

Teacher Self-Efficacy in Relation to the Student's Attitudes Towards Science in Cluster 10 Division Davao City

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Abstract. This study investigated the relationship between teacher self-efficacy and students' attitudes toward science in Cluster 10, Division, Davao City. It employed a non-experimental quantitative research method to determine the associations between variables, with the respondents being the 116 teachers from Marilog District Cluster 10 in the Division of Davao for the school year 2024- 2025. Pearson r was used to determine the relationship between the two variables. Findings revealed that Teacher Self-Efficacy was often extensive and frequently observed, particularly in terms of motivation, teacher performance, student reinforcement, and teacher persistence. Students' attitudes towards science, in terms of Curiosity, honesty, Flexibility, Persistence, and Open-Mindedness, are extensive. A significant relationship existed between teacher self-efficacy and students' attitudes towards science. Domains of teacher self-efficacy, such as motivation, teacher performance, student reinforcement, and teacher persistence, influence students' attitudes toward science and significantly impact their attitudes. Learning also boosts confidence and self-esteem, as achieving new knowledge and skills contributes to a greater sense of accomplishment.

KEY WORDS

1. Teachers' Self-esteem 2. Scientific Attitudes 3. Marilog District

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1. Introduction

As studies show, students' self-esteem and learning results improve with teachers' self-efficacy. Their educators significantly enhance children's self-esteem. One of the most essential actions they can undertake, especially as students, is engaging with an educator with a strong sense of self-worth. Research consistently indicates that educators with elevated self-esteem are more likely to get support from their students and peers, particularly academically successful pupils, than those with diminished self-esteem. Most professors expressed concern about their pupils' attitudes toward sci-

ence, which were attributed to their disinterest in the class and lack of focus on the subject matter. Teacher self-efficacy significantly influences the teaching process, particularly in science education, where the development of conceptual knowledge and inquiry-based learning is crucial. Educators possessing self-confidence are more inclined to be proactive, imaginative, and effective in their pedagogical approaches. This self-assurance enhances students' engagement, curiosity, and sustained excitement for science, elevating their morale and generating an engaging classroom atmosphere. Kwarteng

and Sappor (2021) contend that scientific educators' achievement of learning objectives is the most reliable measure of teaching self-efficacy. Fostering adept science educators is essential for nurturing scientifically literate citizens in modern society. Improving engineering self-efficacy has been a significant topic for scholars due to the recognized need for future educators to integrate engineering into science instruction properly (Zhang et al., 2023). Kaur and Choudhary (2020) argued that Science has enhanced contemporary comprehension of the world through technologies and discoveries, building new foundations for modern Physics. Notwithstanding the significance of these topics, they are infrequently integrated into the physics curricula of lower high school and primary education globally, chiefly owing to the complex mathematics necessitated for their instruction. Bernardo, Cordel, Calleja, and Teves (2023) delineate various issues and challenges in science education in the Philippines, including inadequate performance in global science literacy assessments, difficulties in implementing modular distance learning, the need for a culturally relevant science curriculum, and a declining interest in agriculture among the youth. Filipino students consistently attain worse scores in science literacy compared to students from other countries. The Philippines engaged in PISA for the inaugural time in 2018, with pupils undertaking examinations in reading, mathematics, science, and global skills. The PISA 2018 Framework defines science literacy as "the ability to engage with science-related issues and with the ideas of science as a reflective citizen. The PISA science framework asserts that scientific literacy depends on integrating knowledge and skills applied in diverse situations. Student performance was evaluated using seven proficiency levels, with Level 6 indicating the highest competency and Level 2 signifying the lowest proficiency. Students with Level 2 proficiency can apply foundational knowledge to

clarify scientific phenomena in familiar contexts and analyze basic data sets. This skill level serves as a foundational or minimal standard for scientific literacy (OECD, 2019). The Philippine educational system persists in grappling with scientific literacy. Most pupils struggle to comprehend scientific principles and their application to real-world situations. Despite regular curriculum modifications, numerous students remain apathetic and lack confidence in the science courses. Decreased enrollment in STEM programs intensifies this issue and heightens the likelihood of a broader disparity in future scientific and technological proficiency. Content interventions and a focus on science education are essential to tackle this issue, beginning with enhancing teachers' expertise and confidence in the subject matter. Teachers in Cluster 10 of the Davao Division encounter numerous classroom obstacles regularly. One issue is instructing a science class comprised of kids with diverse capacities to ensure that all can acquire grade-level skills and knowledge. Mitigating these challenges necessitates the enhancement of instructors' self-efficacy in pedagogy. For students to learn efficiently, educators must have confidence in their capabilities to improve learning and promote classroom debates, especially in science classes. Students may have learning disadvantages if a teacher possesses insufficient instructional self-efficacy beliefs. Educators with diminished self-efficacy may neglect to plan or prepare their instructional materials. Consequently, teacher efficacy impacts the influence teachers exert on students' learning. Therefore, the researcher considers it essential to examine the influence of instructors' self-esteem on students' attitudes toward science in Cluster 10 Division, Davao City. Teacher efficacy involves promoting student welfare, which can increase motivation when students find joy in their activities. This is highly relevant to life motivation, patriotism, and embodying the attributes of an exemplary citizen within the nation. They

can influence and transform the lives of their students. The self-esteem of teachers significantly influences students' experiences in the classroom. Educators are mostly recognized for instructing the students under their supervision. Additionally, educators fulfill numerous other functions within the classroom. Educators establish the atmosphere of their classes, cultivate a supportive environment, guide and develop pupils, serve as role models, and remain attentive to indications of distress.

