need assistance with their classmates in learning Science concepts. These findings is supported by the study of Zhang et al. (2020) where study focused on the relationship between student motivation and science achievement in TIMSS. The study concluded that motivation factors have robust effects on students' achievement in science.

The extent of manifestation by the students in learning science considering teacher characteristics shows that the item on the teachers preparing lessons before going to class

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got the highest mean (3.45) and was interpreted as often manifested while the item on the teacher stirring interest in the science class got the lowest mean (2.05).

The overall mean is 2.97 which is interpreted as often manifested. These results show that the teachers continually perform their duty and responsibility to prepare their lessons, however, the students could feel that the preparation of the teacher is not enough to stir their interest. The study of Tambunan (2018) determined the dominant factor of teachers' role as a motivator of interest and motivation to perform in Mathematics. It was found that delivery of learning goal and learning comfort equal to 6.10%, and 6.00% is influenced by the delivery of learning objectives and variations of learning approaches, 5.17% is influenced by the delivery of learning objectives, 5.06% is due to variations in the learning approach, 4.61% is influenced by learning comfort and variation of learning approach, and 4.26% influenced by the pleasant class atmosphere. Zhang, F. et al. (2020) studied student motivation and science achievement in TIMSS. The findings, derived from an international dataset, are nationally representative and identify Expectancy-Value Theory as the most closely aligned framework. The study informs future TIMSS research methodologies for constructing and modeling motivation variables. It also highlights motivation factors with robust effects on students' science achievement. From this literature, it can be deduced that the delivery of learning goals and learning comfort are the dominant factors as motivators of interest.

Extent of manifestation by the students in learning science considering pedagogy

The over-all mean of 2.64 shows that the extent of manifestation of the students in learning science considering pedagogy is often manifested. This means that it is clearly true that the teachers that the methods, approaches and assessment by the teachers are understood by the students and nobody would disagree with it according to the lens of other students.

In accordance with the study of Clement et.al (2018), conceptual change teaching strategies focus on helping students identify and address misconceptions they may hold about scientific concepts. These misconceptions may impede their ability to understand and retain

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factual information. By addressing these misconceptions, students can better understand and remember scientific concepts, including their factual components. Hence, the study suggests that teachers can help their students learn science more deeply and remember factual information by using conceptual change teaching strategies to address any misconceptions students may have about scientific concepts. By doing so, students can develop a more accurate understanding of the concepts and retain the factual information associated with them more effectively.

Another indicator that is considered is the learning environment. The learning environment is a factor in students' achievement according to RH Malik (2018). Table 6 shows the extent of manifestation by the students in learning science considering the learning environment.

It can be gleaned that the large number of students in the class does affect their individual concentration in learning science considering the learning environment (3.43) and interpreted as often manifested. Item number 1 got the lowest mean (2.58) which is on teachers giving probing questions for learners' understanding and is interpreted as somewhat manifested.

This implies that students' current learning is affected by their learning environment. This coincides with what Finn (2017) stated that class size has an effect on student learning, with smaller classes generally being associated with better outcomes. The effect of class size on student achievement was found to be more pronounced in the early grades, particularly in reading and mathematics, and tended to diminish in the higher grades. The study also found that the effect of class size on student achievement was mediated by several factors, including teacher quality, instructional practices, and classroom management. For example, smaller classes were found to be associated with more individualized instruction, greater teacher attention to individual students, and more opportunities for student participation in classroom activities.

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Extent of manifestation by the students in learning science considering instructional resources

The data unveils that school gives full support in the purchase of instructional materials with the highest mean of 2.59 interpreted as somewhat manifested under the manifestation by the students in learning science considering instructional resources. This shows that the school's support in the purchase of instructional materials is not fully felt by the students which is also validated by the perceptions of the students on the adequacy of laboratory facilities. Support of schools and adequacy of instructional materials will influence the learning outcomes of the students.

The over-all mean for this indicator is 2.27 which means somewhat manifested. This indicates that the students cannot clearly see on the schools responsibility of providing then with adequate instructional resources. This will hinder the students to show interest and willingness to study, thus affecting their academic achievement in the subject.

