

# Personal and Institutional Factors Affecting the Teaching Performance of Public Secondary Science Teachers

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## Abstract

This study examined the personal professional capacity and institutional factors affecting the teaching performance of public secondary science teachers in the Division of Lanao del Sur I-B during School Year 2025–2026. Anchored in Bandura's Social Cognitive Theory and Bronfenbrenner's Ecological Systems Theory, it employed a descriptive-correlational design involving 50 science teachers from 26 public secondary schools selected through total enumeration. Data were gathered using a researcher-developed, expert-validated, and pilot-tested questionnaire covering teaching self-efficacy, instructional competence, professional development, administrative and leadership support, instructional and laboratory resources, workload, and PPST-based teaching performance. Frequency, percentage, mean, standard deviation, independent-samples t-test, one-way analysis of variance, Pearson correlation, and multiple regression were used to analyze the data. Results showed very high teaching self-efficacy, instructional competence, and teaching performance, with classroom management receiving the highest performance rating. Institutional factors and professional development were rated high, while the replacement of damaged or outdated science materials received the weakest assessment. Teaching self-efficacy differed significantly according to years of experience, perceptions of institutional factors differed according to educational attainment, and instructional delivery and learner engagement differed according to age. Personal professional capacity and institutional factors were significantly and positively related to teaching performance, with correlation coefficients ranging from  $r = .40$  to  $.76$ ,  $p < .05$ . Personal professional capacity had a strong positive relationship with teaching performance, while institutional factors had a moderate positive relationship. The regression model was statistically significant,  $F = 38.96$ ,  $p < .001$ , and the predictors collectively explained 62% of the variance in teaching performance. Personal professional capacity contributed more strongly to the prediction of teaching performance than institutional factors,  $B = .90$ ,  $p < .001$ . The study recommends sustained science-specific professional development, strengthened administrative support, improved workload management, and increased provision and maintenance of instructional and laboratory resources through the proposed Science Teachers' Professional Capacity and Institutional Support Enhancement Program. The study supports SDG 4 on Quality Education, SDG 9 on Industry, Innovation and Infrastructure, and SDG 10 on Reduced Inequalities. Its sustainability impact lies in strengthening long-term instructional quality, institutional capacity, equitable resource allocation, and responsive science education in disadvantaged communities.

**Keywords:** Administrative Support, Institutional Factors, Instructional Competence, Personal Professional Capacity, Science Education, Teaching Performance, Teaching Self-Efficacy

## 1. Introduction

Quality science education develops learners' conceptual understanding, inquiry skills, critical thinking, and capacity to respond to scientific and technological change. Its effectiveness depends substantially on teachers' ability to deliver instruction, manage classrooms, engage learners, and support achievement. In Philippine public schools, these responsibilities are reinforced by the Enhanced Basic Education Act of 2013 (RA 10533) and the Philippine Professional Standards for Teachers (PPST). However, science teachers in geographically and economically disadvantaged communities often work with limited instructional resources, inadequate laboratory facilities, demanding workloads, and uneven institutional support. This study therefore examines how teachers' personal professional capacity and their institutional environment influence the teaching performance of public secondary science teachers in the Division of Lanao del Sur I-B.

Science education develops scientific literacy, inquiry, problem-solving, and skills needed in a changing technological world. Because teachers translate curriculum standards into classroom learning, their competence, commitment, and work environment strongly influence student outcomes under RA 10533 and the PPST. However, disadvantaged schools continue to face instructional and resource constraints. Paigalan and Bauyot (2025) identified leadership, institutional

climate, professional development, cultural adaptability, teacher competence, and self-efficacy as key influences on teaching performance. These challenges are pronounced in BARMM, where structural and socioeconomic conditions affect education. The 2024 Functional Literacy, Education and Mass Media Survey reported a 14.4% illiteracy rate among residents aged five and above, while the region obtained a mean score of 35.00, classified as Low Proficiency, in the 2024 Grade 12 National Achievement Test. Learning losses, limited technology access, and inadequate teacher training were also identified as major barriers (as cited in Mamalampac et al., 2025). In Lanao del Sur I-B, science teachers manage large classes, limited instructional and laboratory resources, power interruptions, and administrative duties while maintaining required standards (Radam, 2025). The study therefore examines personal professional capacity through teaching self-efficacy, instructional competence, and professional development, and institutional factors through leadership support, instructional and laboratory resources, workload, and school-related responsibilities. Teaching performance is assessed using self-reported PPST indicators on instructional delivery, classroom management, and learner achievement and engagement.

Teaching performance is a multidimensional construct shaped by professional competence, classroom practices, learner engagement, and institutional conditions. Flick (2023) emphasized that research validity depends on appropriate instruments and consideration of participants' experiences, supporting the use of PPST-aligned self-reported data. Teaching self-efficacy—the belief in one's ability to achieve instructional outcomes—is a key foundation of effective teaching (Bandura, 1977, as cited in Jerrim et al., 2025). Strong self-efficacy promotes persistence, adaptability, and inquiry-based teaching, while emotional self-efficacy also influences empathy and inclusive education (Graziano et al., 2024). Gamuza et al. (2025) reported very high teacher self-efficacy, with classroom management receiving 4.61, instructional delivery 4.51, and overall teaching performance 4.50. Self-efficacy was significantly related to performance at Spearman's  $\rho=0.510$ ,  $p<0.050$ , and was stronger among older, more educated, and experienced teachers, while sex had no significant effect. Scherer et al. (2021) likewise linked adaptability with self-efficacy, training, and professional readiness. Instructional competence includes subject knowledge, pedagogy, assessment, and professional practices. Canuto et al. (2024) found that instructional proficiency strongly influenced science teachers' performance, even under limited resources. As cited by Lucman and Basher (2025), instructional competence was also significantly associated with science teachers' performance in Lanao del Sur I-B. Professional development strengthens competence, confidence, and adaptability. Sustained, content-focused, and context-responsive training improves STEM teachers' efficacy and readiness (Zhou et al., 2023; Scherer et al., 2021). Aquino and Bautista (2023) found that contextualized training and Learning Action Cells improved lesson planning, instruction, and assessment more effectively than one-time programs. Similar benefits were reported among science teachers in Lanao del Sur I-B (Lucman and Basher, 2025). Institutional support is also essential. Tosun & Bozkurt Bostancı, (2024) found that administrative guidance strengthened leadership, collaboration, and professional growth, while Guhao and Sioting (2023) linked organizational trust with self-efficacy and professional learning. Paigalan and Bauyot (2025) identified leadership as the strongest organizational predictor of performance, with correlations from  $r/\beta = .45$  to  $.67$ , and found that self-efficacy and competence mediated the effects of administrative support at  $r/\beta = .48$  to  $.58$ . Thus, institutional support is most effective when teachers possess the competence and confidence to apply it.

