American Journal of Education and Technology (AJET)

ISSN: 2832-9481 (ONLINE)

VOLUME 5 ISSUE 4 (2026)



PUBLISHED BY

E-PALLI PUBLISHERS, DELAWARE, USA

American Journal of Education and Technology (AJET)

Volume 5 Issue 4, Year 2026
ISSN: 2832-9481 (Online)
DOI: https://doi.org/10.54536/ajet.v5i4.8989
https://journals.e-palli.com/home/index.php/ajet

Administrative Interventions in Utilizing English as a Medium in Teaching Mathematics, Science, and Technology and Student Achievement in the Division of Quezon

Ranilo H. Pardito[1*]

Article Information

Received: August 27, 2026
Accepted: November 12, 2026
Published: November 20, 2026

Keywords

Administrative Intervention, English As A Medium of Instruction, Instructional Leadership, Mathematics Achievement, Science Technology Achievement

ABSTRACT

The study sought to determine the relationship between Secondary School Heads' Administrative Interventions in utilizing English as a medium in teaching Mathematics and Science and Technology and Students' Achievement in the Division of Quezon. Specifically, it aimed to answer the following research questions: (1) What is the profile of the Secondary School Heads in terms of educational attainment, length of service and type of school assignment (2) What is the level of administrative intervention among secondary school heads in the Division of Quezon? (3) What is the level of students' achievement in Math and Science? (4) Is there a significant difference in the level of administrative intervention when secondary school heads are grouped according to educational attainment, length of experience and type of school assignment and (5) Is there a significant relationship between administrative intervention and students' achievement? The study was conducted at the 43 municipalities of Quezon Province and included public and private secondary schools. The respondents consisted of 229 secondary school heads from 144 public and 85 private schools. The study employed the descriptive- correlational research design to examine the relationship between administrative interventions and achievement tests. Data were gathered using the duly validated instruments focused on classroom monitoring and observation, lesson planning and instructional materials preparation, facilitation of classroom activities and delivery of instructions, and classroom testing and evaluation. The instruments underwent intensive consultation and validation with experts and practitioners in educational management. Students' achievement data for School Year 2024–2025 were also utilized. The statistical tools employed included the mean, independent-samples t-test, analysis of variance (ANOVA), Pearson's product-moment correlation coefficient, and stepwise regression. Data were gathered using validated survey instruments and students' achievement results. Findings revealed that the overall level of administrative intervention was high, with lesson planning and instructional materials preparation obtaining the highest weighted mean (AWM = 4.13). Students' achievement in Mathematics and Science and Technology was generally classified as Moderate across districts and school types. Public schools recorded higher mean achievement scores than private schools in both subject areas. The reported correlation coefficients also indicated strong positive relationships between administrative intervention and achievement in Mathematics and Science and Technology. The findings underscore the importance of strengthening instructional supervision, teacher support, lesson planning, assessment practices, and professional development to improve learning outcomes. This study may serve as a basis for developing school-based capacity-building initiatives that promote effective content instruction through the use of English as a medium of instruction.

INTRODUCTION

English plays a significant role in globalization, serving as an important language for international communication, academic exchange, scientific advancement, and professional collaboration. Proficiency in English can expand individuals' access to educational opportunities and employment in an increasingly interconnected world. In multilingual societies such as the Philippines, English also serves as an important language in education, business, science, technology, and international relations. However, the ability to communicate effectively in English remains a concern in educational settings, particularly when teachers are expected to explain specialized concepts and facilitate learning across different subject areas.

The Philippines has a rich linguistic landscape characterized by numerous regional languages and varieties. Filipino and English hold official-language status under the 1987 Constitution, while regional languages serve as auxiliary official languages in their respective regions and may be used as auxiliary media of instruction. The country's language policies reflect continuing efforts to balance national communication, regional linguistic diversity, and the development of English proficiency. The Department of Education's 1987 Policy on Bilingual Education emphasized developing competence in both Filipino and English while recognizing the importance of regional languages in education (Department of Education [DepEd], 1987). These policies demonstrate that language education in the Philippines involves not only the acquisition of linguistic skills but also questions

[1] Special Education Teacher, Rising Star SPED Academy, California, USA
[*] Corresponding author's e-mail: ranipardito@gmail.com

of educational access, cultural identity, and effective classroom communication.