According to Supovitz et. al., (2020) in their study about the Impact of Instructional Materials on Student Learning in Science, the use of high-quality instructional materials was associated with improved student learning outcomes in science. Students in the treatment group scored significantly higher on measures of science content knowledge, process skills, and attitudes towards science compared to students in the control group. The study also identified several characteristics of effective instructional materials, including a clear and focused scope and sequence, appropriate level of challenge, engaging and interactive activities, and alignment with standards and assessments. Overall, the study suggests that the use of high-quality instructional materials can have a positive impact on student learning outcomes in science. The study's findings highlight the importance of providing teachers with access to effective instructional materials that are aligned with standards and assessments and that engage and challenge students.

In addition, Saad (2019) mentions that schools with better laboratory facilities had higher student achievement scores in science. The study found that schools with better laboratory facilities had a positive impact on student achievement in science and that

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laboratory facilities were more important for students from lower socioeconomic backgrounds. The study also found that the quality of laboratory instruction and the availability of laboratory equipment and materials were important factors in predicting student achievement in science. The study suggested that investing in laboratory facilities and improving the quality of laboratory instruction could improve student achievement in science education.

Parental support is another factor that is considered a predictor of students' science achievement. Table 8 shows that parents/guardians support the students morally in their studies having the highest mean of 3.34 interpreted as often manifested. On the other hand, parents/ guardians assist the students financially and materially have the lowest mean of 2.58 interpreted as somewhat manifested.

Looking at the data, it can be inferred that most of the students can ask for help from their parents, and most have enough time to help them; however, the real challenge is that the majority of the parents find it hard to assist them financially. According to Scantlebury (2019), parent involvement is positively associated with student achievement in science. The researchers suggest that parental involvement can take many forms, such as helping with homework, engaging in science-related activities at home, and attending school events related to science. The researchers also found that parental support, encouragement, and interest in science can positively impact children's attitudes towards science. The study highlights the important role that parents can play in supporting their children's science education. By being involved and engaged in their children's learning, parents can help to foster a positive attitude towards science and encourage their children to pursue science-related fields in the future. The study also emphasizes the need for schools and teachers to work with parents to promote parental involvement in science education.

Extent of manifestation by the students in learning science considering parental support

The school heads and teachers were likewise asked as to which of the independent variables namely: student motivation, teacher characteristics, pedagogy, learning

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environment, instructional resources, and parental support will influence the dependent variable which is Science achievement. The following were there responses.

"All that mentioned above help give impact on Science Achievements but one of the best was the kind of learning environment the school and students had."

"On student motivation, the depth and breadth of learning are influenced by self-awareness, clarity of personal values, interest and goals, personal expectations for success and failure, emotion and general state of mind."

"For student cognitive Ability, the learner seeks to create meaningful, coherent representation of knowledge can be able to links new information with existing and future - oriented knowledge in meaningful ways. It is a mental operation to facilitate creative and critical thinking.

Comfortable and convenience of physical environment and supportive social environment, functional school organization and supportive school policies to develop a holistic person enhance a learning environment that is motivating and enhancing to increase science achievement among learners. The presence, concerns, guidance and love of parents to the learners inspire learners to study more, learn more and achieve more as learners feel secure and highly motivated."

Level of achievement of the students in Science in the last quarter

The result shows that the students do not sufficient skill, knowledge or experience to do or carry out a task in Science which needs higher order thinking or critical analysis. The purpose of teaching and learning is to have at least the majority of the students, that is more than one-half of the total population must be competent and have the necessary knowledge and skills in understanding concepts, thus be able to use it in practical life. This result could be attributed to the different challenges that the schools have experienced.

Further, this means that the students do not possess the necessary ability and skills to do or carry out a task. These low achievement levels are also documented in international

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assessments of science education. These results are also consistent with the results of the PISA examination where the students were found to be lowest in Science.

To answer the problem as to which of the factors will predict the Science achievement of Grade 9 students in Medina District, a hypothesis which states that none of the factors singly or in combination predict the science achievement of the students. The null hypothesis was tested at 5% level of significance. Regression was used to determine which of the independent variables will predict the dependent variable which is the students' academic achievement.

In conclusion, at least some of the predictors (Teacher Characteristics, Pedagogy, and Learning Environment) show statistically significant relationships with students' achievement in science as evidence by low p-value compared to 5% level of significance. However, the Motivation, instructional resources, and parental predictors do not appear to be statistically significant.