1.1. Theoretical/Conceptual Framework of the Study—This is based on the social cognitive theory of teacher self-efficacy (TSE), which pertains to a teacher's confidence in their capacity to execute educational duties proficiently. TSE significantly impacts student performance and teacher welfare. It is founded on the social cognitive theory developed by Albert Bandura. The self-efficacy theory asserts that an individual is more inclined to undertake a new task—be it a demanding assignment, mastering a new technology, or using novel teaching strategies—if they possess confidence in their ability to execute the activity successfully. A favorable result ensues from this action. Similarly, behavioral learning theory, which emphasizes how people learn through interactions with the environment, directs the learner's attitude. It asserts that all behaviors are learned via punishment, reinforcement, and conditioning. According to the learning theory, attitudes can also be learned and unlearned using the concepts of classical and operant conditioning. When the right answer is chosen from a range of possibilities, the subject is instantly reinforced. The framework

provides a basis for comprehending the main ideas and factors of my study. It assists me in organizing my strategy, figuring out how the variables relate to one another, and deriving insightful conclusions from the data. He obtains deeper understanding of the phenomena he investigates by employing this framework, which also guarantees that my interpretation is based on accepted theories and concepts (Crawford, 2020). To test preexisting theories or develop new ones, he viewed the TF as a subset of the CF that looked at the connections in the study. According to Mensah et al. (2020), the theoretical framework for the research is not a summary of everyone's thoughts about the research. Instead, it was a compilation of the thoughts of giants in the field as they relate to your proposed research, as well as an understanding of those theories and how individuals use them to interpret the data collected. Figure 1 illustrates the conceptual foundation of this investigation. The study's independent variable is teachers' self-efficacy, which includes the following indicators: motivation, student performance, reinforcement, and persistence. Moreover, the study's dependent variable is the learners' attitude toward science, which comprises curiosity, honesty, flexibility, open-mindedness, and acceptance of the provisional nature of scientific explanations. The arrows pointing toward both variables from the independent variables indicate the relationship among the variables, which requires rigorous clarification if it is significantly related, considering the different indicators. The indicators depend on the variables that necessitate the concept of this study concerning the problem itself

2. Methodology

This chapter delineates the research methodology, participant demographics, research instruments, data collection procedures, and data analysis conducted during the study.

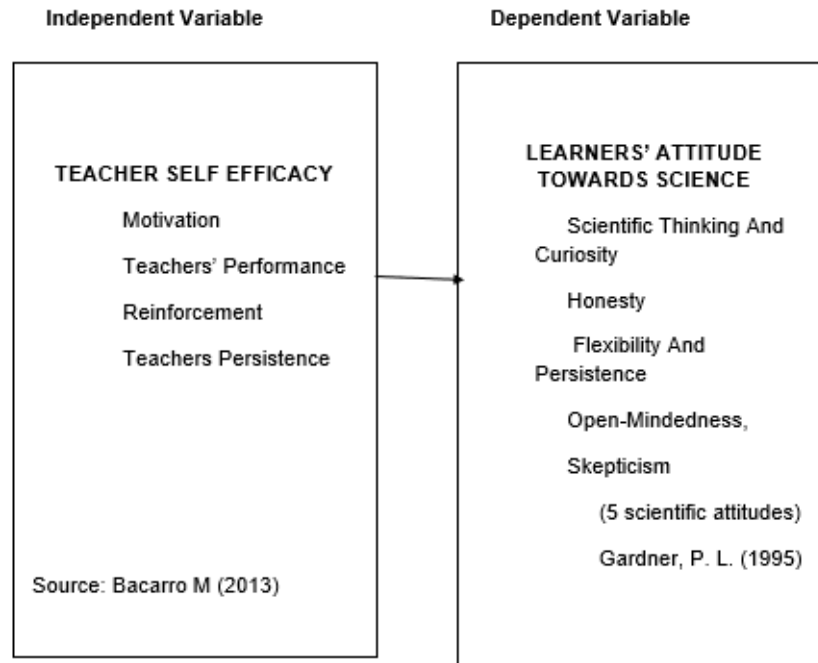


Fig. 1. Conceptual Framework

2.1. *Research Design*—The sampling protocol should also specify a sampling technique: simple random (every individual has the same probability of being selected to take part in the study), systematic (participants are selected in defined criteria), cluster (instead of just looking at individuals, the population is divided into groups (e.g., schools, local government areas) which represents a unit of study that latter can be randomly selected to be included in the study), and stratified (participants are divided into groups with similar characteristics) (Brenner 2020) In this study, the researcher employed a quantitative research method, utilizing a descriptive correlational design. Weighted mean and standard deviation were used to describe and evaluate secondary teachers' self-efficacy regarding students' attitudes toward science in Cluster 10, Division of Davao City, and to assess the significance of the research study. The study primarily focused on how teachers understand the research's foundational principles and technical components, typically assessed using structured instruments that yield

quantitative data suitable for statistical analysis, as Bhandari (2023), a correlation reflects the strength or direction of the relationship between two or more variables. Correlational research is ideal for gathering data quickly from natural settings. That helps you generalize your findings to real-life situations in an externally valid way. There are a few situations where correlational research is an appropriate choice. To investigate non-causal relationships, they want to find out if there is an association between two variables, but they do not expect to find a causal relationship between them. The sample size is essential in quantitative research, particularly in correlational research. While tools for determining sample size exist, the key takeaway is that increasing the number of variables in a study necessitates a bigger sample size (Abu-Bader, 2021). Researchers who use this method do not generally begin with a hypothesis. Instead, they develop one after collecting the data. Variables are not manipulated in this type of research, and researchers do not use the law of probability. Survey research involving large

datasets falls into this category of design. Thus, this method was suitable for the present study because it examines the relationship between learning modalities and the efficacy of public elementary school teachers in Marilog District, Cluster 10, Division of Davao City, Region XI.