The relationship between language and learning is particularly important in subjects such as science and mathematics, where students must understand specialized vocabulary, interpret explanations, communicate reasoning, and solve problems. When English is used as the medium of instruction, teachers need to communicate subject-specific information accurately and make complex concepts accessible to learners with varying levels of English proficiency. Research on mathematics instruction through English-medium and content-integrated approaches highlights the importance of examining how language demands interact with subject learning (Ruiz-Cecilia *et al.*, 2023). Similarly, UNESCO (2024) emphasizes the educational value of multilingual approaches that build on learners' existing linguistic resources while supporting the acquisition of additional languages. These perspectives suggest that effective teaching requires attention to both content knowledge and the language through which that knowledge is communicated.

The challenge of teaching academic content through English is not limited to the Philippines. In educational systems where English is an additional language for teachers or learners, language proficiency, classroom interaction, and instructional practices may influence how effectively subject matter is explained and understood. Research on English-medium instruction in secondary science classrooms has examined teacher–student interaction and the opportunities students have to participate meaningfully in classroom discussions (2021 study on classroom interaction in English-medium secondary science education). Such research underscores the importance of examining English-medium instruction not merely as a language policy but also as a pedagogical practice requiring appropriate communication strategies, instructional support, and attention to learners' needs.

Teachers' attitudes, beliefs, and perceptions toward English as a medium of instruction are therefore important considerations in educational practice. These perspectives may influence their willingness to use English, their confidence in explaining subject matter, and their decisions about when to employ clarification, scaffolding, or other instructional strategies. However, English proficiency should not be treated as the sole determinant of teaching effectiveness. Content knowledge, pedagogical competence, familiarity with learners' linguistic backgrounds, and the availability of instructional resources also contribute to successful teaching. Consequently, teacher preparation should develop not only subject-specific knowledge and skills but also the capacity to communicate academic content clearly and respond appropriately to learners' language needs.

The role of school heads is equally important in establishing conditions that support effective teaching and learning. As instructional leaders, school heads are involved in monitoring classroom instruction, providing feedback, supporting teacher development, facilitating curriculum implementation, and identifying areas in which teachers require additional assistance. Adams and Hamdhiyya (2022), in their systematic review of research on leadership in science instruction, identified several leadership practices associated with supporting science teaching, including curriculum monitoring, resource provision, and professional development. Ferrell *et al.* (2023) likewise examined administrators' perceptions of science instruction and highlighted differences in how school leaders understand and support evidence-based teaching practices. These findings reinforce the importance of examining school heads' perceptions and beliefs when investigating instructional supervision and teacher support.

In the Philippine context, language-of-instruction policies have continued to evolve in response to educational priorities and the linguistic diversity of learners. Executive Order No. 210, issued in 2003, established a policy to strengthen the use of English as a medium of instruction in the educational system. Subsequently, DepEd Order No. 16, s. 2012, provided guidelines for implementing Mother Tongue-Based Multilingual Education. More recently, Republic Act No. 12027 (2024) discontinued the mandatory use of the mother tongue as the medium of instruction from Kindergarten to Grade 3, while allowing its optional implementation in qualifying monolingual classes. DepEd Order No. 020, s. 2025, subsequently established the policy on the medium of instruction for Kindergarten to Grade 3 beginning School Year 2025–2026. These developments demonstrate the need for school leaders and teachers to understand applicable language policies and implement them in ways that support effective instruction and learning.

Despite the importance of English in academic communication and the instructional responsibilities of school heads, questions remain about how school leaders perceive teachers' use of English as a medium of instruction, particularly in science, mathematics, technology, and other content areas. School heads' beliefs may influence their expectations for teachers' communication skills, their approaches to classroom observation, and the professional development opportunities they prioritize. Understanding these perceptions is important because instructional supervision involves more than checking lesson plans, classroom activities, and assessment procedures; it also requires determining whether instructional practices enable learners to understand and engage with the subject matter.

In view of these considerations, the present study investigates school heads' perceptions and beliefs regarding the use of English as a medium of instruction. Specifically, it seeks to understand how school heads view teachers' English-language competence, the role of English in teaching content-area subjects, and the implications of these perceptions for instructional supervision and professional development. By examining these perspectives, the study aims to provide evidence that

may inform teacher preparation, instructional leadership, and school-based capacity-building initiatives. Ultimately, the study recognizes the importance of aligning language competence, subject-matter expertise, and instructional leadership to promote meaningful teaching and learning.