In BARMM, proactive and relational leadership is essential because teachers work under complex socioeconomic, geographic, and governance conditions (Radam, 2025). Workload and limited social support can cause burnout and reduce instructional effectiveness (El Alaiki et al., 2025; Erden et al., 2023). Manageable workloads are associated with better teaching performance (Wahab and Arazo, 2024), yet BARMM teachers often assume additional duties because of personnel shortages (Radam, 2025). Demographic characteristics influence teaching performance inconsistently. Younger teachers may be more proficient with digital technologies, while mid-career and experienced teachers often demonstrate more stable pedagogy and professional mastery (Dogan & Arslan, 2025; Coldwell, 2022; Bacus et al., 2024). Female teachers have been associated with emotional self-efficacy, inclusive practices, and learner-centered instruction, while some male science teachers report stronger confidence in STEM teaching and organizational commitment (Graziano et al., 2024; Ibrahim & Aljneibi, 2022; UNESCO, 2020). The predominance of female science teachers reflects broader teaching-workforce patterns (Lucman & Basher, 2025). Civil status has no consistently direct effect on performance, although it may shape organizational commitment and the balance between family and professional responsibilities (Erden et al., 2023; Panergayo et al., 2022). Educational attainment may strengthen knowledge and pedagogy, but its effects may be limited under similar institutional conditions (Bacus et al., 2024). Learning Action Cells, in-service programs, and science-specific training therefore provide accessible professional-development pathways. Experience also strengthens professional mastery and resilience against work-related pressures (Wahab and Arazo, 2024). Teaching performance primarily involves instructional delivery, classroom management, and learner achievement and engagement. Effective teachers plan, implement, and assess organized, student-centered lessons despite limited resources (Bacus et al., 2024). Science instructional quality is also associated with self-efficacy, training, innovation, classroom management, and administrative support (Garcia, 2025). Strong classroom management depends on pedagogy, leadership, feedback, collaboration, and organizational trust (Tosun & Bozkurt Bostancı, 2024; Guhao and Sioting, 2023). Student-centered practices and continuous progress monitoring

further promote learner achievement, while adaptive teaching can partly offset inadequate laboratory facilities and instructional materials (Bacus et al., 2024).

Globally, the literature consistently links teaching performance with self-efficacy, competence, sustained professional development, leadership, manageable workload, and access to institutional support. International findings also indicate that demographic characteristics can influence technology use, career development, emotional efficacy, and professional adaptation, but their effects are less consistent than those of psychological and institutional conditions. At the national level, Philippine studies emphasize the importance of PPST-aligned instructional competence, school-based professional development, Learning Action Cells, organizational trust, work-life balance, and student-centered instruction. The national context also demonstrates that formal educational attainment alone does not guarantee effective teaching, particularly when educators experience common resource constraints and organizational pressures. Continuing, contextualized professional learning appears more directly connected with classroom practice. Locally, science teachers in Lanao del Sur I-B work within the broader educational conditions of BARMM. They must respond to low regional literacy and achievement outcomes, limited science facilities, shortages of instructional materials, power interruptions, teacher shortages, and extensive school-related duties. These realities make teacher self-efficacy, adaptability, instructional competence, leadership support, workload management, and locally relevant professional development particularly important. The division therefore provides a critical setting for examining how internal professional capacity and external institutional conditions jointly shape teaching performance.

The study is grounded in Albert Bandura's Social Cognitive Theory and Urie Bronfenbrenner's Ecological Systems Theory. Abshar and Rofifah (2026) explained that Social Cognitive Theory examines the reciprocal relationships among the individual, behavior, and environment. Within the present study, teachers' self-efficacy, instructional competence, and professional development interact with their instructional behavior and school environment to influence performance. High self-efficacy supports persistence, adaptability, and task completion, whereas low self-efficacy may lead to hesitation and avoidance of challenging instructional actions. The conceptual model also draws on Bandura's Social Cognitive Theory (1977), which proposes that beliefs about personal capability and previously acquired behavior influence performance. Teaching self-efficacy, instructional competence, and participation in professional development therefore constitute internal capacities that may shape instructional delivery, classroom management, and learner engagement. Ecological Systems Theory explains that professional behavior is affected by several interconnected environmental systems. The theory as cited by Shao et al. (2025) indicates that school climate and leadership quality form an institutional ecosystem that directly influences teacher efficacy, work engagement, and performance. In Lanao del Sur I-B, the microsystem includes classroom conditions, teaching load, and learner characteristics; the mesosystem consists of relationships among teachers and administrators; the exosystem includes decisions regarding resource allocation and professional development; and the macrosystem encompasses national policies, education standards, and the PPST. The study's conceptual process integrates these theoretical positions. Its inputs consist of teachers' demographic profiles, personal professional capacity, and institutional factors. These variables are assessed, compared across demographic groups, and examined for their interrelationships and predictive contributions. Teaching performance serves as the outcome and is measured through instructional delivery, classroom management, and learner achievement and engagement. The resulting evidence provides the basis for a proposed professional development enhancement program addressing identified personal and institutional needs.