2.2. Ethical Consideration—It encompasses moral principles and values that shape our actions and decision-making processes. It serves as a guiding framework for evaluating what is right and wrong in various situations, informing our judgments and behaviors. The researcher diligently adhered to the established protocols considered essential as standard guidelines for conducting the research study, by the study protocol assessment criteria, especially in managing the population and data. The survey questionnaires and accompanying authors were submitted for additional assessment. Following the Ethics Committee's permission, the researcher advanced to the subsequent step of the study.

Social Value The researcher recognized that her submitted research proposal must concentrate on social, scientific, or therapeutic issues. The researcher explicitly delineates how the anticipated outcomes would augment knowledge in the nursing field, improve individual health and well-being, or enrich our comprehension of persistent health challenges. Furthermore, the researcher would emphasize how my research could result in recommendations for enhancements in healthcare.

Informed Consent Before commencing this study, the researcher secured a written informed consent from the participants and thoroughly elucidated the study's goal, delineating the particular objectives and the nature of their involvement. This would facilitate their comprehension of the significance of their involvement and enable them to determine their desire to participate. The researcher wanted to underscore that participation was wholly voluntary. Any respondent who opted to decline or withdraw

at any study stage was respected without pressure or coercion. Their comfort and psychological well-being were paramount, and they would implement the requisite measures to establish a supportive environment during the research process. Additionally, the researcher secured written agreement from the participants and clarified that the study aimed to examine the factors that may either enhance or hinder teachers' satisfaction with school clinic services. The primary aim is to leverage these insights to enhance the provided services, cultivate trust, and guarantee that study participants feel safe and valued by establishing a transparent and candid communication channel.

Vulnerability of Research Participants In this study, my respondents were teachers who were not considered vulnerable since they were all of legal age and were not classified as highly vulnerable psychologically. She made sure that the survey was conducted at their convenience. Additionally, they took steps to protect the confidentiality of the information they disclosed. The participants' foreseeable risks, burdens, and benefits were carefully evaluated. These risks were avoided because the researcher's questionnaire did not include any offensive, discriminatory, or demeaning language that could offend the participants. The data was gathered cautiously, ensuring that private and unnecessary information was left out. This study had no high-risk situations involving the participants' social and emotional needs. Additionally, this study made sure that there were more possible advantages for the participants than disadvantages. By offering a convincing justification for combining different initiatives that deal with the examination of teachers' perspectives, the results of this study would benefit the entire Department of Education, encompassing educators, students, parents, and the community.

Privacy and Confidentiality She observed the Data Privacy Act of 2012, ensuring that the data could not be traced back to the participants,

who would be the natural source of information and must be protected to maintain their identities. Moreover, the researcher assured that no personal data would be shared without the participants' consent. Thus, access was limited to the researcher to ensure that no personal data was exposed. This act protected the fundamentals of human rights on the privacy of information, ensuring the free flow of information that promotes innovation and growth. The researcher protected the respondent/participants' right to privacy, treating their responses with the highest respect. Unless the law requires, the confidentiality of information shall always be observed. The study did not request Other personal information to safeguard participants' identities and enable them to participate without fear of being identified as involved. All data was collected meticulously to safeguard the anonymity of the sources and to anonymize any confidential information that could be revealed. Pseudonyms were employed to safeguard these names and identities. An archive journal documenting the information on these codes was transcribed. Consequently, personal names were excluded from the identifying procedure. If written responses existed, a camera documented them. Documents and recordings were securely stored in a single location, either encrypted or safeguarded.

Risk, Benefits, and Safety The researcher administered the survey questionnaires and ensured that respondents were fully informed about the nature of their participation. She emphasized the confidentiality of their answers as specified in the online survey questionnaire while thoroughly explaining the study's goals and advantages. She would establish an open space where participants could freely and unrestrictedly ask questions regarding the study. The goal was to ensure that the respondents experienced no harm in any manner whatsoever. she also ensured that my questionnaire and interview guide did not include degrading

or offensive statements that could impact the respondents negatively. Likewise, this study was designed solely to collect academic information related to the research, and participants were not asked to provide personal information. To minimize inconvenience, the researcher ensured respondents were given ample time to complete the online questionnaire. The respondents were free not to answer questions that might cause them psychological or emotional distress, and they were free to withdraw as respondents from the study if they felt they could not discuss the information they would be asked to provide. The researcher would value their participation and prioritize their welfare during the study.

Justice As a researcher, she avoided impartiality in choosing the respondents; the researcher would regard all respondents equally regardless of whether they were respondents. The researcher was not prejudiced in choosing the respondents for the study who met the qualifications of being a permanent-regular employee in the purposefully selected schools. During the study, the researcher respected the respondents by minimizing routine interruptions. To compensate for the time spent gathering data, the researcher provided tokens of appreciation to the respondents.