LITERATURE REVIEW

Historical Development of Philippine Education

The development of Philippine education has been shaped by successive historical, political, and cultural transformations that influenced the country's educational institutions, curriculum, language policies, and instructional practices. Before Spanish colonization, education in the Philippines was informal, community-based, and closely associated with daily living. Parents, elders, and tribal tutors transmitted practical knowledge, cultural traditions, social values, and livelihood skills to younger generations. Indigenous writing systems, including Baybayin, also reflected the existence of established systems of communication and knowledge transmission (Alzona, 1932; National Museum of the Philippines, 2014).

With the arrival of Spanish colonizers, education gradually became more formalized through the establishment of schools and universities, primarily under the supervision of religious orders. Early educational institutions emerged in Cebu in 1565, while the University of Santo Tomas was established in 1611. A significant educational development during this period was the Educational Decree of 1863, which provided for the establishment of primary schools for boys and girls in every town and introduced provisions for teacher preparation. Despite these developments, access to education and curricular content remained strongly influenced by colonial religious and administrative priorities. Following Spanish rule, the First Philippine Republic recognized the importance of public education through the Malolos Constitution of 1899. However, the Philippine–American War disrupted the development of a unified national educational system.

During the American colonial period, substantial reforms transformed the Philippine educational system. Act No. 74 (1901) established a centralized public education system and expanded access to public schooling. English was introduced as the principal medium of instruction, while American teachers, popularly known as Thomasites, helped address the shortage of qualified teachers. The establishment of the Philippine Normal School in 1901 and the University of the Philippines in 1908 further strengthened teacher education and higher education. Consequently, English became deeply embedded in Philippine education and influenced curriculum development, classroom communication, instructional materials, and assessment practices.

Following World War II, educational administration underwent several organizational changes. The Department of Instruction was renamed the Department of Education in 1947. During the Marcos administration, Presidential Decree No. 1 (1972) reorganized the executive branch, while Presidential Decree No. 1397 (1978) transformed the Department of Education and Culture into the Ministry of Education and Culture. Subsequently, the Education Act of 1982, or Batas Pambansa Blg. 232, established a comprehensive framework for formal and nonformal education and clarified the responsibilities of educational institutions, administrators, teachers, and other personnel.

The 1987 Constitution provided the foundation for contemporary Philippine education by recognizing the roles of Filipino and English in the educational system. Subsequent legislation strengthened educational access and institutional governance. Republic Act No. 6655 (1988) established free public secondary education, while Republic Acts Nos. 7722 and 7796 (1994) created the Commission on Higher Education and the Technical Education and Skills Development Authority, respectively. Moreover, Republic Act No. 9155 (2001), otherwise known as the Governance of Basic Education Act, strengthened school-based management and defined the leadership responsibilities of school heads in ensuring effective basic education delivery.

Language policies continued to evolve in response to the country's multilingual environment and changing educational priorities. Executive Order No. 210 (2003) promoted the strengthening of English as a medium of instruction. Later, DepEd Order No. 16, s. 2012, established guidelines for implementing Mother Tongue-Based Multilingual Education (MTB-MLE). More recently, Republic Act No. 12027 (2024) discontinued the mandatory use of the mother tongue as the medium of instruction from Kindergarten to Grade 3 while allowing its optional use in qualifying monolingual classes. DepEd Order No. 020, s. 2025, subsequently provided guidance on the medium of instruction for these grade levels beginning School Year 2025–2026. Collectively, these developments illustrate the continuing effort to balance English proficiency, Filipino language development, learners' comprehension, cultural diversity, and educational achievement.

English as a Medium of Instruction in Philippine Education

English as a Medium of Instruction (EMI) refers to the use of English to teach academic subjects other than English in educational settings where English is not the first language of the majority of the population. Macaro (2018) explained EMI within the broader context of educational policy and classroom practice, emphasizing the relationship between language use, content learning, teacher preparation, and student experiences. The implementation of EMI therefore involves more than the use of English during classroom discussions; it also requires teachers to communicate disciplinary concepts, explain academic processes, facilitate student participation, and assess learning through an additional language.

In Philippine education, English has historically

served as an important language for teaching, learning, assessment, and academic communication, particularly in science and mathematics. Learners are expected to understand technical vocabulary, interpret written problems, follow explanations, analyze information, and communicate their reasoning. These demands make language proficiency an important consideration in the delivery of content instruction. However, proficiency in English should not be considered the sole determinant of academic achievement because learners' prior knowledge, instructional experiences, language backgrounds, and access to learning resources also influence their performance.