The literature clearly establishes that teaching effectiveness is associated with teachers' self-efficacy, instructional competence, professional learning, administrative support, workload, and access to instructional resources. However, many studies have examined these variables separately, in broader national settings, or among teaching populations outside disadvantaged rural science education contexts. Limited evidence explains how personal and institutional factors interact and jointly predict the performance of public secondary science teachers in Lanao del Sur I-B. Existing professional development opportunities also tend to vary in structure, duration, content relevance, and responsiveness to actual classroom conditions. Training may be less effective when it is generic, short-term, or disconnected from the difficulties encountered by science teachers in resource-constrained schools. The need is therefore not simply for additional training but for evidence showing which personal capacities and institutional conditions should be strengthened. The study addresses these gaps by determining teachers' demographic characteristics and assessing their teaching self-efficacy, instructional competence, professional development participation, administrative and leadership support, instructional and laboratory resources, workload, and school-related responsibilities. It also examines perceived teaching performance through PPST-aligned indicators, determines whether personal capacity, institutional support, and performance differ according to demographic profile, and tests the relationships among the principal variables. The study further determines the combined and individual predictive contributions of personal professional capacity and institutional factors to teaching performance. The null hypotheses concerning demographic differences, relationships, and predictive effects are tested at the 0.05 level of significance. The evidence generated is intended to guide a professional development enhancement program that responds to the specific needs of public secondary science teachers in the division.

The study aligns principally with SDG 4 – Quality Education because it focuses on strengthening science teaching, teacher competence, professional development, classroom management, learner engagement, and educational achievement. By identifying the factors that support or inhibit effective instruction, the research can inform interventions intended to improve equitable access to quality learning in a disadvantaged educational setting. It also supports SDG 9 – Industry, Innovation and Infrastructure through its attention to science instructional materials, laboratory resources, technology access, innovative teaching practices, and the professional capacity needed to deliver science education under resource limitations. Strengthening both teacher capability and school-level instructional infrastructure can support more sustainable and responsive science learning. The research further relates to SDG 10 – Reduced Inequalities because it concentrates on teachers serving geographically and economically disadvantaged communities in BARMM. Examining the conditions of schools in Lanao del Sur I-B may help education authorities design interventions that respond to local resource and professional-development disparities rather than applying uniform programs that overlook contextual inequalities.

The study contributes to educational sustainability by identifying the professional capacities and institutional conditions needed to maintain effective science instruction over time. Strengthening self-efficacy, instructional competence, and continuing professional development can help teachers adapt to curricular, technological, and classroom changes while sustaining learner engagement and achievement. It contributes to institutional and governance sustainability by providing the Department of Education, the Ministry of Basic, Higher, and Technical Education, and school administrators with evidence relevant to teacher deployment, training design, leadership practices, workload distribution, resource allocation, and institutional support. Addressing excessive duties and inadequate resources can help protect teacher well-being, professional commitment, and long-term instructional quality. The research also has socioeconomic and community sustainability implications. Improved teaching performance may enhance learners' educational experiences and scientific capabilities, particularly in communities affected by low literacy and limited educational resources. Stronger science education can support learners' capacity to participate in technological, social, and economic development. Technological and innovation sustainability are addressed through the study's concern with laboratory equipment, instructional resources, technology access, teacher adaptability, and innovative science pedagogy. Cultural sustainability is also relevant because teaching in BARMM requires instructional practices that recognize the region's distinctive social, cultural, and institutional conditions. For teachers, the study may promote reflective practice, professional growth, and participation in capacity-building activities. For students, improvements in instruction may support stronger engagement and learning outcomes. For future researchers, the findings can provide a local baseline for examining additional psychological, socioeconomic, institutional, and community variables in other educational levels and contexts.

The study focuses on public secondary science teachers handling junior and senior high school science subjects in the Division of Lanao del Sur I-B during School Year 2025–2026. It excludes private-school teachers, elementary teachers, teachers from Lanao del Sur I-A, and personnel outside the specified division. The demographic variables are age, sex, civil status, educational attainment, and years of teaching experience. Personal professional capacity is assessed through teaching self-efficacy, instructional competence, and participation in science-related professional development and training. Institutional factors cover administrative and leadership support, the availability of science instructional and laboratory resources, teaching workload, and school-related responsibilities. Teaching performance is measured through self-reported PPST indicators concerning instructional delivery, classroom management, and learner achievement and engagement. The investigation is limited to teachers' survey-based perceptions of the selected variables. Psychological conditions beyond self-efficacy, broader socioeconomic circumstances, and external community influences are not included. Accordingly, the findings describe the conditions of public secondary science teachers in Lanao del Sur I-B and are not intended to represent all teachers in Lanao del Sur or other educational settings.

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## **2. Material and methods**

### **2.1 Research Design**

The study used a descriptive-correlational research design. The descriptive component assessed the respondents' demographic characteristics, personal professional capacity, perceived institutional factors, and teaching performance. The correlational component examined whether changes in personal and institutional factors were associated with changes in teaching performance. Multiple regression analysis was also used to determine the extent to which personal professional capacity and institutional factors predicted teaching performance. This design provided a basis for understanding the personal and school-related conditions associated with effective science teaching in the Division of Lanao del Sur I-B.

### **2.2 Locale of the Study**

The study was conducted in public secondary schools within the Division of Lanao del Sur I-B. The division was purposively selected because its proximity to the provincial capital made data collection more feasible within the study's available time and resources. The participating teachers were assigned to 26 public secondary schools distributed across the municipalities covered by the division.

### **2.3 Respondents of the Study**

The respondents were 50 public secondary science teachers actively employed in the Division of Lanao del Sur I-B during School Year 2025–2026. They were teaching science subjects at the secondary level and possessed a Bachelor's degree in Secondary Education major in Science or a degree in a related field. The respondents differed in age, sex, civil status, educational attainment, and years of teaching experience, providing varied representation of the division's science teaching workforce.

### **2.4 Sample and Sampling Procedure**

Initial information from the division office indicated a broader number of teachers across several areas. After verification and field validation with the respective school principals, 50 teachers were confirmed to meet the study's qualifications. Because the target population was manageable, total enumeration or census sampling was applied. All qualified public secondary science teachers in the division were therefore included as respondents.

