

School Heads' Leadership Competence, Teacher Professional Development, and Instructional Quality in Mathematics Classroom Performance

Margie Soria Santuyas

Doctorand of Bohol Island State University Main Campus, Bohol, Philippines

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Email of Corresponding Author: margie.santuyas@deped.gov.ph

Abstract

This study examined the predictive influence of school heads' leadership competence, teacher professional development, and instructional quality on students' classroom performance in mathematics in public secondary schools in the Division of Bohol for School Year 2025–2026. Anchored on Transformational Leadership Theory, Instructional Leadership Theory, Human Capital Theory, Constructivist Learning Theory, and the Theory of Planned Behavior, the study employed a quantitative, non-experimental correlational design with a predictive approach. Data were collected through structured questionnaires administered to 136 school heads, 295 mathematics teachers, and 381 students selected through stratified sampling. Instruments were based on DepEd standards and the PISA 2022 Analytical Framework, with reliability confirmed through a Cronbach's alpha of 0.84. Descriptive statistics, Pearson r correlation, and multiple regression analysis were used. Findings revealed that school heads demonstrated high leadership competence, teachers exhibited moderate to high professional development, and instructional quality in mathematics was generally good. Students achieved outstanding classroom performance. Significant relationships were found between leadership competence and teacher professional development, teacher professional development and instructional quality, and leadership competence and instructional quality. However, no significant direct relationships or predictive effects were observed between these variables and students' classroom performance. The results suggest that leadership and professional development influence student outcomes indirectly through instructional processes. The study recommends strengthening instructional leadership, reflective practice, ICT integration, and higher-order thinking strategies in mathematics instruction. This study aligns with SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) by promoting improved teaching quality and professional development. It contributes to educational, institutional, and socio-economic sustainability by enhancing human capital, strengthening governance practices, and supporting continuous improvement in mathematics education.

Keywords: Classroom Performance, Instructional Quality, Leadership Competence, Mathematics Education, Public Secondary Schools, Teacher Professional Development

1. Introduction

Quality education is essential for national development and individual success, with mathematics performance serving as a key indicator of academic achievement due to its links to problem-solving and higher-order thinking (OECD, 2023). In the Philippine context, improving mathematics outcomes remains a priority aligned with DepEd policies and professional standards. Educational leadership, teacher professional development, and instructional quality are critical factors influencing student performance. However, their combined effects on mathematics classroom performance remain underexplored. This study examines how school heads' leadership competence, teacher professional development, and instructional quality predict students' classroom performance in mathematics in public secondary schools in the Division of Bohol for School Year 2025–2026, aiming to inform an evidence-based action plan.

1.1 Background of Mathematics Classroom Performance and Leadership Competence in Public Secondary Schools

Mathematics performance reflects learners' readiness for advanced learning and problem-solving (OECD, 2023). The Department of Education emphasizes improving mathematics outcomes through the K–12 curriculum and professional standards for teachers and school heads. School leadership significantly shapes instructional practices, teacher development, and school climate (Kelly and Kim, 2021). Effective leadership fosters teacher professional development (Borko, 2020; Harris and Jones, 2022), which enhances instructional quality, particularly in STEM areas (Sahlberg, 2021). Leadership practices can either enable or constrain teaching effectiveness (Gurr and Drysdale, 2020). Despite these established relationships, limited studies have examined how leadership competence, teacher professional development, and instructional quality collectively influence mathematics performance.

1.2 Themes on Leadership Competence, Teacher Professional Development, and Instructional Quality in Mathematics

Literature consistently highlights the interconnected roles of leadership, teacher development, and instructional quality in improving academic outcomes. Leadership competence, encompassing instructional and organizational dimensions, is a strong predictor of school performance (Leithwood et al., 2020). Instructional leadership directly influences teaching practices and student achievement (Hallinger and Lu, 2020; Grissom and Loeb, 2021), while transformational leadership enhances teacher performance and organizational commitment (Bass and Avolio, 1994; Joubert and Koen, 2021; Fababier, 2023). Teacher professional development improves pedagogical skills and instructional effectiveness, particularly in mathematics (Darling-Hammond et al., 2020; Nguyen et al., 2020). Constructivist approaches emphasize active learning and scaffolding (Vygotsky, 1978), supported by technology-enhanced engagement (Becker and Cohen, 2022). Instructional quality, defined through cognitive activation, classroom management, and teacher support, is strongly associated with mathematics achievement (Mu, Bayrak, and Ufer, 2022; Liu et al., 2024; OECD, 2023; Schäfer et al., 2024). Classroom performance is influenced by teacher competence, leadership support, and instructional quality (Akpan and Babajide, 2020; Sani, 2022). Leadership acts as a mediating factor linking professional development and instructional practices to student outcomes (Sahlberg, 2021; Gurr and Drysdale, 2020).