Canilao (2018), in English in the Teaching of Mathematics: Policies, Realities, and Opportunities, examined the relationship between language policies and actual classroom practices in Philippine mathematics education. The study highlighted the complexity of implementing English as the prescribed medium of instruction in multilingual classrooms. Although English plays an important role in mathematics discourse, academic materials, and assessment, teachers and learners may also use Filipino, Tagalog, or Taglish to clarify mathematical concepts and facilitate classroom communication. This situation demonstrates that the language prescribed by educational policies does not always correspond to the language practices that emerge during actual instruction. It also suggests that learners' comprehension and participation should be considered when determining the appropriate use of instructional languages.

These observations are relevant to the present study because science and mathematics require learners to understand both conceptual content and the language through which such content is communicated. In particular, mathematical problem-solving involves interpreting questions, understanding relationships among quantities, identifying relevant information, and explaining solutions. Similarly, science instruction requires learners to understand specialized vocabulary, interpret scientific explanations, and communicate observations and conclusions. Therefore, school heads and teachers need to consider how English proficiency and instructional language practices influence learners' opportunities to understand academic content.

Teacher Competence and Instructional Strategies in EMI

The successful implementation of EMI depends not only on language policies but also on teachers' pedagogical competence, disciplinary knowledge, and ability to address learners' language-related needs. Richards and Pun (2022) examined teacher strategies in implementing English-medium instruction and challenged the assumption that English proficiency alone determines the effectiveness of EMI. They discussed the cognitive, genre-related, and academic task dimensions of disciplinary teaching and emphasized the importance of disciplinary literacy in helping learners understand and engage with subject content. Their discussion indicates that teachers must be able to explain complex concepts, guide learners through discipline-specific academic tasks, and provide appropriate language support. The authors also emphasized the importance of professional development in preparing teachers to manage the linguistic and pedagogical demands of EMI.

Similarly, Prabjandee and Nilpirom (2022) examined pedagogical challenges encountered by teachers implementing EMI, particularly when institutions require teachers to transition to English-medium instruction without adequate consultation, preparation, and professional development. Their study presented the 4E framework as a guide for improving EMI pedagogy. The framework includes embracing EMI with appropriate attitudes, planning EMI lessons, executing lessons through suitable instructional strategies, and engaging in reflective practice. These recommendations emphasize that effective EMI implementation requires systematic lesson preparation, appropriate scaffolding, continuous monitoring of student understanding, and reflection on instructional effectiveness.

The 4E framework is particularly relevant to science and mathematics instruction because teachers must communicate abstract concepts and technical information in ways that learners can understand. For example, teachers may introduce unfamiliar academic vocabulary before presenting a lesson, use diagrams and illustrations to explain scientific processes, demonstrate mathematical procedures step by step, and provide opportunities for students to explain their answers. Through these practices, teachers can maintain academic rigor while addressing the language demands of content learning.

Further support for integrating language and content instruction is provided by the National Clearinghouse for English Language Acquisition (NCELA, 2021), which discussed effective instructional practices for teaching mathematics to English learners. The practice brief emphasized the importance of maintaining mathematical rigor while providing appropriate language support. It identified meaningful classroom interactions, explicit attention to mathematical language, and opportunities for learners to explain and justify their reasoning as important instructional considerations. Visual representations, structured discussions, vocabulary development, and teacher modeling can help learners understand mathematical concepts while developing the language needed to communicate their thinking.

These recommendations are consistent with the need to provide differentiated instruction in multilingual classrooms. Teachers may use visual aids, concrete examples, think-aloud strategies, guided practice, graphic organizers, and explicit vocabulary instruction to make subject content more accessible. Such strategies are especially important when learners encounter unfamiliar terminology or complex written problems. Accordingly, the integration of language support into science and mathematics instruction should be considered an

essential component of effective EMI pedagogy rather than an additional instructional activity.

Ruiz-Cecilia *et al.* (2023), in a systematic review of mathematics teaching through Content and Language Integrated Learning (CLIL), Content-Based Instruction (CBI), and EMI, further emphasized the relationship between language and mathematical learning. Their review provided a basis for understanding how different approaches integrate subject content and language development. Similarly, Morata *et al.* (n.d.) examined mathematics teachers' experiences with language use and changes in the medium of instruction, highlighting the relevance of teacher perspectives and classroom language practices. In the Philippine context, Bibon (2022) investigated the relationship between science teachers' instructional practices and learners' academic achievement. Collectively, these studies support the importance of examining the relationship among instructional language, teacher competence, pedagogical approaches, and subject learning.

