



TEACHERS' PEDAGOGICAL STRATEGIES AND ITS RELATIONSHIP WITH LEARNERS' ACADEMIC ACHIEVEMENT IN SCIENCE

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ABSTRACT

This study aimed to determine the teachers' pedagogical strategies and their relationship with learners' academic achievement in science. The study was conducted in five public secondary schools in the 5th District of Iloilo during School Year 2024–2025. It involved thirty (30) science teachers and four hundred fifty (450) learners, with fifteen (15) students selected from each teacher's class, using a descriptive-correlational research design. The findings revealed that there were no significant differences in teachers' pedagogical strategies when grouped according to teaching experience, highest educational attainment, and teaching position. However, significant differences were found in learners' science grades when classified according to sex, age, and grade level. Moreover, the results showed no significant relationship between teachers' pedagogical strategies and learners' academic achievement in science. The study concluded that although teachers' professional background may have a slight influence on their pedagogical strategies, learners' academic achievement in science is more strongly associated with their sex, age, and grade level.

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Keywords: *Pedagogical Strategies, Science Teachers, Students' Academic Achievement*

INTRODUCTION

Science, technology, engineering, and mathematics literacy are essential competencies for individuals to thrive in the 21st century. In response to this growing demand, educators and policymakers have increasingly prioritized the improvement of science education.

The rapid advancement of technology has affected various aspects of daily life, from communication to healthcare. Science knowledge is essential for understanding technological complexities, adapting to change, and making informed decisions (Elías et al., 2022). It also supports digital literacy, which contributes to both personal and professional growth (Jones et al., 2023; Lee et al., 2022).

Moreover, science-related industries continue to drive the global economy, creating a demand for skilled professionals in fields such as engineering, computer science, and healthcare (National Science Board, 2023). These sectors provide valuable employment opportunities that contribute to economic stability and career development (The National Academies of Sciences, Engineering, and Medicine, 2018).

Critical thinking and problem-solving skills are likewise vital in science-related fields, influencing both professional and personal success (National Science Board, 2023). Science literacy develops logical reasoning, analytical ability, and effective problem-solving skills, which prepare individuals to address real-world challenges (The National Academies of Sciences, Engineering, and Medicine, 2018). Furthermore, it promotes innovation and

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creativity, drives economic progress, and contributes to the resolution of global issues, while also encouraging entrepreneurship and technological advancement (National Science Board, 2023; The National Academies of Sciences, Engineering, and Medicine, 2018).

In response to the global need for 21st-century science literacy, the Philippines has implemented several measures to strengthen science education. DepEd Order No. 31, s. 2012, revised the K–12 curriculum by emphasizing science, inquiry-based learning, and hands-on activities. Collaborations between DepEd and universities have also enhanced science teacher education in line with DepEd Order No. 18, s. 2022, with a focus on content mastery and effective instruction. Increased government funding has supported the provision of laboratory equipment, technology integration, and teacher training (Department of Budget and Management, 2023). Filipino educators have also adopted science integration, problem-based learning, and project-based approaches (Bulatao & Sy, 2023). In addition, professional development programs and online learning networks have facilitated knowledge sharing (Cabrera & Lontoc, 2022), while science activities and competitions have further increased student engagement (Alcaraz & de Leon, 2023), thereby addressing the country’s science literacy needs.

However, despite these efforts, student outcomes in science subjects remain varied. Although these initiatives are promising, several challenges persist. Many schools continue to face limited resources, including inadequate infrastructure, lack of equipment, and insufficient funding for teacher training and professional development.

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Continued efforts are therefore necessary to ensure the effectiveness of policy initiatives and to address the enduring challenges in science education. Strategies must also be developed to improve access to quality science education for all learners, particularly those from marginalized communities. Despite these difficulties, the growing commitment of Filipino educators and policymakers to improving science education represents a positive step toward preparing future generations for the demands of the 21st century.

With these premises, the researcher aimed to investigate the relationship between teachers' internal teaching factors and student learning outcomes in science education, with particular emphasis on the interplay of science teacher preparation, pedagogical strategies, and parental engagement.

MATERIALS AND METHODS

Research Methodology

This chapter presents the research method, research design, participants of the study, data-gathering procedures, research instrument, and data analysis to be used in the study. The purpose of this study is to investigate the relationship between teachers' pedagogical strategies and learners academic achievement in science.

Research Method

The research method utilized in this study is quantitative research, process of collecting and analyzing numerical data to describe, predict or control phenomena of interest using a descriptive survey questionnaire.