1.3 Local, National, and Global Context of Mathematics Performance and Educational Leadership

Globally, PISA 2022 results reveal persistent gaps in mathematics performance, with Filipino students scoring significantly below the OECD average (OECD, 2023; Rappler, 2023; Philstar, 2025). Only a small proportion achieve minimum proficiency, indicating systemic challenges in instructional quality and learning outcomes. National reforms focus on curriculum enhancement, teacher training, and digital literacy to address these gaps. Locally, policies such as Republic Act No. 9155 promote decentralized governance and empower school heads to improve educational quality. DepEd Order No. 42, s. 2017 (PPST) and DepEd Order No. 24, s. 2020 (PPSSH) establish professional standards for teachers and school leaders, emphasizing leadership competence, continuous development, and instructional improvement. The UNESCO Education 2030 Framework reinforces the importance of quality education and lifelong learning (Albert et al., 2023; Balderas et al., 2018).

1.4 Theoretical Foundations of Leadership Competence, Teacher Development, and Mathematics Instruction

This study is grounded in multiple theoretical frameworks. Transformational Leadership Theory highlights leaders' role in motivating and developing teachers (Bass and Avolio, 1994). Instructional Leadership Theory emphasizes guiding teaching and learning processes (Hallinger and Lu, 2020). Human Capital Theory views education and training as investments that enhance productivity and outcomes (Becker and Schultz, 1964). Constructivist Learning Theory explains how learners actively construct knowledge through experience (Vygotsky, 1978). The Theory of Planned Behavior links attitudes, norms, and perceived control to behavioral intentions. These frameworks collectively explain how leadership competence influences teacher development and instructional quality, which in turn affect classroom performance in mathematics.

1.5 Research Gap on the Combined Influence of Leadership Competence, Teacher Professional Development, and Instructional Quality

Although existing studies examine leadership, professional development, and instructional quality independently, there is limited empirical evidence on their combined predictive effects on mathematics classroom performance. Furthermore, localized studies within Philippine public secondary schools, particularly in the Division of Bohol, remain scarce. Addressing this gap is critical to developing context-specific interventions that strengthen leadership practices, enhance teacher development, and improve instructional quality.

1.6 Alignment of the Study with Sustainable Development Goals on Quality Education and Growth

This study aligns primarily with SDG 4 – Quality Education, which promotes inclusive and equitable education and lifelong learning opportunities. It also supports SDG 8 – Decent Work and Economic Growth by strengthening teacher competence and human capital, and SDG 9 – Industry, Innovation and Infrastructure through the promotion of innovative instructional practices and professional development. These alignments are consistent with the UNESCO Education 2030 Framework, which emphasizes the role of empowered teachers and effective leadership in achieving sustainable educational outcomes.

1.7 Contribution of the Study to Educational, Institutional, and Socio-Economic Sustainability

This study contributes to educational sustainability by improving teaching quality and learning outcomes, particularly in mathematics. It supports socio-economic sustainability by enhancing human capital through teacher development and leadership competence. It also contributes to institutional sustainability by strengthening governance frameworks aligned with DepEd policies and standards. Additionally, it promotes innovation and community sustainability by encouraging collaborative leadership, stakeholder engagement, and continuous improvement in educational practices.

2. Material and methods

2.1 Research Design

The study employed a quantitative, non-experimental correlational research design, specifically a predictive design. This approach was used to examine the relationships among school heads' leadership competence, teacher professional development, instructional quality, and learners' classroom performance in mathematics. The design aimed to determine the extent to which leadership competence, teacher professional development, and instructional quality predict learners' classroom performance.

2.2 Locale of the Study

The study was conducted in public secondary schools within the Schools Division of Bohol, one of the twelve divisions in Region VII. The division is composed of three congressional districts and has the highest number of school districts in the region, totaling fifty-eight. The selection of the locale focused on junior and senior high schools within the division to ensure relevance to the study variables.