Language Proficiency and Student Achievement in EMI

The relationship between language proficiency and academic achievement has been examined in different educational contexts, particularly in countries where English is not the primary language of learners. Historical studies by Stoddart (1986), Dendir (1981), and Tekeste (1986) discussed educational challenges associated with the use of English as the language of instruction in Ethiopia. These studies provide historical perspectives on the potential difficulties that arise when the language prescribed by educational policies does not sufficiently correspond to learners' linguistic abilities. Although the Ethiopian educational context differs from that of the Philippines, the studies highlight the importance of considering language accessibility when implementing English-medium education.

More recent evidence is provided by Feng *et al.* (2023), who systematically reviewed the determinants of students' academic success in EMI classes. Their review examined factors associated with student achievement and highlighted the importance of English language competence and other academic and learner-related characteristics. The findings reinforce the view that successful participation in EMI requires attention to the linguistic and academic demands placed on learners. In this regard, English proficiency should be considered alongside students' prior knowledge, learning motivation, academic confidence, and opportunities for instructional support.

The findings of Canilao (2018), Richards and Pun (2022), and Prabjandee and Nilpirom (2022) further suggest that the effectiveness of EMI cannot be understood solely through the prescribed language of instruction. Rather, it requires an examination of how teachers communicate academic concepts, how learners process subject-specific language, and how schools support teachers in addressing language-related difficulties. Thus, the relationship between EMI and student achievement should be examined within the broader context of teaching quality, instructional materials, learner characteristics, and school leadership.

English-Medium Instruction and Mathematics and Science Education

The relationship between EMI and subject achievement is particularly important in mathematics and science because these disciplines require learners to interpret technical language, understand abstract concepts, and apply knowledge to solve problems. In mathematics, learners must interpret word problems, recognize mathematical relationships, understand symbols, and communicate their solutions. In science, they must understand specialized terminology, interpret explanations, analyze evidence, and describe scientific processes. Consequently, difficulties in understanding the language of instruction may affect learners' participation and their ability to demonstrate subject knowledge.

Canilao (2018) demonstrated that language practices in Philippine mathematics classrooms may involve the strategic use of English and local languages. Such practices suggest that teachers need to consider learners' linguistic backgrounds when presenting mathematical concepts and facilitating discussions. The use of familiar languages to clarify difficult concepts, when appropriate under the applicable language policy, may help learners develop conceptual understanding while continuing to engage with English academic terminology. This approach does not necessarily require abandoning English as the instructional language; rather, it recognizes the importance of making academic content comprehensible.

The NCELA (2021) mathematics teaching practice brief similarly emphasized that language development can be integrated into mathematics instruction without reducing the intellectual demands of the subject. Teachers may introduce important vocabulary, use visual representations, model mathematical reasoning through think-aloud strategies, and provide structured opportunities for learners to explain their solutions. These strategies allow learners to develop mathematical understanding while acquiring the language needed to participate in academic discussions.

Richards and Pun (2022) further emphasized disciplinary literacy, suggesting that teachers must understand the language structures, academic tasks, and cognitive demands associated with their respective subject areas. In science, for example, learners need support in interpreting scientific texts, explaining cause-and-effect relationships, and communicating observations. In mathematics, they need opportunities to interpret problems, justify procedures, and explain numerical relationships. Therefore, effective EMI requires teachers to integrate language scaffolding with subject-specific instructional strategies.

Prabjandee and Nilpirom (2022) also highlighted the

importance of lesson planning, instructional scaffolding, and reflective practice in EMI implementation. Teachers who anticipate potential language difficulties can prepare vocabulary activities, visual materials, guided questions, and differentiated learning tasks before instruction. They can also monitor learners' responses and modify their teaching approaches when students demonstrate difficulties understanding the lesson. These practices are particularly important in science and mathematics, where language comprehension and conceptual understanding are closely connected.

Taken together, these studies indicate that effective EMI implementation requires an integrated approach to language and content instruction. Teachers need adequate preparation, appropriate instructional resources, and continuous professional development to address the linguistic and cognitive demands of their subjects. This also highlights the responsibility of school administrators to provide instructional guidance, professional support, and opportunities for collaborative planning.

Instructional Leadership and School Improvement

The implementation of effective instruction depends not only on teachers' classroom practices but also on the quality of school leadership. School heads play an important role in establishing instructional priorities, monitoring curriculum implementation, supporting teacher development, and ensuring that teaching and learning resources are appropriately utilized. Through instructional supervision, classroom observation, lesson-plan evaluation, instructional feedback, and professional development, school heads help create an environment that promotes effective teaching and continuous improvement.