### **2.5 Research Instrument**

Data were gathered using a researcher-developed questionnaire with four sections covering respondents' demographic profile, personal professional capacity, institutional factors, and PPST-aligned teaching performance in instructional delivery, classroom management, and learner achievement and engagement. The last three sections used a four-point Likert scale: 3.26–4.00 for Strongly Agree/Very High, 2.51–3.25 for Agree/High, 1.76–2.50 for Disagree/Low, and 1.00–1.75 for Strongly Disagree/Very Low. Three subject-matter experts validated the instrument for relevance, clarity, contextual appropriateness, and alignment with the study objectives. After revision, it was pilot-tested with 10 public secondary science teachers from the Division of Marawi City who were excluded from the main study. Cronbach's alpha was used to determine internal consistency and reliability.

### **2.6 Data Gathering Procedure**

Approval to conduct data collection was obtained from the Division Research Office before the questionnaire was administered. The respondents were informed about the study and provided consent through physical or online forms. To accommodate accessibility limitations, the questionnaires were distributed either personally or through online platforms. The respondents were given sufficient time and privacy to complete the instrument. After retrieval, the responses were coded and categorized for statistical processing. All collected information was handled confidentially, stored securely, and used exclusively for academic and research purposes.

### **2.7 Data Analysis Techniques**

Descriptive and inferential statistical techniques were used to analyze the data. Frequency and percentage distributions summarized the respondents' age, sex, civil status, educational attainment, and years of teaching experience. Means and standard deviations determined the levels of personal professional capacity, institutional factors, and teaching performance according to the established descriptive scale. The Independent Samples t-test was used to identify significant differences between sex groups. One-Way Analysis of Variance was applied to determine differences in personal professional capacity, institutional factors, and teaching performance across the other demographic groupings. When the analysis of variance produced a significant result, appropriate post hoc tests were conducted to identify the groups that differed. Pearson's Product-Moment Correlation Coefficient was used to determine the strength and significance of the relationships among personal professional capacity, institutional factors, and teaching performance. Multiple linear regression analysis determined the combined and individual predictive contributions of personal professional capacity and institutional factors to teaching performance. All hypotheses were tested at the 0.05 level of significance. The null hypothesis was rejected when the p-value was equal to or less than 0.05 and was not rejected when the p-value was greater than 0.05.

### **2.8 Ethical Considerations**

The study followed established ethical standards to protect the respondents' rights, privacy, and well-being. Names, employee numbers, school positions, and other identifying information were neither collected nor disclosed. Responses were coded and reported numerically to maintain anonymity and prevent the identification of individual participants. Before data collection, the respondents received clear information about the study's objectives, procedures, and requirements. Participation was voluntary, and respondents were informed that they could withdraw at any time without penalty. Instructions and consent information were communicated in understandable language. Electronic records were kept in password-protected files and stored through secure Google Drive facilities. Access to the data was limited, and the information was retained and used only to the extent necessary to meet the study's objectives. The questionnaire did not include sensitive questions and posed no anticipated threats to the respondents' physical or psychological well-being. Its content was limited to their teaching experiences, school environment, and instructional practices.

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## **3. Results and Discussion**

### **3.1 Demographic Profile of the Respondents**

### **3.1.1 Age, Sex, and Civil Status**

The 50 respondents were predominantly mid-career teachers. Those aged 36–45 constituted the largest group at 40%, followed by teachers aged 30–35 at 32%. Teachers aged 24–29 represented 12%, those aged 46–55 represented 10%, and those aged 56–65 represented 6%. The sample was also predominantly female, with 48 female teachers accounting for 96% and only two male teachers accounting for 4%. In terms of civil status, 80% were married, 18% were single, and 2% were separated. The concentration of teachers between 30 and 45 years old suggests that the division's science workforce was largely composed of professionals in the consolidation stage of their careers. Coldwell (2022) explained that mid-career teachers generally move beyond initial professional adjustment and develop more consistent and reliable teaching practices. Bacus et al. (2024) similarly observed that many Filipino public-school teachers were in the mid-career age range. The predominance of female respondents reflects the continuing feminization of the teaching profession, consistent with Ibrahim and Aljneibi (2022), although the very small number of male respondents limits meaningful sex-based comparisons. The large proportion of married teachers may indicate the need to balance household and professional responsibilities. Erden et al. (2023) found that married and single teachers may experience well-being differently because of variations in personal and occupational demands.

### **3.1.2 Educational Attainment and Teaching Experience**

Most respondents had pursued education beyond the bachelor's level. Nineteen teachers, or 38%, had master's units, while 15, or 30%, held master's degrees. Five teachers, or 10%, had doctoral units, and one, or 2%, held a doctoral degree. Only 20% had bachelor's degrees as their highest qualification. The teachers were also generally experienced: 30% had taught for 12–15 years, 26% for 8–11 years, and 24% for at least 16 years. Only 14% had two to three years of experience, while 6% had four to seven years. Overall, 80% had taught for at least eight years, and 54% had more than 12 years of service. The high proportion of teachers pursuing or completing graduate education indicates sustained academic and professional engagement. Bacus et al. (2024) suggested that postgraduate education can strengthen content knowledge and support more sophisticated instructional practice. The extensive teaching experience represented in the sample may also contribute to confidence, classroom familiarity, and the ability to explain scientific concepts. Wahab and Arazo (2024) associated longer experience with stronger capacity to integrate scientific knowledge and contemporary skills. However, experience alone may not be sufficient in disadvantaged settings. Panergayo et al. (2022) emphasized that teaching efficiency emerges when professional experience is reinforced by continuing education and development.

### **3.1.3 Overall Demographic Characteristics**

The coded demographic results showed a mean of 2.66 for age with a standard deviation of 1.02, indicating a sample concentrated in the young-to-middle-age ranges. Sex had a mean of 1.04 and a standard deviation of 0.20, confirming the sample's strong female predominance. Civil status had a mean of 2.16 and a standard deviation of 0.42, reflecting the high proportion of married teachers. Teaching experience showed greater variation, with a mean of 2.74 and a standard deviation of 1.59. Educational attainment had a mean of 3.44 and a standard deviation of 1.51, indicating that many respondents had graduate units or degrees but that educational backgrounds remained diverse. The overall profile reflects a relatively stable, academically engaged, and experienced science teaching workforce. Coldwell (2022) noted that teachers with approximately a decade of experience may reach a professional stage marked by established competence and greater emphasis on learner outcomes. At the same time, variation in education and experience means that institutional interventions should not assume uniform professional needs. Bernardo et al. (2023) argued that institutional support must remain adaptable enough to address the different requirements of both beginning and experienced teachers.