2.3 Respondents of the Study

The respondents included school heads, junior and senior high school mathematics teachers, and students from public secondary schools in the Division of Bohol. A total of 136 school heads, 295 mathematics teachers, and 381 students participated in the study. These respondents were drawn from the three congressional districts to represent the educational context of the division.

2.4 Sample and Sampling Procedure

The study utilized the Cochran formula at a 95% confidence level, 50% degree of variability, and 5% precision level to determine the sample size. Stratified sampling was employed to ensure proportional representation across the three congressional districts. The sample covered fifty-two school districts across forty-two municipalities and included 136 secondary schools. Mathematics teachers and their students were randomly selected to participate in the study to ensure representativeness and reliability of the data.

2.5 Research Instrument

Data were collected using structured survey questionnaires administered to school heads, teachers, and students. The instrument for school heads consisted of three parts: assessment of leadership competence based on DepEd Order No. 24, s. 2020 and adapted from Lood (2023), covering the domains of leading strategically, managing school operations and resources, focusing on teaching and learning, developing self and others, and building connections; assessment of teacher professional development based on Domain 7 of the Philippine Professional Standards for Teachers (PPST), which includes philosophy of teaching, dignity of teaching as a profession, professional links with colleagues, professional reflection and learning to improve practice, and professional development goals; and assessment of instructional quality in mathematics based on the PISA 2022 Analytical Framework, including teacher support, disciplinary climate, and cognitive activation. The teachers' questionnaire contained the same components as the school heads' instrument, assessing leadership competence, professional development, and instructional quality. The student questionnaire included assessment of instructional quality in mathematics and classroom performance based on academic grades. The instruments were adopted and modified, and pilot-tested among selected respondents to ensure clarity and appropriateness. Reliability testing yielded a Cronbach's alpha of 0.84, indicating good internal consistency. The instruments were validated by a research adviser and statistician prior to administration.

2.6 Data Gathering Procedure

Data collection followed three phases. During the pre-data gathering phase, permission was secured from relevant authorities, including the BISU School of Advanced Studies, the Schools Division Superintendent of Bohol, school principals, and respondents. Consent was obtained prior to participation. In the actual data collection phase, questionnaires were distributed through Google Forms and printed copies, in compliance with DepEd Order No. 009, s. 2005 to avoid class disruption. Respondents were assured of confidentiality and anonymity and were encouraged to answer honestly. In the post-data gathering phase, responses were collected, organized, and prepared for analysis to support interpretation and conclusion of findings.

2.7 Data Analysis Techniques

Data analysis involved the use of weighted mean to determine the levels of school heads' leadership competence, teacher professional development, and instructional quality in mathematics, while arithmetic mean was used to assess students' classroom performance. Descriptive interpretations were applied based on defined scales for each variable. Pearson r correlation was utilized to determine the strength and direction of relationships among variables, while multiple regression analysis was employed to examine predictive relationships. All statistical analyses were conducted using appropriate statistical software to ensure accuracy and reliability of results.

3. Results and Discussion

3.1 Levels of Leadership Competence, Professional Development, Instructional Quality, and Classroom Performance

3.1.1 School Heads' Leadership Competence

The results indicate that school heads demonstrated a high level of leadership competence, with an overall mean of 3.53 interpreted as Career Stage 4. Strong performance was observed in leading strategically, managing school operations and resources, and building connections, all rated at Career Stage 4. However, focusing on teaching and learning and developing self and others were rated at Career Stage 3, indicating slightly lower competence. High scores were noted in planning, stakeholder engagement, and operational management, while lower ratings were observed in research utilization, ICT management, mentoring, and professional networking. These findings suggest that school heads are highly effective in administrative and relational leadership but still developing in instructional and research-based leadership practices. This aligns with Leithwood (2020), emphasizing the importance of evidence-based and participatory leadership, and with SEAMEO INNOTECH (2022) and OECD (2021), which highlight the need for stronger digital leadership. Similarly, findings from the Philippine Institute for Development Studies (2023) and Robinson (2021) stress the importance of instructional leadership, while UNESCO (2021) underscores the role of professional development systems and collaborative networks. DepEd (2021) and Hargreaves (2020) further support the importance of strong stakeholder engagement and collaborative leadership.

