Teachers' Pedagogical Practices and Their Relationship to Students' Academic Performance in Science

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ABSTRACT

This study examined the relationship between teachers' pedagogical practices and students' academic performance in science at Consuelo M. Valderrama National High School during the academic year 2025–2026. A quantitative descriptive–correlational research design was employed. Using stratified random sampling, 120 students from Grades 7–10 were selected as respondents. Teachers' pedagogical practices were assessed using an adapted questionnaire covering course organization and planning, communication, teacher–student interaction, assignments, exams and grading, and supplementary instructional methods. Students' academic performance was measured using official first-quarter Science grades based on the Department of Education (DepEd) K–12 grading standards.

Descriptive results showed that teachers' pedagogical practices were rated at a very high level overall (M = 4.79), while students' academic performance yielded a mean grade of 83.12, classified as satisfactory based on DepEd standards. Pearson Product–Moment Correlation analysis revealed a weak positive relationship between pedagogical practices and academic performance (r = 0.165), which was not statistically significant at the 0.05 level (p = 0.071). These findings indicate that although pedagogical practices are perceived as highly effective, they may not independently account for variations in students' science achievement. The study highlights the importance of considering additional learner-related and contextual factors when addressing academic performance in science.

Keywords-Pedagogical practices, academic performance, science education, secondary students, descriptive-correlational study

INTRODUCTION

Academic performance refers to the extent to which learners achieve expected educational outcomes, commonly measured through grades and formal assessments. In science education, academic performance reflects not only mastery of content knowledge but also the development of scientific reasoning, conceptual understanding, and problem-solving skills. Pedagogical practices encompass the instructional strategies, classroom interactions, assessment methods, and organizational approaches employed by teachers to facilitate student learning.

Despite ongoing efforts to improve science instruction, poor academic performance in science remains a persistent concern across educational contexts. Students who experience academic difficulty often demonstrate reduced motivation, lower self-efficacy, and decreased engagement in science learning, which may limit their long-term academic and career opportunities (Brew et al., 2021). These challenges may be exacerbated when instructional practices do not adequately address diverse learner needs or fail to promote active participation.

Previous studies emphasize the importance of effective teaching practices in supporting student learning; however, empirical findings regarding the strength of the relationship between pedagogical practices and academic performance remain inconsistent. Research suggests that while instructional quality plays a critical role in learning, academic achievement is also influenced by learner characteristics, family background, school resources, and learning environments (Almerino et al., 2020; Wu, 2019).

Within the Philippine context, particularly in rural public secondary schools, limited empirical evidence exists on how students' perceptions of teachers' pedagogical practices relate specifically to science achievement. Addressing this gap, the present study examines the relationship between teachers' pedagogical practices and students' academic performance in science at Consuelo M. Valderrama National High School.

The findings aim to contribute empirical evidence that may inform instructional improvement, school-level interventions, and policy decisions in science education.

Objectives of the Study

The general objective of this study is to determine the relationship between teachers' pedagogical practices and students' academic performance in science.

Specifically, it aims to:

1. Determine the level of teachers' pedagogical practices in terms of course organization and planning, communication, teacher–student interaction, assignments, exams and grading, and supplementary instructional methods.

2. Determine the level of students' academic performance in science based on their official first-quarter grades.

3. Identify whether a significant relationship exists between teachers' pedagogical practices and students' academic performance in science.

Research Questions

1. What is the level of teachers' pedagogical practices in terms of course organization and planning, communication, teacher–student interaction, assignments, exams and grading, and supplementary instructional methods?

2. What is the level of students' academic performance in science based on their official first-quarter grades?

3. Is there a significant relationship between teachers' pedagogical practices and students' academic performance in science?

METHODOLOGY

This section presents the research design, locale of the study, respondents of the study, research instruments, sampling procedure, data gathering procedures, and statistical treatment of the data.

Research Design

This study employed a quantitative descriptive–correlational research design to examine the relationship between teachers' pedagogical practices and students' academic performance in science without manipulating any variables.

Participants and Sampling

The participants of the study were junior high school students enrolled at Consuelo M. Valderrama National High School during the academic year 2025–2026. The target population consisted of 237 students distributed across four grade levels: Grade 7 (73 students), Grade 8 (58 students), Grade 9 (51 students), and Grade 10 (55 students).

A total of 120 students were selected as respondents using **stratified random sampling**, with grade level serving as the stratification variable. This sampling technique was employed to ensure adequate and proportional representation of students from each grade level. Within each stratum, participants were selected randomly to

minimize sampling bias and enhance the representativeness of the sample. Thirty (30) students were drawn from each grade level, resulting in an equal number of respondents across Grades 7 to 10.