Perceptions of the teachers in support of Science teaching considering seminars and trainings

The study of Ekpenyong et al. (2016) revealed that there exists a positive and small relationship between the frequency of teachers' attendance at in-service training, seminars and workshops and students' academic performance in social studies. It was recommended that government should make it mandatory for all teachers in both primary and post primary to undergo professional training.

Perceptions of the teachers in support of Science teaching considering laboratory and facilities

Generally, the teachers agree (2.69) on the support manifested by the school heads in support to Science teaching considering laboratory and facilities. A well-organized laboratory can promote students' ability to solve problems and critical thinking skills.

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Perceptions of the teachers in support of Science teaching considering Science related activities

The table indicates that item no. 4 on "attendance to Science-related activities is a chance to meet and socialize with other Science enthusiasts" got the highest mean (4.58) which means the teachers strongly agree. Meeting experts is a way of helping oneself to generate better ideas. Experts know what works and what does not work at the same time working with experts in any field can provide better perspectives.

On the other hand, the item no. 1 on " I am motivated in participating any Science related activity" got the lowest mean (3.84) which means they agree on this item. Motivation is the driving force behind great accomplishments and the bedrock of professional success.

Generally, the teachers agree (4.38) that support is manifested by the schools considering participation to Science-related activities. Teachers joining Science-related activities will improve not only their methods and strategies in teaching but also their performance in assessments. Participating in the learning process with experts will help teachers forge a deeper understanding of scientific concepts and procedures.

To support the teachers perceptions on the support of Science teaching considering Science seminars and training, laboratories and facilities, and participation in Science-related activities, some teachers were interviewed to get their insights as to the indicated subject.

The interview was conducted with 10 science teachers from Medina district to validate the perceptions of the teacher in support of teaching Science. Since the schools are not so far from each other, the interview was made at the municipality of Medina on a Saturday. A meager amount was reimbursed to the participants for their transportation and a simple snack was provided after the session. .

Perception of teachers on support of Science teaching considering Science seminars and training.

The teachers were asked as to the importance of attending seminars and trainings. Majority of them agreed that teachers should attend seminars and trainings to be updated

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with the latest trend in teaching. Teacher A, B, C and D said, " I like to attend seminars and trainings because not only that I will be updated with the latest trend in Science subject but also I will be able to find new friends." She further said that having new friends will give me the opportunity to learn from the experiences of other teachers which I could apply to my class.

Teacher B, D, G and F on the other hand, said " seminars and trainings inspire me to become a better teacher. My learnings from the seminars and training will be brought back to my classrooms.". Another teacher said, "seminars and trainings will help me become a better teacher thus improving my efficiency and effectiveness".

Although most of the teachers have come to an agreement for the importance of seminars and trainings, they said the internal support is not enough. One teacher said," we need to ask from external stakeholders to be able to attend seminars and trainings". Attendance to these activities will depend on the budget of the agency where the teacher is asking support. One will be lucky to be supported by the LGU if budget is available. This sometimes will result to less enthusiasm and eagerness of the teachers to attend considering the finacial constraint.

Teacher C, D and F are unanimous in saying that they have attended seminars on in the district level and only very few can attend regional and national level seminars and training. Teachers D, F , J and H said they are required to attend district level seminars and training especially that these are free. Others have attended international webinars during the pandemic wherein expenses were minimal, that is only registrations were paid.
Others paid for the registration by themselves, others ask for support from the school and LGU.

Majority of the participants shared that the seminar they always attend is the in-service training (INSETs) conducted by the school as mandated by DepEd.

The summary of verbatim responses from the teachers and the themes associated to it, namely: attendance to seminars and training keep teachers updated, win new

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acquaintances and exchange of best practices and an inspiration to become better teachers are presented using their verbatim responses.

Perceptions of teachers considering attendance to seminars and training in support to science teaching

Themes	Verbatim Responses
1. Keep teachers updated on new trends and strategies 2. Win new acquaintances and best practices 3.Inspiration and Motivation to become better teachers	I like to attend seminars and trainings because not only that I will be updated with the latest trend in Science subject but also I will be able to find new friends." She further said that having new friends will give me the opportunity to learn from the experiences of other teachers which I could apply to my class. Teacher B, D, G and F on the other hand, said " seminars and trainings inspire me to become a better teacher. My learnings from the seminars and training will be brought back to my classrooms.". Another teacher said, " seminars and trainings will help me become a better teacher thus improving my efficiency and effectiveness". "seminars and trainings inspire me to become a better teacher". "help me become a better teacher thus improving my efficiency and effectiveness".