3.1.2 Teacher Professional Development

Teachers demonstrated a moderate to high level of professional development, with an overall mean of 3.47 interpreted as Career Stage 3. Strong performance was observed in dignity of teaching and professional collaboration, while philosophy of teaching, reflective practice, and professional development goals were still developing. Teachers actively participated in training and collaboration, but lower ratings were noted in reflective practice, advocacy, and self-directed learning. These results indicate that professional development is present but not yet fully internalized or sustained. This supports OECD (2021), which emphasizes reflection and application in professional learning, and UNESCO (2021), which highlights broader professional engagement and advocacy. Hargreaves (2020) reinforces the importance of collaborative leadership, while Robinson (2021) stresses the role of reflective practice in improving teaching effectiveness. SEAMEO INNOTECH (2022) further supports the need for self-directed and technology-enabled professional learning.

3.1.3 Instructional Quality in Mathematics

Instructional quality in mathematics was rated as generally good, with an overall mean of 3.44. Teacher support obtained the highest rating, reflecting strong assistance and engagement with students, while disciplinary climate received the lowest rating, indicating challenges in maintaining focus in digital environments. Cognitive activation in encouraging mathematical thinking and fostering reasoning was rated as good, showing moderate success in promoting higher-order thinking. These findings indicate that teachers are effective in supporting students and contextualizing learning but need to strengthen classroom management in digital settings and enhance higher-order thinking skills. This aligns with OECD (2021) and Department of Education (2022), which emphasize the role of teacher support in student achievement. UNESCO (2023) highlights challenges in digital classroom management, while recent mathematics education research (2020–2024) supports the importance of real-world problem-solving in cognitive activation.

3.1.4 Students' Classroom Performance in Mathematics

Students demonstrated outstanding classroom performance, with mean grades of 93.09 during the midterm and 93.92 during the final grading period. Most students achieved outstanding ratings, with a noticeable improvement from midterm to final, while very few students fell below satisfactory levels. These results suggest strong mastery of mathematical competencies and effective instructional practices. This is consistent with OECD (2023), which emphasizes the role of structured instruction and feedback, and Praetorius et al. (2020), who highlight the impact of instructional quality on academic outcomes. Hattie (2020) and Zhu and Kaiser (2025) emphasize the importance of feedback and instructional support in improving performance. Local studies by Baluyos et al. (2024) and DepEd (2022) also confirm that classroom management, assessment, and differentiated instruction enhance student achievement.

3.2 Relationships Among Leadership, Professional Development, Instructional Quality, and Performance

3.2.1 Leadership Competence and Teacher Professional Development

The analysis revealed a high positive correlation ($r = 0.769$, $p < .001$) between leadership competence and teacher professional development, indicating a significant relationship. This suggests that effective leadership strongly supports teacher development by fostering motivation and participation in professional learning. This aligns with Nguyen et al. (2021), Liebowitz & Porter (2019), Tian & Huber (2020), and Liu & Hallinger (2020), which emphasize the role of leadership in shaping teacher learning and collaboration.

3.2.2 Teacher Professional Development and Instructional Quality

A high positive correlation ($r = 0.740$, $p < .001$) was found between teacher professional development and instructional quality, indicating a significant relationship. This indicates that professional development enhances instructional practices and teaching effectiveness. This is supported by Darling-Hammond et al. (2020), Hill et al. (2020), Kraft et al. (2021), and Opfer & Pedder (2021), which highlight the importance of sustained professional learning in improving teaching quality.

3.2.3 Instructional Quality and Students' Classroom Performance

The relationship between instructional quality and students' classroom performance was very low and not significant ($r = -0.022$, $p = 0.717$). This suggests that instructional quality alone does not directly predict immediate student performance. This aligns with OECD (2020), Scherer et al. (2022), Praetorius et al. (2020), and Hattie (2023), which emphasize that student achievement is influenced by multiple factors and that instructional effects may be indirect and long-term.

3.2.4 Leadership Competence and Students' Classroom Performance

The relationship between leadership competence and students' performance was very low and not significant ($r = -0.019$, $p = 0.761$). This indicates that leadership influences student outcomes indirectly rather than directly. This supports Grissom et al. (2021), Liebowitz & Porter (2019), Liu & Hallinger (2020), OECD (2020), and Scherer et al. (2022), which highlight the mediating role of teacher and classroom factors.