## **3.2 Personal Professional Capacity**

### **3.2.1 Teaching Self-Efficacy**

Teaching self-efficacy received an overall mean of 3.38 and a standard deviation of 0.36, interpreted as Very High. The highest-rated indicator was confidence in teaching science concepts effectively to learners with diverse abilities, with a mean of 3.54. Teachers also reported very high confidence in modifying strategies for different academic abilities, using varied teaching methods, motivating learners, explaining difficult topics, managing unexpected challenges, and sustaining engagement. Adapting instruction despite limited science resources received the lowest mean of 3.26 but remained within the Very High range. The findings indicate that the respondents generally believed they could manage science instruction and respond effectively to classroom challenges. This supports the premise that perceived capability influences persistence, adaptability, and instructional behavior under Bandura (1977). The results also agree with Panergayo et al. (2022), who observed that Filipino science teachers may maintain strong efficacy even when working under structural and resource constraints. The high ratings therefore suggest professional resilience among teachers operating in disadvantaged public-school environments.

### **3.2.2 Instructional Competence**

Instructional competence obtained an overall mean of 3.29, interpreted as Very High, with a reported standard deviation of 0.42. The strongest indicators were alignment of instruction with DepEd and MBHTE competencies and the regular assessment of learner understanding, both with means of 3.38. Using assessment results to improve instruction obtained

3.34, while inquiry-based and problem-solving instruction obtained 3.30. The use of critical-thinking activities and appropriate instructional resources received means of 3.22, while ICT integration received the lowest mean of 3.20. These three indicators were rated High, whereas the remaining indicators were Very High. The results suggest that science teachers perceived themselves as competent in standards-based planning, assessment, content delivery, and adjustment of instruction. Their comparatively lower ratings for ICT, instructional resources, and critical-thinking activities may reflect the material and technological limitations of their schools. Canuto et al. (2024) similarly identified instructional competence as an important contributor to teacher and learner performance, particularly in science, where teachers must translate complex content into meaningful and manageable learning experiences.

### **3.2.3 Professional Development**

Participation in professional development was rated High. The item-level summary produced an overall mean of 3.01, while the accompanying narrative reported 3.04; both values fell within the same descriptive category. Applying knowledge and skills gained from training received a Very High mean of 3.30, while the positive influence of professional development on teaching received 3.26. Teachers nevertheless reported difficulties involving limited opportunities, heavy workloads, insufficient follow-up, short-term programs, classroom constraints, and training that did not sufficiently address current science-teaching trends. Difficulty applying learning because of classroom constraints received the lowest mean of 2.80. The lower rating relative to self-efficacy and instructional competence indicates that teachers valued professional learning but experienced limitations in its availability, continuity, and practical application. Zhou et al. (2023) found that professional development improves the efficacy of in-service STEM teachers, particularly when training is sustained, content-focused, and responsive to classroom conditions. The present findings therefore suggest that science-related development programs should move beyond isolated seminars and provide continuing, contextually relevant support.

## **3.3 Institutional Factors**

### **3.3.1 Administrative and Leadership Support**

Administrative and leadership support obtained an overall mean of 2.98, interpreted as High, with a standard deviation of 0.63. Teachers generally perceived that their schools provided administrative assistance and support for professional learning. However, the rating remained below the Very High level, indicating room for improvement in consultation, follow-up support, instructional budgeting, professional encouragement, and the continuity of school-supported development activities. The findings suggest that the respondents experienced a generally supportive administrative environment, although assistance was not consistently sufficient across all areas. Guhao and Sioting (2023) associated perceived administrative support with organizational trust, professional learning behavior, and teacher self-efficacy. Their findings indicate that teachers who trust school leaders are more likely to participate actively in professional learning communities and improve their instructional practice. Strengthening leadership responsiveness may therefore help move institutional support from High to Very High.

### **3.3.2 Availability of Instructional and Laboratory Resources**

The availability of instructional and laboratory materials received an overall mean of 2.61, interpreted as High, with a standard deviation of 0.40. This was the lowest-rated institutional dimension. Accessibility and relevance of science materials and laboratory facilities received means ranging from 2.56 to 2.72. The regular replacement of damaged or outdated science materials was rated Low, with a mean of 2.28. The results indicate that resources were present to some extent but were insufficiently updated, maintained, replaced, or adequate for the full requirements of practical science instruction. The common perception of limited resources suggests a division-wide rather than isolated school problem. Canuto et al. (2024) identified science materials and laboratory equipment as important predictors of instructional and learner outcomes because they enable inquiry-based and hands-on learning. Although the teachers continued to report strong instructional competence, improving the accessibility, condition, and replacement of equipment could further strengthen performance. Badeo and Duque (2022) likewise emphasized that adequate instructional tools are foundational to scientific inquiry and higher-order learning.

### **3.3.3 Teaching Workload and School-Related Responsibilities**

Teaching workload and school-related responsibilities received an overall mean of 3.00 and a standard deviation of 0.66, interpreted as High. Teachers generally considered their teaching assignments manageable and reported sufficient time for planning, preparing instructional materials, evaluating outputs, and providing feedback. However, class size, laboratory preparation, documentation, coordination work, and other non-teaching assignments continued to affect the time available for instruction. The moderate variation in responses indicates that workload conditions differed across schools and individual assignments. The results indicate that workload was not generally unmanageable but remained a relevant constraint on professional time and instructional concentration. Wahab and Arazo (2024) found a significant relationship between work-life balance and teaching performance, with manageable responsibilities contributing to stronger focus, motivation, and instructional effectiveness. Maintaining equitable assignments and reducing avoidable administrative demands may therefore help teachers sustain their current performance.