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Perception of teachers on support of Science teaching considering laboratories and facilities

Laboratory experiences of the students are important where they will learn to use the tools and conventions of science. They may develop skills in using scientific equipment correctly and safely, making observations, taking measurements, and carrying out well-defined scientific procedures thus understanding the nature of science.

Perceptions of the teachers considering laboratories and facilities as support to Science teaching

Themes	Verbatim Responses
Separate laboratory for each Science subject	• There is only one laboratory in school • How I wish the school can provide another laboratory for chemistry and physics • Biology laboratory should be separated from other subjects with laboratory • It is difficult to discuss lessons in Science without laboratory room • It is difficult to capture the interest of the students in Science without actual performance in laboratory
Lack of laboratory and facilities	• Laboratory facilities are scarce • You can hardly perform experiments due to unavailability of the needed equipment • Materials for experiments are mostly improvised • Chemicals are not always available • Not all students are motivated to do experiments due to lack of facilities needed for the experiment.

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	• Students feel the lack of understanding science concept

Participation of Teachers to Science-related Activities

Attending seminars has numerous benefits. This includes among others improving ones communication skills, gaining new knowledge from experts, and improving ones confidence. Table 16 shows the verbatim responses of the teacher participants and the themes.

Perceptions of teachers on their participation to Science-related activities

Theme	Verbatim Responses
1.Excellent opportunities to learn new development in teaching	• My participation to Science-related activities has given me a chance to learn new things • Has given a new outlook in teaching science • Attending Science –related activities will not only improve my teaching techniques but also enhance my confidence in teaching. .

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2.Feeling of Independence from the burden of work in classrooms	• An opportunity to see the good of other schools and use it in our school if possible • A chance to gain new knowledge from experts and co-participants
3.Develop critical thinking, problem-solving and coping skills	• A good time to relax from the daily hussles in the classroom at the same time learning new things • Feel relax while learning new things • Can focus how to improve myself with out the responsibilities in the classroom. • I have gained skills in critical thinking through reflection of the things I do in my classroom and in the things I learn from the activities • I learn to find ways and means how to attend science-related activities if finance is not available from the school • I gained confidence in solving problems by myself like approaching LGU for support

It was found out that teachers' characteristics, pedagogy, and learning environment are predictors needed to improve Science achievement of the students . Hence, an action plan, with focused on the predictors with lower ratings, is proposed for the improvement of students' achievement and to further strengthen the preparations of the schools to improve Science achievement in Medina district secondary schools.

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Conclusions

Based on the findings, the following conclusions were drawn:

1. The challenges encountered by the school especially in Science instruction affects the academic performance of students in Science and likewise in the preparation of the teachers such as planning in teaching. The insufficient instructional resources is the additional burden of teachers that makes Science performance is low in scores. Thus, PISA result in Science is still low.

2. Positive perceptions of teachers' characteristics, pedagogy, and learning environment affects on student engagement, academic achievement, motivation, classroom climate, and student-teacher relationships.

3. Students were found to be less competent which could mean the students possess limited understanding of scientific concepts, principles, and processes. This can hinder students' ability to apply scientific knowledge to real-world situations and make informed decisions related to science and technology.

4. The quality of teachers, including their knowledge, expertise, and instructional practices, is the crucial factor in students' science achievement. Effective teachers who possess strong subject knowledge and pedagogical skills positively impact students' understanding and performance in science.

5. Teachers fully believed as to the benefits of attending seminars. Training and seminars enhanced subject Knowledge and provide opportunities for teachers to deepen their understanding of scientific concepts, principles, and advancements. By attending these events, teachers stay updated with the latest developments in the field of science and strengthen their subject knowledge, they also learn new pedagogues and helps create a dynamic and up-to-date learning environment for students.

6. Generally, the factors considered in this study to be the predictors of Science achievement among Grade 9 students of schools from Medina district are teacher characteristics, pedagogy and learning environment.

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