3.2.5 Teacher Professional Development and Students' Classroom Performance

The relationship between teacher professional development and students' performance was very low and not significant ($r = -0.032$, $p = 0.600$). This suggests that the impact of professional development on student performance is indirect and gradual. This aligns with Kraft et al. (2021), Darling-Hammond et al. (2020), OECD (2020), and Scherer et al. (2022), which emphasize the delayed and mediated effects of professional learning.

3.2.6 Leadership Competence and Instructional Quality

A moderate positive correlation ($r = 0.571$, $p < .001$) was found between leadership competence and instructional quality, indicating a significant relationship. This suggests that leadership plays an important role in shaping instructional practices. This is supported by Grissom et al. (2021), Liu & Hallinger (2020), Nguyen et al. (2021), and Praetorius et al. (2020), which emphasize leadership's role in improving teaching quality and school environments.

3.3 Predictive Influence of Leadership, Professional Development, and Instructional Quality

The regression analysis revealed that leadership competence, teacher professional development, and instructional quality did not significantly predict students' classroom performance in mathematics, with the model explaining only a negligible variance ($R^2 = 0.001$). None of the predictors were statistically significant. These findings indicate that student performance is influenced by multiple factors beyond the variables examined. This aligns with OECD (2020), Scherer et al. (2022), Grissom et al. (2021), Kraft et al. (2021), City et al. (2020), and Leithwood et al. (2020), which emphasize the indirect and multifaceted nature of leadership and instructional effects on student outcomes. The results highlight that leadership and professional development contribute to long-term improvements through teacher practices and school conditions rather than direct immediate effects on student performance.

4. Conclusion & Recommendations

The study concludes that school heads demonstrate high leadership competence, particularly in strategic, administrative, and relational domains, while teachers exhibit moderate to high professional development characterized by strong collaboration and professionalism, and instructional quality in mathematics is generally good with strong teacher support. Students achieved outstanding classroom performance in mathematics with slight improvement over time, indicating effective instructional practices and learning environments. Significant relationships were found between leadership competence and teacher professional development, teacher professional development and instructional quality, and leadership competence and instructional quality, while no significant direct relationships were observed between leadership competence, teacher professional development, instructional quality, and students' classroom performance. The findings suggest that leadership and professional development influence instructional quality and student outcomes indirectly and over time, highlighting the need to strengthen instructional leadership, research utilization, ICT integration, reflective practice, and higher-order thinking skills for more sustained and meaningful educational improvement (Nguyen et al., 2021; Liu & Hallinger, 2020; Darling-Hammond et al., 2020; Kraft et al., 2021; Elmore, 2000).

Based on the findings, it is recommended that school heads strengthen instructional leadership through enhanced mentoring, data-driven decision-making, ICT integration, and support for research and innovation; teachers be encouraged to engage in continuous, self-directed professional development through reflective practice, action research, and participation in professional learning communities; instructional practices in mathematics emphasize higher-order thinking, reasoning, real-life problem-solving, and improved classroom management in technology-rich environments; and DepEd

policymakers sustain evaluation of leadership, professional development, and instructional strategies to ensure alignment with learning goals. Future researchers are encouraged to explore additional factors influencing students' mathematics performance, including learner-related and contextual variables, and to consider mixed-methods approaches for deeper understanding of instructional and leadership dynamics (Darling-Hammond et al., 2020; Kraft et al., 2021; Liu & Hallinger, 2020; Nguyen et al., 2021).

The study is limited by its focus on selected variables—school heads' leadership competence, teacher professional development, and instructional quality—which did not significantly predict students' classroom performance in mathematics, suggesting that other factors such as prior knowledge, motivation, cognitive abilities, and environmental influences may have stronger effects; it is also confined to public secondary schools in the Division of Bohol for School Year 2025–2026, which may limit generalizability, and relies primarily on quantitative survey data, which may not fully capture deeper contextual and qualitative aspects of teaching, learning, and leadership processes.

Compliance with ethical standards

The study adhered to standard research protocols by securing permission from appropriate institutional authorities prior to data collection and obtaining informed consent from all participants. Respondents were assured of confidentiality and anonymity, and participation was voluntary, with data collected and handled in a manner consistent with the procedures described in the study.

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