### 3.4 Teaching Performance Based on the PPST

#### 3.4.1 Instructional Delivery

Instructional delivery obtained an overall mean of 3.36 and a standard deviation of 0.51, interpreted as Very High. Integrating relevant real-life situations received the highest mean of 3.50, followed by encouraging participation and interactive learning at 3.46. Logical lesson organization obtained 3.40, and communicating standards-aligned objectives received 3.38. Technology integration and timely feedback received the lowest means of 3.26 but were still rated Very High. The findings show that the respondents perceived themselves as consistently applying effective, standards-based, and learner-centered instructional strategies. The strong rating despite resource limitations suggests that professional competence may partly compensate for inadequate physical materials. Canuto et al. (2024) similarly found that competence in instructional planning and implementation predicts effective science teaching and learner achievement, particularly when teachers foster inquiry and critical thinking.

#### 3.4.2 Classroom Management

Classroom management was the highest-rated performance domain, obtaining an overall mean of 3.44 and a standard deviation of 0.51, interpreted as Very High. Promoting fairness and inclusiveness received the highest mean of 3.58, followed by establishing discipline and respect at 3.52 and ensuring safety during science activities at 3.50. Creating a cooperative atmosphere, reinforcing positive behavior, managing disruption, and encouraging collaborative learning were also rated Very High. Time management during science lessons and laboratory activities received the lowest mean of 3.20 and was rated High. The results demonstrate that creating safe, orderly, inclusive, and participatory learning environments was a major professional strength. Tosun & Bozkurt Bostancı (2024) explained that successful classroom management extends beyond behavior control and depends on pedagogical competence, leadership assistance, and continuous professional feedback. Guhao and Sioting (2023) also found strong self-efficacy among public-school teachers in classroom management and learner engagement. The present findings confirm classroom management as a central competency among the respondents.

#### 3.4.3 Learner Achievement and Engagement

Learner achievement and engagement obtained an overall mean of 3.32 and a standard deviation of 0.49, interpreted as Very High. Setting clear expectations received the highest mean of 3.44, followed by motivating learners at 3.42. Assessment-informed engagement strategies, constructive feedback, scientific-data interpretation, inquiry activities, and critical-thinking tasks were also rated Very High. Monitoring learner progress and providing remediation or enrichment received the lowest mean of 3.22 and was rated High. The findings suggest that teachers prioritized learner participation, progress, scientific reasoning, and academic improvement. This corresponds with the responsibilities established in the Philippine professional standards, particularly curriculum planning, assessment, and reporting (DepEd, 2017). Bacus et al. (2024) similarly identified student-centered activities and systematic monitoring of learner progress as indicators of strong teaching performance. The results indicate that the respondents were aware of and applied strategies intended to promote learner engagement and achievement.

### 3.5 Differences in Personal Professional Capacity

#### 3.5.1 Differences According to Sex

Male teachers obtained a higher mean personal professional capacity score of 3.40, compared with 3.21 among female teachers. However, Welch's independent-samples test showed that the difference was not statistically significant, with  $t = -2.75$ ,  $df = 2$ , and  $p = 0.11$ . The null hypothesis was therefore not rejected. The result must be interpreted cautiously because the sample contained only two male respondents. The absence of a significant difference suggests that professional capacity was more strongly associated with shared training and working conditions than with sex. Aquino and Bautista (2023) stated that collaborative learning structures such as Learning Action Cells enable teachers to develop instructional practice collectively, which may reduce demographic differences in competence. Ibrahim and Aljneibi (2022) similarly found that when teachers work under comparable institutional support systems, personal demographic characteristics may exert less influence on professional commitment and capacity.

#### 3.5.2 Differences According to Age, Civil Status, Education, and Experience

Overall personal professional capacity did not differ significantly according to age, civil status, educational attainment, or teaching experience. Age produced  $F = 0.63$  and  $p = 0.64$ , civil status produced  $F = 0.56$  and  $p = 0.58$ , educational attainment produced  $F = 2.17$  and  $p = 0.09$ , and teaching experience produced approximately  $F = 2.12$  and  $p = 0.09$ . Because all  $p$ -values were above 0.05, the corresponding null hypotheses were not rejected. These results differ from Wahab and Arazo (2024), who associated educational attainment and teaching experience with stronger professional competence. However, Wahab and Arazo (2024) also indicated that common organizational conditions can reduce the predictive influence of demographic characteristics. The shared standards, Learning Action Cells, In-Service Training, and division-level requirements experienced by the respondents may have contributed to relatively uniform professional capacity. Dien et al. (2022) likewise found that the effects of education and experience on teacher effectiveness were highly context-dependent.

### 3.5.3 Teaching Self-Efficacy According to Experience

Although overall personal professional capacity did not differ significantly by teaching experience, teaching self-efficacy did. It produced  $F = 2.72$  and  $p = 0.04$ . Teachers with 8–11 years of service obtained a mean of 3.57, and those with at least 16 years obtained 3.47, compared with 3.04 among teachers with four to seven years. Instructional competence and professional development participation did not differ significantly according to experience, with  $p$ -values of 0.34 and 0.30, respectively. The pattern indicates that repeated classroom experience strengthens confidence in teaching science and managing learners. Ma et al. (2022) explained that self-efficacy develops through authentic experience and repeated successful performance. Gamuza et al. (2025) similarly found that teachers with longer service consistently demonstrated stronger self-efficacy across instructional domains. Teaching experience therefore appeared to influence confidence more directly than it influenced the respondents' overall professional capacity.

## 3.6 Differences in Perceived Institutional Factors

### 3.6.1 Differences According to Sex and Other Profile Variables

Male teachers obtained an institutional-factor mean of 3.10, while female teachers obtained 2.87. The difference was not significant, with  $t = -0.84$ ,  $df = 1$ , and  $p = 0.56$ . Institutional perceptions also did not differ according to age, civil status, or teaching experience, with  $p$ -values of 0.66, 0.83, and 0.55, respectively. Educational attainment was the only profile variable that produced a significant overall difference, with  $F = 3.19$  and  $p = 0.02$ . The nonsignificant sex difference suggests that institutional conditions affected teachers collectively rather than according to personal characteristics. Tosun & Bozkurt Bostancı (2024) maintained that leadership, materials, and organizational support operate as system-level conditions that generally influence the entire teaching workforce. Improvements in institutional support should therefore be implemented across schools and should not be designed only for particular demographic groups.