Foundational studies by Hallinger and Murphy (1985), Cotton (2003), and Waters *et al.* (2004) emphasized the importance of instructional leadership, clear school goals, monitoring of teaching and learning, and support for teacher development. Their contributions provide a foundation for understanding how school leaders influence instructional quality through the establishment of shared expectations, systematic supervision, and organizational support. Similarly, Fullan (1991) emphasized the importance of educational change, collaboration, and shared responsibility in improving school performance. Schmoker (2004) also highlighted the value of collaborative professional learning, evidence-based instructional improvement, and the systematic examination of teaching practices.

Within the context of EMI, these leadership responsibilities extend to ensuring that teachers are adequately prepared to deliver content through English. School heads need to understand the instructional challenges associated with language proficiency, disciplinary vocabulary, learner comprehension, and assessment. They may support teachers through targeted professional development, collaborative lesson planning, classroom observation, constructive feedback, and the provision of appropriate instructional materials. In this regard, instructional leadership serves as an important mechanism for translating language policies into effective classroom practices.

Richards and Pun (2022) and Prabjandee and Nilpirom (2022) provide additional support for this perspective by emphasizing teacher preparation, lesson planning, scaffolding, and reflective practice. Their discussions suggest that the implementation of EMI should not be viewed solely as an individual teacher responsibility. Rather, it requires institutional support and a school environment that encourages professional collaboration and instructional development. School heads therefore have an important role in identifying teachers' professional needs and facilitating appropriate interventions.

Recent empirical research has further examined the relationship between school leadership and instructional improvement. Ramos and Bauyot (2024) investigated school leadership and professional development in the Schools Division of Panabo City, emphasizing the importance of supportive leadership, collaboration, resource provision, and continuous professional learning. Similarly, Godes and Dioso (2024) examined school heads' instructional supervisory practices and teachers' performance and reported a significant relationship between these variables. These findings support the importance of systematic supervision and administrative support in promoting teacher effectiveness.

Ferrell *et al.* (2023) explored administrators' capacity to support reform-oriented science instruction, emphasizing the importance of school leaders' knowledge, beliefs, and understanding of instructional improvement. This perspective is particularly relevant to EMI because school administrators must understand the instructional demands of science education and the challenges teachers encounter when communicating technical concepts through English. School heads who recognize these challenges may be better positioned to provide appropriate professional support and instructional resources.

Moreover, Özdemir *et al.* (2024) reviewed 144 empirical articles concerning school leadership and student achievement and identified instructional leadership as a frequently examined leadership model. Shen and Wu (2025), in a multivariate meta-analysis of 42 empirical studies, reported positive relationships between principal leadership and student achievement, although the results varied according to research methods, outcome measures, and analytical approaches. Hallinger *et al.* (2025), in a meta-analytic review of 68 quantitative studies, also reported a significant relationship between principal instructional leadership and teacher attitudes.

Collectively, these studies reinforce the importance of school leadership in establishing conditions that support effective teaching, professional learning, and student achievement. Nevertheless, leadership should not be considered the sole determinant of educational outcomes. Student performance may also be influenced

by learner characteristics, socioeconomic conditions, teacher competence, instructional resources, curriculum implementation, and the language demands of academic subjects. Accordingly, the present study considers instructional leadership as an important organizational factor that may support effective EMI implementation and contribute to improved teaching and learning.

School Heads' Perceptions and Administrative Interventions in EMI

School heads' perceptions and beliefs about EMI are important because they influence how educational policies are interpreted, implemented, supervised, and supported at the school level. Their understanding of English proficiency, subject-specific language requirements, teacher competence, and learner comprehension may shape their decisions regarding instructional supervision and professional development. School heads who recognize the challenges of EMI may be more likely to provide targeted assistance to teachers, while those who focus primarily on policy compliance may give less attention to the pedagogical and linguistic support required in multilingual classrooms.

Canilao (2018) demonstrated the complexity of implementing language policies in Philippine mathematics classrooms, where prescribed instructional languages and actual classroom communication may differ. Richards and Pun (2022) emphasized that EMI requires disciplinary literacy and appropriate teacher preparation rather than English proficiency alone. Similarly, Prabjandee and Nilpirom (2022) identified the importance of positive attitudes, systematic lesson planning, instructional scaffolding, and reflective practice. These perspectives suggest that school heads need to understand EMI as both a language-related and an instructional concern.