Transparency As a researcher, she provided transparency and communication about the research being done honestly and fairly. To safeguard the welfare of the participants, the researcher properly implemented the methods discussed in this study. All necessary documents supporting the data analysis were included. Notably, the researcher describes the extent of the respondents' involvement in this study and explains how they maintain objectivity in analyzing the data and presenting the study results. **Qualifications of the Researcher.** In this study, the researcher ensured that other factors, such as conflicts of interest, did not influence the respondents' responses. The study's findings could be accessed by the respondents' parents

and school administrators of the participating schools, provided they followed proper protocol to protect the respondents' anonymity. The researcher also acknowledged the efforts of every person who contributed to the study's success. A furnished copy of the research results was provided to the Division of Davao City, allowing it to be accessed by the respondents for further study.

Adequacy of Facilities The researcher would create a supportive and conducive environment for engaging the respondents, ensuring that all necessary learning materials are readily accessible during the study. She committed to completing the research within the specified timeline. To ensure the accuracy of the data she collected from the respondents, she carefully encoded their ratings, choosing times when the researcher felt alert and focused on minimizing the risk of errors. Furthermore, she would analyze diligently and ensure that my results are well-organized and aligned with the study's objectives, providing a solid foundation for assessing adequacy. This approach would help me maintain the research process's integrity and ensure the reliability of my findings. The researcher had an adequate budget and equipment to conduct the study, ensuring that the researcher had the best facilities to complete the research. The researcher personally owned the laptop, printer, internet connection, and other necessary facilities, ensuring they were adequate and readily available. Additionally, if possible, Google Meet was used to gather the data. Aside from the enumerated resources, some experts, including the adviser, the RMC Research Ethics Committee, and panel members, who also serve as expert validators, provide the researcher with the guidance needed to conduct this research.

Community Involvement Active community participation includes supporting local organizations, volunteering, and donating. Social well-being and constructive change depend on

both individual and collective participation. It helped to involve the community from project planning through reporting. The researcher intended to present the results to the community; thus, community involvement would be prioritized in determining the study agenda, suitable methods, and use of the conclusions or results. After that, the results of this study were discussed in meetings and conferences by the society. Community involvement is the participation and service rendered by a person serving to develop their community and personal development. This idea is part of the basic and collegiate curricula for students since it links content standards to actual learning by self-reflection, so guiding them. The researcher thus interacted with communities such as those in this study, where the respondents were secondary school teachers in Marilog District, Cluster 10, Division of Davao City, Region XI. The community was made up of different people; thus, the researcher was respectful of and sensitive to its religious, cultural, and traditional practices. The present study's manuscript was corrected, validated, and rewritten with help from the RMC graduate school. The RMC graduate school provided the researcher with guidelines based on its research policies and standards. This also fits the parents, students, and junior high school teachers conversely, as my target participants were seen to be following the appropriate protocol and seeking permission from the principal of the public schools. Furthermore, the study's results might help important public-school organizational players and other stakeholders since they received information on teachers' effectiveness in encouraging creativity and expression among students in their science subject practices.

2.3. Research Respondents—In this study, the researcher respondents were secondary school teachers in Marilog District, Cluster 10 Division of Davao City, Region XI. A total of 165 teachers were employed. The researcher

identified 116 out of 165 total science teachers in the cluster using a sample size calculator net as respondents to the present study, which primarily aimed to establish the coherence of the two variables. In addition, the study also examined the relationship between two variables: teachers' self-efficacy and students' attitudes towards science in Cluster 10, Division of Davao City. It would investigate which domains of teachers' self-efficacy significantly influence students' attitudes toward science in Cluster 10, specifically in the said division. A simple random sample represents the entire data population and selects individuals from the population randomly without considering factors. A stratified random sample was first divides the population into smaller groups with shared characteristics. Moreover, the researcher would consider the study's inclusion criteria, such as teachers with at least five years of teaching experience in public schools, as the respondents. These teacher-respondents are selected because they are assumed to have taught, particularly in science subjects. The one hundred ten (100) teachers in the Marilog District are distributed to the twenty-seven (27) high schools and integrated schools, respectively. It was politically situated in the 3rd Congressional District of the City. The district was managed by a Public School District Supervisor (PSDS), who was responsible for the school's internal and external activities. The researcher employed the purposive sampling technique, meaning all teachers who teach science subjects were considered respondents in this study.

2.4. Research Instrument—Quantitative research instruments encompass questionnaires, surveys, structured interviews, and behavioral observations, all grounded in clear coding and categorization frameworks (Farnsworth, 2019). The researcher contends that my selection of research instruments is essential for guaranteeing the reliability and validity of the data she gathers and for adequately addressing her research

inquiries. The final draft included the changes, comments, and recommendations from the experts before distribution and implementation. The instrument was implemented in Cluster 10, Marilog District, Davao City. The reliability was determined by Cronbach's alpha, resulting in a value of 0.91, which is within the accepted dependable range of 0.70 to 1.00. The panel of experts subsequently confirmed the final version for the instrument's validity. The instrument was composed of two parts. The first part focuses on learning modalities, which describe teachers' ability-type modalities. The second part of the instruments assesses the quality of teaching by teachers, particularly those in Marilog District, Cluster 10, Division of Davao City. Each dimension has five (5) items purposely constructed to elicit the necessary data. A five-point scale with corresponding descriptive ratings was provided to guide respondents in choosing an appropriate evaluation. The five-point scale with descriptive equivalents and interpretation for every response is presented below: This study used a five-point Likert scale to describe the teachers' self-efficacy provisions.