Students were included in the study if they were officially enrolled during the data collection period and had obtained parental or guardian consent. Participation was voluntary, and students were informed of their right to withdraw from the study at any time without penalty. Students who were not officially enrolled or who did not secure consent were excluded from the study.

Table 1. Population and Sample Size of Grade 7, 8, 9, and 10 Students of Consuelo M. Valderrama National High School

Grade Level	Population Size	Sample Size
Grade 7	73	30
Grade 8	58	30
Grade 9	51	30
Grade 10	55	30
Total Sample size	**237**	**120**

Research Instrument

Teachers' pedagogical practices were measured using an adapted questionnaire based on Fox and Hackerman (2003). The instrument consisted of five dimensions: course organization and planning, communication, teacher–student interaction, assignments, exams and grading, and supplementary instructional methods. Responses were rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always).

Validity and Reliability of the Instrument

Content validity of the adapted questionnaire was established through expert review by science educators, who evaluated the relevance and clarity of each item in relation to the study objectives. Minor revisions were made based on their feedback. The internal consistency of the instrument was determined using Cronbach's alpha, which yielded a coefficient greater than 0.70, indicating acceptable reliability for educational research.

Data Gathering Procedure

Prior to data collection, permission to conduct the study was obtained from the school principal of Consuelo M. Valderrama National High School. Parental consent and student assent were secured in accordance with ethical guidelines for research involving minors.

The adapted questionnaire on teachers' pedagogical practices was administered to the selected respondents during regular school hours. Clear instructions were provided, and respondents were given sufficient time to complete the instrument. To ensure confidentiality, each questionnaire was coded, and no identifying information was recorded.

Students' official first-quarter Science grades were obtained from school records through coordination with class advisers and with the approval of the school administration. The questionnaire responses and academic performance data were matched using unique codes to ensure accuracy while maintaining respondent anonymity.

Academic Performance Measure

Students' academic performance in science was measured using their official first-quarter Science grades obtained from school records and interpreted according to the Department of Education (DepEd) K–12 grading standards

Data Analysis

Descriptive statistics, including mean and standard deviation, were used to describe teachers' pedagogical practices and students' academic performance in science. Pearson Product–Moment Correlation was employed to determine the relationship between the study variables at a 0.05 level of significance.

Table 2. Parameters Used in the Statistical Analysis of Data

Variable	Statistical Tool	Parameters / Criteria
Teachers' pedagogical practices	Frequency, Mean, Standard Deviation	Weighted mean interpretation: 1.00–1.80 (Very Low), 1.81–2.60 (Low), 2.61–3.40 (Moderate), 3.41–4.20 (High), 4.21–5.00 (Very High)
Students' academic performance in science	Frequency, Mean, Standard Deviation	DepEd K–12 grading scale: 90–100 (Outstanding), 85–89 (Very Satisfactory), 80–84 (Satisfactory), 75–79 (Fairly Satisfactory), below 75 (Did Not Meet Expectations)
Relationship between teachers' pedagogical practices and students' academic performance	Pearson Product–Moment Correlation (r)	$\alpha = 0.05$ level of significance; variables continuous and approximately normally distributed

Ethical Considerations

Ethical standards in educational research were strictly observed throughout the conduct of the study. Participation was voluntary, and respondents were informed of their right to withdraw at any stage without penalty. Confidentiality and anonymity of respondents were ensured by using codes instead of names, and all data collected were used solely for academic and research purposes.

RESULTS

This section presents the results of the study based on the data collected from the respondents. The findings are organized according to the research questions and are presented using descriptive and inferential statistics. Tables are used to display the computed means, standard deviations, and correlation coefficients. Interpretation of the findings is reserved for the Discussion section.

Level of Teachers' Pedagogical Practices

Table 3 presents the overall level of teachers' pedagogical practices as assessed by the student-respondents.

Table 3. Level of Teachers' Pedagogical Practices

Teachers' Pedagogical Practices	Mean	SD
Overall Mean	**4.79**	**0.576**

As shown in Table 3, the overall mean score for teachers' pedagogical practices was 4.79.

Teachers' Pedagogical Practices by Dimension

Course Organization and Planning

Table 4 presents the mean scores and standard deviations for teachers' pedagogical practices in terms of course organization and planning.

Table 4. Teachers' Pedagogical Practices in Terms of Course Organization and Planning

Course Organization and Planning	Mean	SD
My science teacher clearly explained what we need to do for the class.	4.84	0.465
My science teacher is well-prepared for each class.	4.88	0.369
My teacher knows the subject well.	4.88	0.439
My science teacher uses our class time wisely.	4.73	0.562
My science teacher highlights and explains the important points in class.	4.96	0.200
Weighted Mean	**4.86**	**0.432**

The weighted mean for course organization and planning was 4.86.