In this regard, administrative interventions may include professional development programs focused on academic English, subject-specific vocabulary, content-based instructional strategies, and classroom communication. School heads may also encourage teachers to prepare EMI lesson plans that incorporate visual aids, guided questioning, think-aloud demonstrations, vocabulary instruction, and opportunities for collaborative learning. Regular classroom observations and constructive feedback can help determine whether teachers are effectively integrating language support into science and mathematics instruction.

The 4E framework proposed by Prabjandee and Nilpirom (2022) may also serve as a useful reference for designing school-based professional development. School heads may encourage teachers to develop positive attitudes toward EMI, prepare appropriate lesson plans, implement lessons using instructional scaffolds, and engage in reflective practice. These activities may be incorporated into learning action cells, department meetings, peer coaching, and other school-based professional learning initiatives.

Furthermore, the mathematics teaching practices discussed by NCELA (2021) provide practical examples that school administrators may consider when supporting teachers. These include explicit vocabulary instruction, visual representations, structured mathematical discussions, and opportunities for learners to explain their reasoning. Such approaches may be adapted to science instruction through diagrams, demonstrations, scientific vocabulary activities, and guided explanations of scientific concepts.

However, the appropriateness and effectiveness of these interventions should be determined by the actual needs of teachers and learners in the research setting. School heads' perceptions should therefore be examined in relation to their supervisory practices, administrative decisions, and the academic outcomes of students. This approach provides a basis for identifying interventions that respond to the actual challenges encountered in implementing EMI.

Student Achievement and National Assessment Practices

Student achievement is an important indicator of the effectiveness of educational programs, instructional practices, and school improvement initiatives. Achievement assessments provide information about learners' attainment of curriculum standards, identify areas requiring additional instruction, and help educational institutions evaluate the effectiveness of teaching and learning. In the Philippine basic education system, the National Achievement Test (NAT) forms part of the Department of Education's national assessment framework.

DepEd Order No. 55, s. 2016, established policy guidelines for the National Assessment of Student Learning under the K to 12 Basic Education Program. The assessment framework provides mechanisms for evaluating learners' academic performance and generating information that can support educational planning and instructional improvement. Over time, national assessments have undergone changes in target grade levels, administration procedures, assessment modalities, and testing schedules. Therefore, historical references to the National Elementary Achievement Test and National Secondary Achievement Test should be distinguished from the current NAT framework.

Historical diagnostic-test results included in the original study provide an earlier perspective on achievement challenges in Philippine education. Grade 4 students obtained an overall score of 39.99% in the June 2002 National Diagnostic Test and 43.55% in the March 2003 National Achievement Test. First-year secondary students obtained 28.04% and 36.13%, respectively. In English, the reported scores were 42.14% and 41.80% for Grade 4 and 29.67% and 41.48% for first-year secondary students. These results may provide historical context for discussing academic performance. However, the figures should be retained only when the original Department of Education reports can be verified. They

should not be presented as current achievement levels or directly compared with recent assessment results without considering differences in test design, grade levels, assessment objectives, and scoring procedures.

More recent assessment policies provide an updated context for examining student achievement. DepEd Memorandum No. 024, s. 2025, announced the administration of the NAT for Grade 6 for School Year 2024–2025. The assessment covered English, Mathematics, Science, Filipino, and Araling Panlipunan. English was used for testing in English, Science, and Mathematics. Meanwhile, DepEd Memorandum No. 014, s. 2026, announced the administration of the Computer-Based National Achievement Test for Grade 12 for School Year 2025–2026, reflecting developments in assessment delivery.

These assessment practices are particularly relevant to the present study because English-language assessment items may require learners to demonstrate both subject knowledge and the ability to understand academic language. For instance, students answering mathematics problems must interpret instructions and identify relevant numerical information, while science assessments may require them to understand technical vocabulary, analyze explanations, and interpret scientific situations. Consequently, English proficiency may be one factor associated with performance in these subject areas.

Nevertheless, national assessment results alone cannot establish that EMI or school heads' perceptions directly cause differences in student achievement. Assessment performance may also be influenced by curriculum coverage, prior learning, teacher preparation, instructional quality, access to learning materials, socioeconomic circumstances, and testing conditions. Therefore, student achievement should be interpreted within the broader educational context rather than attributed exclusively to the language of instruction.

Management Interventions for Improving EMI Implementation

The reviewed literature suggests that effective EMI implementation requires coordinated efforts among school heads, teachers, and other educational stakeholders. The perspectives of Fullan (1991), Cotton (2003), Schmoker (2004), and Waters *et al.* (2004) emphasize collaboration, clear instructional priorities, systematic monitoring, and the use of evidence to improve teaching and learning. These principles may provide a foundation for developing management interventions that address the challenges associated with EMI in science and mathematics.