The data gathered was tallied, tabulated, analyzed, and interpreted confidentially, with the statistician's help. The research instrument underwent validity testing to elicit the participants' correct and accurate responses. In this study, content validity was used. The different types of criteria described the content validity concerning the parameters of the indicators of the variable under study. The experts who validated the instrument were provided with literature highlighting the theories and principles on which the tool was based and framed. To complete the validation process, the experts who reviewed and checked the instrument were provided with an evaluation form to assess the instrument's construct and technical aspects. The following were the areas considered in the evaluation of the research tool: clarity and direction of items, which included the vocabulary level, language

structure, and conceptual level of questions, the test directions, and the items were written in clear, and understanding manner; presentation and organization which refers to logical organization of the items; suitability of items which includes appropriateness of the items to the objectives of the research; appropriateness of the questions in determining the conditions, knowl-

edge, perception, and attitudes that are supposed to be measured; adequateness of items per category refers to sufficiency of representation of criteria of every indicator; attainment of purpose; objectivity and; appropriateness of the rating scale. A complete copy of the research evaluation tool is included in the appendices

Scale for Interpreting Teachers' Self-Efficacy

Range of Means	Descriptive Equivalent	Descriptive Interpretation
4.20–5.00	Very High Extensive	The teachers' self-efficacy is always observed.
3.41–4.19	Extensive	The teachers' self-efficacy is often observed.
2.60–3.40	Moderately Extensive	The teachers' self-efficacy is sometimes observed.
1.80–2.59	Less Extensive	The teachers' self-efficacy is rarely observed.
1.00–1.79	Not Extensive	The teachers' self-efficacy is not observed.

Scale for Interpreting Learners' Attitude Towards Science

Range of Means	Descriptive Equivalent	Descriptive Interpretation
4.20–5.00	Very Extensive	The learner's attitude towards science is always observed.
3.41–4.19	Extensive	The learner's attitude towards science is oftentimes observed.
2.60–3.40	Moderately Extensive	The learner's attitude towards science is sometimes observed.
1.80–2.59	Less Extensive	The learner's attitude towards science is rarely observed.
1.00–1.79	Not Extensive	The learner's attitude towards science is not observed.

2.5. *Data Gathering Procedure*—The researcher collected the requisite data via the subsequent methodologies: The researcher secured

approval from the Dean of the Graduate School and thereafter sought authorization from the Schools Division Superintendent of the Davao

City office to survey the teachers in Marilog District, Cluster 10, Division of Davao City, Region XI. The letter of authorization from the Schools Division Superintendent was submitted to the principals and cluster leaders of public elementary schools in Davao City to organize the research project. The arrangement was established with the school principals and supervisor after observing safety measures during the research execution. Following approval, the researcher personally executed the research, administered the survey, and collected the results. The principals obtained a copy of the letter to verify that the researcher had conducted and collected the data from the study participants with integrity. The collected data was confidentially counted, tabulated, evaluated, and interpreted. The findings of this study were examined and elucidated in light of the study's objectives. The researcher complied with the utmost ethical standards during the investigation, following the study protocol and evaluating defined criteria, especially in managing the population and data.

The teacher-respondents from many schools in the Marilog District, Davao City, have voluntarily opted to engage in or withdraw from the study at any point without incurring any repercussions or fines. The respondents' personal and professional information, necessary for the study, was maintained in privacy and handled with the highest confidentiality, under data protection principles. Conversely, the research questionnaire employed was devoid of technical jargon and readily comprehensible to the study participants, so mitigating potential biases. The research questionnaire was sent with the approval of each office. Consequently, no research questionnaire was administered to teaching staff without authorization from the appropriate command channels. The researcher also addressed additional ethical difficulties, such as plagiarism, fabrication, falsification, conflicts of interest, participant identification in focus groups, deceit, observation of individuals in public or quasi-public settings, technological challenges, and authorship-related concerns.

2.6. Data Analysis—Data analysis was an essential aspect of the research, encompassing the organization, purification, and interpretation of data to reveal patterns, trends, and insights. In this study, the researcher employed the following statistical instruments for data analysis: The mean was employed to assess the degree of

instructors' self-efficacy and students' attitudes toward science. The Pearson Product-Moment Correlation Coefficient, or Pearson's r , examined the strong association between teachers' self-efficacy and pupils' attitudes about science. Linear Regression Analysis identifies the domain of instructors' self-efficacy that strongly impacts learners' attitudes toward science.

3. Results and Discussion

This chapter meticulously examines and explains the data. Integrating tabular and textual analysis enhances comprehension of the implications, reinforcing the hypothesis.