### 3.6.2 Differences According to Educational Attainment

Educational attainment significantly differentiated perceptions of administrative and leadership support, with  $F = 3.29$  and  $p = 0.02$ , and instructional and laboratory resources, with  $F = 4.93$  and a displayed  $p$ -value of 0.002. Teaching workload did not differ significantly across educational groups, with  $F = 1.40$  and  $p = 0.25$ . The analysis did not establish which specific education groups differed because the post hoc results did not identify the direction of the differences. The findings suggest that teachers with different academic qualifications applied different expectations when evaluating school leadership and science resources. Dien et al. (2022) found that educational attainment can influence teachers' evaluations of institutional effectiveness and professional conditions. Teachers with advanced qualifications may have greater awareness of standards for instructional leadership, laboratories, and learning environments. Dien et al.'s (2022) findings therefore support the conclusion that educational preparation may shape how institutional adequacy is perceived.

## 3.7 Differences in Teaching Performance

### 3.7.1 Differences According to Sex and Demographic Profile

Male respondents obtained a teaching-performance mean of 3.71, while female respondents obtained 3.36. The difference was not significant, with  $t = -3.47$ ,  $df = 2$ , and  $p = 0.07$ . Civil status, educational attainment, and teaching experience also produced no significant differences, with  $p$ -values of 0.60, 0.11, and 0.38, respectively. Age was the only significant profile variable. The statistical summary presented  $p = 0.05$ , while the accompanying narrative reported  $p = .005$ ; both were treated in the source as grounds for rejecting the null hypothesis. The nonsignificant difference according to sex indicates that both male and female teachers perceived themselves as capable of meeting classroom expectations despite differences in sample size and personal characteristics. This corresponds with the professional-resilience perspective discussed by Graziano et al. (2024), in which teachers may employ different relational or emotional approaches but remain similarly capable of accomplishing instructional goals. Age-related variation may reflect generational differences in instructional methods. Dogan and Arslan's (2025) findings showed that younger teachers were generally more likely to adopt digital approaches, while older teachers relied more heavily on traditional and experience-based practices. The absence of significant differences for the remaining characteristics suggests that commitment and instructional practice may be more influential than civil status, qualifications, or years of service (Panergayo et al., 2022).

### 3.7.2 Performance Dimensions According to Age

Instructional delivery differed significantly across age groups, with  $F = 2.61$  and  $p = 0.04$ . Learner achievement and engagement also differed significantly, with  $F = 2.72$  and  $p = 0.03$ . Classroom management did not differ significantly, with  $F = 2.48$  and  $p = 0.06$ . Thus, age influenced how teachers delivered instruction and promoted learner participation but did not significantly distinguish their ability to maintain classroom order and a productive learning environment. Dogan and Arslan (2025) found generational differences in teachers' perceptions and use of digital pedagogy and modern instructional practices. These differences may explain why age was associated with instructional delivery and engagement. Classroom management, however, may be developed through common professional experience and school expectations, making it comparatively stable across age groups.

### 3.8 Relationships Among Personal Capacity, Institutional Factors, and Teaching Performance

#### 3.8.1 Overall Relationships Among the Variables

Using the interpretive scale of Evans (1996), personal professional capacity had a strong positive relationship with teaching performance, with  $r = 0.76$  and  $p < 0.05$ . Institutional factors had a moderate positive relationship with teaching performance, with  $r = 0.55$  and  $p < 0.05$ . Personal professional capacity and institutional factors were also moderately and positively related, with  $r = 0.40$  and  $p = 0.004$ . All corresponding null hypotheses were rejected. The findings indicate that higher self-efficacy, instructional competence, and professional-development engagement were associated with stronger instructional delivery, classroom management, and learner engagement. Institutional support also contributed to performance by enabling teachers to apply their professional capacities under more favorable conditions. Bacus et al. (2024) identified personal professional capacity as one of the strongest contributors to teaching performance. Gamuza et al. (2025) similarly reported a strong relationship between professional efficacy and classroom effectiveness. Gamuza et al. (2025) further found a significant association between self-efficacy and overall teaching performance, reinforcing the complementary influence of personal and institutional conditions.

#### 3.8.2 Personal Professional Capacity Dimensions and Performance

All three dimensions of personal professional capacity were significantly related to teaching performance. Instructional competence produced the strongest relationship, with  $r = 0.78$  and  $p < 0.05$ . Teaching self-efficacy produced a moderate positive relationship, with  $r = 0.61$  and  $p < 0.05$ . Professional development participation had the weakest but still significant relationship, with  $r = 0.39$  and  $p = 0.01$ . The findings identify instructional competence as the principal personal factor associated with teaching performance. Bacus et al.'s (2024) conclusion similarly identified systematic lesson planning, implementation, and assessment as major contributors to teaching effectiveness. The significant relationship between self-efficacy and performance also agrees with Gamuza et al. (2025), who found that teachers with greater confidence in their instructional ability received stronger performance ratings. The weaker professional-development correlation may reflect limitations in training continuity, relevance, follow-up, and classroom application rather than an absence of value.

#### 3.8.3 Institutional Dimensions and Performance

Administrative support had the strongest institutional relationship with teaching performance, producing  $r = 0.64$  and  $p < 0.05$ . Laboratory materials showed a weaker but significant relationship, with  $r = 0.41$  and  $p < 0.05$ . Workload management had the weakest relationship, with  $r = 0.28$  and  $p = 0.05$ . The results indicate that leadership and management assistance were more closely associated with performance than physical resources or workload arrangements. The stronger association of administrative support suggests that leadership provides the direction, encouragement, supervision, and professional opportunities needed to improve teaching. Tosun & Bozkurt Bostancı (2024) described school leaders as central to building collaborative cultures that encourage teacher participation and instructional innovation. The results establish a hierarchy in which instructional competence was the most influential personal dimension and administrative support was the most influential institutional dimension.