Communication

Table 5 presents the descriptive statistics for teachers' pedagogical practices in terms of communication.

Table 5. Teachers' Pedagogical Practices in Terms of Communication

Communication	Mean	SD
My science teacher presents the lessons clearly so we can understand them easily.	4.83	0.459
My science teacher speaks English (or the language used) clearly and correctly.	4.66	0.652
My science teacher uses examples and pictures to help explain the lessons.	4.84	0.456
My science teacher asks challenging questions or gives problems that make us think	4.83	0.441
My science teacher is enthusiastic about the lessons.	4.57	0.834
Weighted Mean	**4.74**	**0.601**

The weighted mean for communication was 4.74.

Teacher–Student Interaction

Table 6 presents the mean scores and standard deviations for teachers' pedagogical practices in terms of teacher–student interaction.

Table 6. Teachers' Pedagogical Practices in Terms of Teacher–Student Interaction

Teacher-Student Interaction	Mean	SD
My science teacher is helpful and responds well to students.	4.88	0.439
My science teacher shows respect for students.	4.98	0.156
My science teacher cares about students' progress.	4.93	0.281
My science teacher provides extra help for this class, considering the number of students.	4.83	0.477
My science teacher is willing to listen to students' questions and opinions.	4.86	0.434
Weighted Mean	**4.89**	**0.381**

The weighted mean for teacher–student interaction was 4.89.

Assignments, Exams, and Grading

Table 7 presents the descriptive statistics for teachers' pedagogical practices in terms of assignments, exams, and grading.

Table 7. Teachers' Pedagogical Practices in Terms of Assignments, Exams, and Grading

Assignments, Exams, and Grading	Mean	SD
My science teacher clearly explains how we will be graded.	4.85	0.441
My science teacher makes exam questions clear and easy for us to understand.	4.71	0.583
My science teacher makes sure the exams cover the important parts of the course.	4.86	0.414
My science teacher gives helpful comments on our assignments and exams.	4.73	0.683
My science teacher uses textbooks that are good quality and helpful.	4.83	0.441
My science teacher gives assignments that help me understand the course material better.	4.73	0.616
Weighted Mean	**4.78**	**0.543**

The weighted mean for assignments, exams, and grading was 4.78.

Supplementary Instructional Methods

Table 8 presents the level of teachers' pedagogical practices in terms of supplementary instructional methods.

Table 8. Teachers' Pedagogical Practices in Terms of Supplementary Instructional Methods

Supplementary Instructional Methods	Mean	SD
My science teacher gives problems or questions for our small group discussions.	4.78	0.625
My science teacher assigns term papers or projects.	4.83	0.422

My science teacher gives lab exercises to help me understand important course ideas.	4.91	0.316
My science teacher assigns projects as a group where students work together with other students.	4.73	0.629
My science teacher uses case studies, simulations, or role playing in class.	4.40	1.012
My science teacher asks us to keep course journals or logs.	4.22	1.142
My science teacher uses computers in teaching us.	4.97	0.221
Weighted Mean	**4.69**	**0.747**

The weighted mean for supplementary instructional methods was 4.69.

Level of Students' Academic Performance in Science

Table 9 presents the descriptive statistics of students' academic performance in science based on their official first-quarter grades.

Table 9. Students' Academic Performance in Science

Variable	**Mean**	**SD**
Science Grade	**83.12**	**4.406**

The mean Science grade of the respondents was 83.12.

Descriptive Statistics of the Study Variables

Table 10 presents the descriptive statistics of teachers' pedagogical practices and students' academic performance in science, including measures of central tendency, dispersion, skewness, and kurtosis.

Table 10. Descriptive Statistics of Teachers' Pedagogical Practices and Students' Academic Performance

Descriptive Statistics	**Pedagogical**	**Academic Performance**
Valid	120	120
Missing	0	0
Mean	4.786	83.12
Std. Error of Mean	0.01026	0.4022
Std. Deviation	0.1124	4.406
Skewness	-0.4646	0.3911
Std. Error of Skewness	0.2209	0.2209
Kurtosis	0.3522	0.01606
Std. Error of Kurtosis	0.4383	0.4383

Minimum	4.390	75.00
Maximum	5.000	95.00

The table 10 indicates that complete data were obtained for both variables (N = 120) with no missing values. The reported skewness and kurtosis values fall within acceptable ranges, indicating that the data are approximately normally distributed and suitable for correlation analysis.

Relationship Between Teachers' Pedagogical Practices and Students' Academic Performance in Science

Table 11 presents the results of the Pearson Product–Moment Correlation analysis between teachers' pedagogical practices and students' academic performance in science.