3.1. Teachers' Self-Efficacy in Terms of Motivation—Table 1 summarizes the extent of instructional delivery. The results focus on the highest and lowest mean ratings of the indicators, which are as follows: Motivation (3.88), Teachers' Performance (4.28), Students' Re-

inforcement (3.81), and Teachers' Persistence (3.71). These indicators are often manifested, while Performance Goals are sometimes manifested. The overall mean rating of 3.28 indicates that the extent of students' learning habits is extensive and is often observed. The researchers

examined the teachers' self-efficacy in relation to their motivation, performance, and the support they offer to students in science subjects. They examined how teachers' beliefs in their capabilities influence their effectiveness in the classroom and the encouragement they provide to their students. The above results indicated that teachers with higher self-efficacy experience greater motivation and enhanced performance, boosting student engagement and support in learning science. Overall, the research highlighted the importance of fostering teachers' confidence in positively impacting educational outcomes within the teaching and learning process. Generally, self-efficacy—the belief in one's ability to succeed in specific situations—is crucial for motivation, performance, and overall well-being, influencing choices, effort, and persistence in various areas of life. Teacher self-efficacy, the belief in one's ability to effectively manage teaching responsibilities, is crucial for well-being and student outcomes, as it influences engagement, motivation, and achievement. Ghaffar, Hamid, and Thomas (2019) noted that science teachers' self-efficacy significantly affects their use of active learning strategies, performance goals, and science learning value. Enhancing student engagement in learning (Thien Chan, 2020) states that teacher self-efficacy affects teachers' decisions and practices

related to instruction, which can impact student engagement in learning activities. Chen et al. (2020) have documented a significantly positive correlation between teacher self-efficacy and several facets of classroom practice, e.g., instructional quality, classroom management, and motivational strategies. These factors, in their turn, contribute to the overall classroom climate and have a positive impact on students' performance. Moreover, teacher efficacy has been linked to important work-related variables like job satisfaction, stress management, and the implementation of innovative teaching strategies. According to Madukwe et al. (2019), teachers' attitudes and instructional strategies have a significant relationship with student academic performance, particularly in science-related fields. Several studies in Western societies like Lu Mustafa, (2021) have examined the relationship between teacher efficacy and student motivation, but these have yet to be well-researched in other regions. Although self-efficacy and student engagement vary due to institutional characteristics and contexts, empirical evidence on the constructions in non-Western collectivist samples appears limited. Likewise, student engagement is vital for positive pupil outcomes; however, little is known about it and its linkages with teacher self-efficacy and in the current study context.

Table 1. The Summary of the Extent of Self-Efficacy

No	Self-Efficacy	Mean	Descriptive Equivalent
1	Motivation	3.88	Extensive
2	Teachers' Performance	4.28	Highly Extensive
3	Students' Reinforcement	3.81	Extensive
4	Teachers' Persistence	3.71	Extensive
Overall Mean		3.92	Extensive

3.2. Learners' Attitude Towards Science in Terms of Curiosity—Table 2 shows the Summary of the Extent of the Learners' Attitude

towards Science. The results presented mean ratings of the indicators, which are as follows: Curiosity (3.55), Honesty (3.57), Flexibility and

Persistence (3.51), Open-Mindedness (3.70), and Skepticism (3.65). These indicators are oftentimes manifested, while Performance Goals are sometimes manifested. The overall mean rating of 3.28 indicates that the extent of the learners' attitude towards science is extensive and, thus, often manifested. A learner's attitude towards science is crucial as it significantly impacts their engagement, achievement, and future career aspirations in STEM fields, emphasizing the importance of fostering positive attitudes through effective teaching and learning experiences. A scientific attitude helps individuals develop a vision for a better life, makes life more meaningful, and teaches them to approach all work systematically. A scientific attitude is like a foundation for all fields of life, so it must be attended to. This reflects the statement by Husain and Khan (2024), who emphasized that a scientific attitude involves curiosity, open-mindedness, and honesty, which contribute to shaping responsible individuals. As a reflective citizen, scientific literacy is the capacity to engage with science-related topics and concepts.

A scientifically literate individual is prepared to participate in rational discussions on science and technology, necessitating the abilities to articulate phenomena scientifically, assess and formulate scientific investigations, and analyze data and evidence scientifically (Oliver Adkins, 2020). Musengimana et al. (2021) and Smith et al. (2020) contend that science educators concur that fostering positive attitudes toward science is a fundamental objective of science education and that achieving high-level proficiency in science education alongside positive attitudes presents a significant challenge for formal education. Numerous studies indicate that students generally possess positive attitudes toward science, and there is a favorable correlation between these views and their performance in scientific topics. Nawani et al. (2019) assert that scientific literacy must be attained via intentional involvement with scientific issues to enhance comprehension and critical evaluation. The PVC educational citizen science initiative was established to foster favorable attitudes towards science among participating students.

Table 2. The Summary of the Extent of the Learners' Attitude towards Science

No	Students' Learning Habits	Mean	Descriptive Equivalent
1	Curiosity	3.55	Extensive
2	Honesty	3.57	Extensive
3	Flexibility and Persistence	3.51	Extensive
4	Open-Mindedness	3.70	Extensive
5	Skepticism	3.91	Extensive
Overall Mean		3.65	Extensive