### 3.9 Predictors of Teaching Performance

#### 3.9.1 Combined Predictive Influence

The multiple-regression model produced a Multiple R of 0.80, indicating a strong positive relationship between the combined predictors and teaching performance. The coefficient of determination was  $R^2 = 0.62$ , meaning that personal professional capacity and institutional factors jointly accounted for approximately 62% of the variance in perceived teaching performance. The adjusted  $R^2$  was 0.61. The model was statistically significant, with  $F = 38.96$  and  $p < 0.05$ , while the remaining 38% of the variance was attributable to factors not examined in the study. The findings show that teaching performance cannot be explained solely by teachers' individual capacities or by school conditions. It is better understood as the product of their interaction. Ibrahim and Aljneibi (2022) similarly found that personal professional characteristics and institutional opportunities jointly influence professional commitment and effectiveness. Strong internal capacity enables teachers to perform, while supportive institutional conditions facilitate or constrain the classroom application of that capacity.

#### 3.9.2 Individual Predictors

Personal professional capacity was the stronger predictor, with an unstandardized coefficient of  $B = 0.90$ , a standard error of 0.14,  $t = 6.59$ , and  $p < 0.05$ . Institutional factors also significantly predicted performance, with  $B = 0.36$ , a standard error of 0.13,  $t = 2.78$ , and  $p = 0.01$ . The constant was reported as -0.55 in the coefficient summary and was not statistically significant, with  $p = 0.23$ . These results indicate that improvement in either predictor was associated with improved teaching performance, although the contribution of personal capacity was substantially greater. The results support Paigalan and Bauyot (2025), who identified leadership, administrative support, and teachers' professional capacity as significant predictors of job performance. The stronger coefficient for personal capacity confirms that internal professional readiness was the leading predictor in the present model. Gamuza et al. (2025) likewise identified self-efficacy, competence, and professional development as major contributors to the teaching performance of Filipino educators.

### **3.10 Proposed Professional Capacity and Institutional Support Enhancement Program**

The findings provided the basis for the Science Teachers' Professional Capacity and Institutional Support Enhancement Program. The program addresses the strong contribution of personal capacity, the importance of administrative support, the limited availability of instructional and laboratory materials, and the need for sustained professional development. It aims to strengthen teaching self-efficacy, instructional competence, participation in science-focused training, administrative responsiveness, laboratory management, and effective use of available instructional resources. The proposed activities include inquiry-based and PPST-aligned instructional workshops, mentoring, peer coaching, demonstration teaching, classroom observation, Learning Action Cell sessions, seminars, external training, regular instructional supervision, feedback conferences, and training in resource improvisation and laboratory utilization. Implementation would involve school heads, master teachers, science coordinators, senior teachers, and DepEd trainers over periods ranging from one month to continuous year-round implementation. Expected outcomes include stronger instructional delivery, higher teaching confidence, sustained professional growth, improved administrative engagement, and increased learner participation in practical science activities. The program also calls for localized instructional materials, science-training modules, improvised teaching aids, and a shared digital repository for lesson plans, videos, and assessment tools. Partnerships with school administrators, parent-teacher associations, universities, colleges, and other organizations would support training, mentoring, resource generation, and knowledge sharing. Monitoring would use classroom observations, PPST-based tools, lesson plans, demonstration-teaching rubrics, coaching records, attendance documents, feedback forms, learner results, and observations of laboratory-resource use. The program is considered feasible because it can operate through existing structures such as Learning Action Cells, In-Service Training, instructional supervision, and the expertise of teachers with advanced qualifications. Its use of established personnel, school-based learning structures, shared resources, and low-cost contextualized materials allows professional and institutional improvements without requiring substantial additional funding.

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## **4. Conclusion & Recommendations**

Public secondary science teachers in the Division of Lanao del Sur I-B were predominantly female, married, academically qualified, and experienced. They demonstrated very high teaching self-efficacy, instructional competence, and PPST-based teaching performance, particularly in classroom management, although participation in professional development was comparatively lower. Institutional support was generally high but remained constrained by inadequate and outdated instructional and laboratory resources. Most personal professional capacity, institutional support, and teaching performance measures did not differ according to demographic characteristics; however, teaching self-efficacy differed by teaching experience, perceptions of institutional support differed by educational attainment, and instructional delivery and learner engagement differed by age. Personal professional capacity and institutional factors were significantly and positively related to teaching performance and jointly explained 62% of its variance, with personal professional capacity emerging as the stronger predictor. These findings support the proposed Science Teachers' Professional Capacity and Institutional Support Enhancement Program.

The Schools Division Office, school administrators, and education program coordinators should sustain teachers' self-efficacy and instructional competence through need-based, science-specific, continuous professional development, graduate-study opportunities, Learning Action Cells, mentoring, peer collaboration, and capacity-building programs aligned with classroom conditions. Veteran teachers and those with advanced qualifications should be engaged as mentors, resource persons, and planning partners. The Division and MBHTE should conduct school-level resource assessments, prioritize the procurement, maintenance, and replacement of instructional and laboratory equipment, ensure equitable access to assessment-preparation materials, and reduce unnecessary administrative burdens. Schools should consistently use PPST data to identify areas for improvement, strengthen leadership and instructional support, improve workload management, and formally implement and evaluate the proposed Professional Capacity and Institutional Support Enhancement Program. Future researchers should examine the variables through experimental or longitudinal studies and test the program in other educational contexts.

The study was limited to survey-based, self-reported perceptions of 50 public secondary science teachers in the Division of Lanao del Sur I-B during School Year 2025–2026. It excluded private-school teachers, elementary teachers, teachers from Lanao del Sur I-A, and other divisions. It examined only selected demographic, personal professional capacity, institutional, and teaching-performance variables; other psychological, socioeconomic, and external community influences were not included. Consequently, the findings describe the participating teachers and should not be generalized to all teachers in Lanao del Sur or other educational settings.

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## **Compliance with ethical standards**

The study complied with institutional ethical requirements and received authorization from the Division Research Office and participating schools. Participation was voluntary, informed consent was obtained, and respondents could withdraw

without penalty. No identifying information was collected, and all responses were coded, securely stored, and used solely for academic purposes. The researcher declares no conflict of interest, acknowledges the contributions of the respondents, school officials, adviser, validators, and other research contributors, and assumes full responsibility for the study's originality, integrity, authorship, and compliance with applicable copyright standards.

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