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The researcher created a researcher-made instrument to capture a comprehensive snapshot of a specific situation, behavior, or population trait with high precision. The questionnaire was distributed by the researcher to the target participants of the study. Responses were gathered by the researcher from the participants.

Research Design

In this study a descriptive-correlational research design is used. In the fascinating world of research, descriptive correlational research design plays a critical role in uncovering the intricate relationships between variables. Unlike its experimental counterpart, where the researcher orchestrates the dance of variables, correlational research observes this dance as it unfolds in the natural world. This observational approach delves into understanding the strength and direction of associations between variables without manipulating them directly (Bryman, 2022). The in this design, the researcher merely measures and analyzes existing relationships between variables, refraining from any manipulation or controlled interventions (Scribbr, 2022).

In this study, the researcher investigated the relationships between various teacher factors (length of teaching experience, highest degree earned, and teaching position) and student academic achievement in science education. The researcher measures variables using researcher-made quantitative instruments.

Participants of the Study

In this study, the researcher utilized all thirty (30) science teachers in the public secondary schools in the Fifth District, along with fifteen (15) students from each teacher's

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class, for a total of 450 students. They served as the central participants in this investigation, as the researcher explored the relationship between teachers' pedagogical strategies and learners' academic achievement in Science.

The study included teachers and students from diverse backgrounds, representing different types of schools and grade levels, to capture a broad range of science education experiences. The researcher also ensured proportional representation based on teaching experience, highest educational attainment, and teaching position to address the specific research questions.

Sampling Design

The researcher used purposive sampling to determine the participants of the study. Purposive sampling was employed when the researcher used judgment to select a sample that, based on prior information, was believed to provide the data needed (Fraenkel, Wallen, & Hyun, 2012).

According to Andrade (2021), a purposive sample consists of participants whose characteristics are suited to the specific purpose of the study. In this study, thirty (30) purposively selected science teachers were identified from the secondary schools in the Fifth District of Iloilo.

The research instrument utilized in this study was a researcher-made questionnaire administered through the survey method using a checklist. Survey is a research method used to collect data from a group of people through questions or interviews. The survey, in the

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form of a checklist, captured the data needed to answer the stated problems. Responses were gathered by the researcher.

Validity of the Research Instrument

Validity of the research instrument was one of the most important criteria for the quality of a test. Validity refers to the appropriateness, meaningfulness, correctness, and usefulness of the inferences made by a researcher based on the data collected (Subong, 2005). In content-related validity, the content and format must be consistent with the definition of the variables and the sample of subjects to be measured, and this process is also helpful in validating the items in the questionnaire (Fraenkel & Wallen, 2007).

The researcher constructed thirty (30) survey questions for teachers. These were submitted to the thesis adviser for review and to a panel of experts for face and content validation. The panel of experts evaluated each item based on appropriateness, relevance, clarity of language, and correctness of sentence construction. The corrections, modifications, and suggestions on the content of the questionnaire were incorporated into the final draft of the instrument before the conduct of the study.

Data Gathering Procedures

Permits from the adviser, Dean of the Graduate School, Office of the Schools Division Superintendent, Office of the District Supervisors, School Heads, and individual participants were obtained to allow the researcher to conduct the study.

The researcher asked the school human resource management officer of the identified schools as on the record of the science teacher of the school.

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The researcher then selected the science teachers through purposive sampling. The researcher developed an instrument to answer the questions stated in the statement of the problem. The researcher then pilot-tested all the instruments with a small sample of teachers and students to ensure clarity, feasibility, and reliability.

Finally, the researcher conducted the final data gathering. The data gathered were collected, tallied, collated, and analyzed.

Data Analyses

In this study, the researcher used SPSS version 21 to analyze the quantitative data gathered from the participants. Descriptive statistics, correlation analysis, and inferential statistical tests such as percentage, frequency count, standard deviation, Kruskal-Wallis H test, Mann-Whitney U test, and Spearman rho were employed to answer the research questions.

Statistical Tools

The data were subjected to appropriate descriptive and inferential statistical analyses to address the research questions and test the study's hypotheses. Descriptive statistics such as frequency counts, percentages, means, and standard deviations were used to summarize the respondents' profiles and teachers' internal factors. For inferential analysis, statistical tests including the standard deviation, Kruskal-Wallis H Test, Mann-Whitney U Test, and Spearman's rho were utilized.

Mean. It is the sum of the Mean is the sum of the total weighted scores of all items in the checklist divided by the total number of items (Borro, 2002). The mean is used to obtain

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the average scores that describe the assessed level of teachers' internal factors in terms of length of service, teaching position, and educational attainment, as well as the level of students' academic performance in terms of age, sex, and grade level.