3.3. Significant Relationship Between Teacher Self-Efficacy in Relation To The Students' Attitudes Towards Science—Table 12 revealed a significant relationship between teacher self-efficacy and students' attitudes towards science. It provides information indicating that the posed null hypothesis must be rejected, stat-

ing that there is a significant relationship, as it offers empirical evidence to demonstrate its correlation. It can be inferred that Pearson's Correlation generated a strong, positive, and statistically significant correlation between the teachers' efficacy ($r = 0.941$; $p < .000$) and the learners' attitude toward science. In the

modern digital era, Teacher Self-Efficacy is crucial for educational institutions to provide high-quality learning experiences. Teachers' self-efficacy, or their confidence in their ability to teach effectively, significantly impacts students' attitudes toward science, with higher self-efficacy leading to more positive attitudes and improved learning outcomes. This is affirmed by Armstrong (as cited in Parcutilo Baluyos, 2019), who emphasized that teachers believe they can significantly influence student achievement and motivation through their instructional decisions. Teachers who strongly believe in enhancing student learning typically set higher expectations for their students, leading to improved academic outcomes. The concept of collective teacher efficacy plays a crucial role in shaping educators' perceptions of their capacity to foster student achievement. This collective confidence empowers teachers and significantly boosts students' self-confidence in their learning capabilities, guiding them toward achieving their academic goals. A higher level of teacher self-efficacy correlates with better

student academic success, creating a positive feedback loop that benefits the entire educational environment. Wang, Hall, and Rahimi (as cited in Parcutilo Baluyos, 2019) noted that self-efficacy for student engagement predicts teachers' psychological well-being, health, and even their intentions to remain in the profession. Furthermore, Pinchevsky and Bogler, cited in Parcutilo and Baluyos (2019). Teachers' perception of role positively predicted the use of the dominating style. It has implications for school principals and teachers regarding the importance of perceived self-efficacy and its role in influencing teachers' choice of conflict-solving styles. Teachers with a voice in decision-making and directing actions in solving issues have higher self-efficacy than those without. Teachers do influence students' academic performance. School variables that affect students' academic performance include the type of treatment that teachers provide to the students. Teacher self-efficacy influences teachers' decisions and actions in designing their instructional programs.

Table 3. Significant Relationship Between Teacher Self-Efficacy in Relation to the Students' Attitudes Towards Science

Variables	r-value	p-value	Interpretation	Decision
Learners' Attitude towards Science	.941	<0.000	Significant	Reject H ₀

**Significant at p <0.05.*

3.4. Domains of Teacher Self-Efficacy Significantly Influence the Students' Attitudes Towards Science —Table 13 presents the simple regression coefficient analysis of domains related to Teacher Self-Efficacy, which significantly affects students' attitudes toward science. Domains of Teacher Self-Efficacy, including motivation (0.001), teacher performance (0.001), reinforcement (0.001), and teachers' persistence (0.000). Meanwhile, the R² value of 0.886 suggests that learners' study habits ex-

plain 88.6% of the variance in teachers' engagement with students' attitudes towards science. This provides empirical evidence that teacher self-efficacy can account for and explain the variability in Students' Attitudes Towards Science. The F-value signifies the sum of squares, where the regression term indicates the model and the residual term indicates the error. The F-value (274.501) and F-statistics are significant (p <0.001), demonstrating that the model accurately predicts learner study patterns. Teacher

self-efficacy, defined as a teacher's confidence in their capacity to enhance student learning, is significantly correlated with student performance and engagement, whereby elevated self-efficacy results in improved outcomes. Empirical research indicates that teachers' self-efficacy views significantly influence student success and conduct. Results of teacher self-efficacy indicate a correlation with enhanced student engagement, improved learning opportunities, and favorable student outcomes. According to Reyes (2019), educators possessing elevated self-efficacy exhibit greater organization, goal orientation, and persistence, resulting in enhanced instructional effectiveness and improved academic support for students. A comparable study conducted by Alibakhshi, Nikdel, and Labbafi (2020) emphasized that teacher self-efficacy has been thoroughly examined. Nevertheless, it appears that the ramifications of teachers' self-efficacy have not been adequately investigated thus far. The research purpose was to examine the effects of instructors' self-efficacy on instruction. The researchers employed a qualitative research methodology. The data were gathered via semi-structured interviews with 20 EFL teachers recruited through purposive sampling. The interviews underwent thematic content analysis. Research indicated that self-efficacy yields several outcomes, encompassing educational, learner-related, and psycho-

logical aspects. Every consequence comprises multiple subcategories. High self-efficacy positively influences teachers' instructional methods, students' motivation, and academic success. It also impacts teachers' burnout levels, psychological well-being, and job satisfaction. The results may hold theoretical and pedagogical importance for EFL educators, teacher trainers, and educational administrators. Recently, Mustafa, Glavee-Geo, Gronhaug, and Almazrouei (2019) investigated the individual and combined effects of the two fundamental structural components—formalization and centralization—on employee self-efficacy, as well as their interaction with self-efficacy in affecting employee task performance. The research further investigates how structure affects individual performance via self-efficacy judgments. Wu, Tsai, and Chen (2019) asserted that teachers' emotional intelligence and self-efficacy directly correlate with their teaching performance and capacity to facilitate student learning. They noted that emotionally intelligent teachers are better equipped to manage classroom dynamics, respond empathetically to student needs, and maintain composure in stressful situations. When paired with strong self-efficacy, these qualities lead to more effective instruction and a positive learning environment that enhances student outcomes and teacher well-being.

4. Conclusions and Recommendations

This chapter includes conclusions, recommendations, discussion, and consequences based on data analysis. Findings were based on the challenges, inferences from the findings, and recommendations from the talks.