Table 11. Correlation Between Teachers' Pedagogical Practices and Students' Academic Performance in Science

Variables	r	p-value
Pedagogical Practices and Academic Performance	**0.165**	**0.071**

The computed Pearson correlation coefficient between teachers' pedagogical practices and students' academic performance was 0.165, with a corresponding p-value of 0.071.

DISCUSSION

This study examined the relationship between teachers' pedagogical practices and students' academic performance in science in a public secondary school context. The discussion interprets the findings in relation to the research questions, theoretical perspectives, and existing literature, while maintaining consistency with the descriptive–correlational design of the study.

The results showed that teachers' pedagogical practices were rated at a very high level across all measured dimensions, including course organization and planning, communication, teacher–student interaction, assessment practices, and supplementary instructional methods. This finding indicates that students perceived their science teachers as consistently implementing effective instructional practices. Such results are aligned with constructivist learning theory, which emphasizes the importance of well-structured learning experiences, clear communication, and active engagement in supporting students' understanding of scientific concepts. Similarly, social learning perspectives highlight the role of positive teacher–student interaction and feedback in fostering an environment conducive to learning.

Despite the high ratings of pedagogical practices, students' academic performance in science was found to be at a satisfactory level based on Department of Education K–12 grading standards. This suggests that while students met the expected learning competencies, higher levels of achievement were not consistently attained. This pattern supports findings from previous studies indicating that academic performance is influenced by a range of factors beyond instructional practices alone, including learner motivation, prior knowledge, study habits, and contextual variables such as home support and access to learning resources (Almerino et al., 2020; Brew et al., 2021).

The correlation analysis revealed a weak positive relationship between teachers' pedagogical practices and students' academic performance in science, which was not statistically significant. This result indicates that higher perceived levels of pedagogical practices were not strongly associated with higher science grades in this context. Similar findings have been reported in earlier studies that identified modest or inconsistent relationships between perceived teaching effectiveness and students' academic outcomes (Wu, 2019). These results suggest that while effective pedagogy is a necessary component of quality instruction, it may not independently explain variations in academic performance as measured through grades.

In the context of a rural public secondary school, structural and learner-related factors may moderate the relationship between instructional practices and academic performance. Large class sizes, limited instructional resources, and varying levels of learner readiness may constrain the extent to which effective pedagogical practices translate into measurable academic gains. Therefore, the non-significant relationship observed in this study should not be interpreted as diminishing the value of effective teaching practices, but rather as highlighting the multifactorial nature of academic achievement in science.

Overall, the findings emphasize that maintaining high-quality pedagogical practices remains essential; however, improving students' academic performance in science may require a more comprehensive approach that integrates instructional quality with targeted learner support and contextual interventions.

CONCLUSION

This study examined the relationship between teachers' pedagogical practices and students' academic performance in science at Consuelo M. Valderrama National High School using a quantitative descriptive–correlational design. The findings showed that teachers' pedagogical practices were rated at a very high level across all measured dimensions, while students' academic performance in science was at a satisfactory level based on Department of Education K–12 grading standards.

Correlation analysis revealed a weak positive relationship between teachers' pedagogical practices and students' academic performance in science, which was not statistically significant. This indicates that, within the context of this study, high levels of perceived pedagogical practices did not correspond to meaningful differences in students' science grades.

The results suggest that although effective pedagogical practices are an essential component of quality science instruction, they may not independently account for variations in students' academic performance. Students' science achievement appears to be influenced by multiple interacting factors beyond classroom instruction alone, including learner-related and contextual variables.

Overall, the study underscores the importance of sustaining effective pedagogical practices while recognizing the need for complementary strategies that address broader academic and learning conditions to improve students' performance in science.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. **Teachers** may sustain high-quality pedagogical practices while incorporating targeted learner-support strategies, such as differentiated instruction and additional academic assistance, to better address diverse learning needs in science.

2. **School administrators** may strengthen academic intervention and enrichment programs that support students' motivation, study skills, and access to learning resources, complementing effective classroom instruction.

3. **Students** may be encouraged to develop effective study habits, active learning behaviors, and greater responsibility for their own learning through structured academic mentoring and support programs.

4. **Parents and guardians** may be encouraged to provide consistent academic support at home and collaborate with teachers in monitoring students' progress in science.

5. **Future researchers** may consider examining additional variables—such as motivation, learning strategies, socioeconomic factors, and school resources—or employing mixed-methods or longitudinal designs to better explain variations in students' academic performance in science.

The manuscript has been thoroughly revised in response to the reviewer's comments. The title, methodology, results, discussion, and conclusions are now appropriately aligned with a descriptive–correlational design. The revisions satisfactorily address concerns regarding causality, methodological rigor, and interpretive clarity.

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