Percentage. Percentage was used to determine the ratio of student and science teacher respondents when they were classified according to variables categorized and could be found in the table of the distributions.

Frequency Count. Frequency count describes the profile of the respondents in terms of several distributions in each selected personal characteristic (Santos, 2006). It determined the distribution of science teachers and students in the selected public secondary schools in the 5th District of Iloilo and classified them according to variables such as teaching experience, educational attainment, and teaching position. Additionally, it summarized the responses of science teachers to items measuring their internal factors in science teaching.

Standard Deviation. The standard deviation was used to determine the level of teachers' internal factors in terms of length of service, teaching position, and educational attainment, as well as the level of students' academic performance in terms of age, sex, and grade level.

Kruskal-Wallis H Test. This is a non-parametric test that is used to determine the significant differences among three (3) or more groups (Subong,2005). In this study, Kruskal-Wallis H Test was employed to determine whether there were significant differences in teachers' internal factors in science teaching when grouped according to length of teaching experience, teaching position, and educational attainment.

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Mann-Whitney U Test. This is a non-parametric test that is used to compare the two means and determine the significant differences between two independent groups (Subong, 2005). In this study, the Mann-Whitney U Test was used to determine whether there were significant differences in students' academic performance in science when grouped according to sex, grade level, and age.

Spearman rho. Spearman rho was used to determine the relationship between teachers' internal factors and students' academic performance in science. All levels of significance in the inferential data analyses were set at 0.05 Alpha.

CONCLUSION

The study shows that teachers generally employ effective and varied pedagogical strategies in science, reflecting a shared commitment to quality instruction regardless of their experience, position, or academic background. While higher educational attainment may slightly enhance teaching competence, it is not the primary factor influencing instructional practices. Students' academic achievement, on the other hand, is influenced by individual characteristics such as sex and age, indicating the importance of adopting inclusive and developmentally appropriate teaching approaches. Although the relationship between pedagogical strategies and academic performance was found to be positive, it was not statistically significant, suggesting that student achievement is shaped by multiple factors beyond teaching strategies alone. Therefore, improving science education requires not only

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the consistent use of effective pedagogical practices but also the consideration of learners' diverse needs and contexts to better support their academic success.



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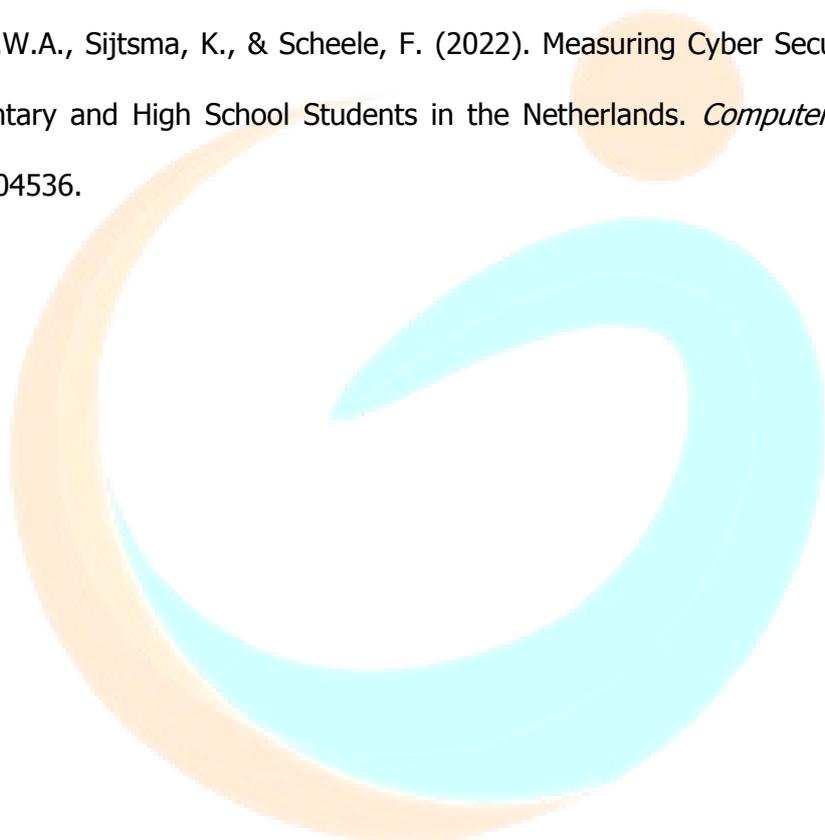
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