4.1. Findings—The results, analysis, and discussions presented the study's findings. The Extent of Teacher Self-Efficacy, in terms of Motivation and teachers' performance, has been observed at times, while student reinforcement and teachers' persistence were consistently ev-

ident. Additionally, managing the learners' information system was frequently demonstrated, suggesting that this aspect of classroom practice was extensively applied. Students' attitudes towards science were often observed in Curiosity, Honesty, Flexibility, Persistence, Open-

Table 4. Regression Coefficient Analysis on Domains of Teacher Self-Efficacy Significantly Influencing the Students' Attitudes Towards Science

Model	B	Beta	Standard Error	p-value	Decision
H ₀ (Intercept)	4.105	–	0.081	0.001	–
H ₁ (Intercept)	0.313	0.175	1.066	0.270	–
Motivation	0.807	0.107	0.102	0.001	*Reject H ₀
Teacher Performance	0.441	0.108	0.136	0.001	*Reject H ₀
Reinforcement	0.683	0.086	0.499	0.001	*Reject H ₀
Teacher Persistence	0.593	0.076	0.409	0.000	*Reject H ₀
R² = 0.886					
F-value = 274.501					
p-value <0.001					

**Significant at p <0.05.*

Mindedness, and Skepticism. These attitudes appeared occasionally across different contexts, suggesting they were present frequently. The analysis revealed a strong and meaningful relationship between teacher self-efficacy and students' attitudes towards science. Domains of Teacher Self-Efficacy, including Teacher motivation, performance, student reinforcement, and persistence, were found to have significantly influenced students' attitudes toward science. The results further indicate that students' attitudes play a substantial role in explaining variations in teacher self-efficacy. This provides empirical evidence that Teacher Self-Efficacy content significantly influences students' attitudes.

4.2. Conclusions—Given the results of the study presented, the following are the conclusions, to wit; Teacher Self-Efficacy was often extensive and frequently observed, particularly in terms of motivation, teacher performance, student reinforcement, and teacher persistence. Students' attitudes towards science, in terms of Curiosity, honesty, Flexibility, Persistence, Open-Mindedness, and Skepticism, are extensive. Students exhibit a broad range of attitudes towards science, characterized by curiosity, honesty, flexibility, persistence, open-mindedness, and skepticism. A significant relationship ex-

isted between teacher self-efficacy and students' attitudes towards science. Domains of teacher self-efficacy, such as motivation, teacher performance, student reinforcement, and teacher persistence, influence students' attitudes toward science significantly. The aforementioned conclusions are informed by the principles of social cognitive theory, as defined by Albert Bandura. Self-efficacy theory asserts that individuals are more inclined to undertake a new activity—be it a demanding assignment, mastering new technology, or using innovative teaching strategies—if they possess confidence in their ability to execute the task successfully. A favorable result ensues from this action. Behavioral learning theory, which underscores the influence of environmental interactions on learning, shapes the learner's attitude. It posits that all behaviors are acquired through punishment, reinforcement, and conditioning. Learning theory posits that attitudes can be acquired and discarded through classical and operant training.

4.3. Recommendations—Based on the results of the study, the following recommendations can be made;

Classroom Teacher Maintain high perceived self-efficacy, including effective lesson delivery, moral leadership, commitment, dedication

to serving, counseling, motivation, and social responsibility, to achieve effective school management that aligns with the school's vision and mission.

The Teacher Provide desirable day-to-day situations that arouse the student's interest, motivating them to participate in all class activities. This approach is based on the idea that psychological and physical conditions that hold the promise of answering needs can stimulate students to respond. They may proactively develop their engagement in activities or seminars to support or improve their teaching and management skills, thereby navigating and guiding learners effectively. This includes manipulating and exploring digital understanding. They may use this knowledge to design personalized instruction, incorporating differentiated strategies and resources that cater to diverse learning styles and abilities. They may engage in regular reflection and self-assessment, using artificial intelligence in instruction to evaluate the effectiveness of their instructional delivery. This process enables continuous improvement, allowing teachers to refine their practices and optimize student learning outcomes. In addition, teachers may acquire concrete knowledge of the children with whom they interact and a personal understanding of how they navigated childhood to have a basis for handling every student under their care. The School Principal May work with and evaluate classroom instructors to establish a positive learning environment, a key to educational success. They should also ask DepEd to create a midlife crisis management seminar for instructors. Likewise, it may help teachers improve by attending seminars and workshops, training, and working with educational technology professionals. They may also assist principals in data analysis to help them im-

prove and make educated teaching decisions. This included frequently examining data at staff meetings, fostering data-driven discussions, and applauding successful instructional approaches. The Department of Education may develop effective evaluation mechanisms or guidelines for appointing classroom teachers. It should also consider what constitutes an appropriate classroom management style within the school environment.

Further Research

Teachers from another location with different measures of perceived self-efficacy and students' attitudes towards science, such as multi-rater assessments. The leadership performance categories of community leadership and cultural competence, for which perceived self-efficacy has no significant effect in this study or similar or comparative studies exploring other indicators, are suggested for further investigation to determine if this study's findings also apply to other situations. It may foster a culture of collaboration among schools within the district, encouraging the sharing of best practices in embracing teachers' efficacy development activities. It may play a significant role in personal development by helping individuals acquire the skills, knowledge, understanding, and values needed to pursue their goals effectively. Continuous learning keeps the brain engaged and active, potentially slowing cognitive decline as we age. Moreover, it equips individuals with the ability to adapt to change and navigate new situations, which is increasingly important in our rapidly evolving world. Learning also boosts confidence and self-esteem, as achieving new knowledge and skills contributes to a greater sense of accomplishment. The findings from this research have the potential to be published in a well-regarded academic journal

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