Teacher professional development is one important intervention. Richards and Pun (2022) emphasized the need to develop teachers' capacity to address disciplinary literacy and the academic demands of EMI. Prabjandee and Nilpirom (2022) similarly recommended appropriate teacher attitudes, EMI lesson planning, instructional scaffolding, and reflective practice through their 4E framework. These recommendations suggest that professional development should extend beyond general English proficiency training and include the language and pedagogical requirements of specific academic disciplines.

A second intervention involves strengthening instructional supervision. School heads may conduct regular classroom observations, review instructional plans, provide constructive feedback, and monitor the integration of language support into subject teaching. These activities can help identify instructional difficulties and determine whether teachers are using appropriate strategies to support learners' understanding of science and mathematics concepts.

A third intervention involves improving the availability and utilization of instructional resources. Teachers may benefit from bilingual learning materials where appropriate, visual representations, vocabulary guides, graphic organizers, scientific illustrations, mathematical models, and other instructional aids. These resources can support comprehension while allowing learners to engage with the academic language required by the curriculum.

A fourth intervention involves promoting collaborative instructional planning. Teachers of English, mathematics, and science may work together to identify common language difficulties, develop subject-specific vocabulary activities, and design instructional strategies that integrate academic language with content learning. Learning action cells, professional learning communities, peer coaching, and collaborative lesson preparation may provide opportunities for teachers to share effective practices and address common instructional concerns.

Finally, school heads may strengthen the use of assessment data in instructional decision-making. Student performance in classroom assessments and national examinations may help identify learning gaps and determine areas requiring remediation or enrichment. When assessment results are examined alongside classroom observations and teacher feedback, school leaders can develop more responsive instructional support programs.

These proposed interventions are grounded in the reviewed literature and provide possible directions for school improvement. However, their actual effectiveness should be evaluated based on the findings of the present study, particularly the identified perceptions of school heads, administrative practices, and student achievement outcomes.

Synthesis and Research Gap

The reviewed literature establishes the historical significance of English in Philippine education and demonstrates how successive educational reforms and language policies have shaped instructional practices and educational outcomes. The historical development of the Philippine educational system illustrates the enduring influence of English in curriculum implementation, classroom communication, and academic assessment. At

the same time, changes in language-of-instruction policies demonstrate the continuing effort to address the linguistic diversity and learning needs of Filipino students.

Research on English as a Medium of Instruction emphasizes the importance of language proficiency, disciplinary literacy, teacher competence, and appropriate instructional strategies in facilitating content learning. Canilao (2018) highlighted the complexity of language practices in Philippine mathematics classrooms, while Richards and Pun (2022) emphasized the importance of disciplinary literacy and teacher professional development. Prabjandee and Nilpirom (2022) proposed the 4E framework, which underscores positive attitudes, systematic lesson planning, instructional scaffolding, and reflective practice. Similarly, NCELA (2021) emphasized the integration of language support into mathematics instruction through vocabulary development, visual representations, structured discussions, and opportunities for mathematical reasoning. These studies collectively demonstrate that effective EMI requires the integration of language development and subject-specific pedagogy.

Furthermore, the literature on instructional leadership highlights the importance of school heads in supporting effective teaching through instructional supervision, professional development, collaborative planning, resource allocation, and evidence-based decision-making. Research by Hallinger and Murphy (1985), Cotton (2003), Waters *et al.* (2004), and Fullan (1991) provides a theoretical foundation for understanding the role of leadership in school improvement. More recent studies by Ramos and Bauyot (2024), Godes and Dioso (2024), Ferrell *et al.* (2023), Özdemir *et al.* (2024), Shen and Wu (2025), and Hallinger *et al.* (2025) further emphasize the relevance of leadership practices to teacher performance, instructional improvement, and student achievement.

In addition, national assessment practices provide mechanisms for examining learners' academic performance and identifying areas requiring instructional improvement. The National Achievement Test offers information about student achievement in different subject areas, including English, mathematics, and science. However, assessment results must be interpreted in relation to curriculum expectations, learner characteristics, instructional quality, and the language demands of assessment tasks. Thus, achievement should not be attributed exclusively to EMI or any single leadership practice.

Despite the contributions of these studies, a research gap remains concerning the relationship among school heads' perceptions of EMI, their administrative and instructional interventions, and student achievement specifically in science and mathematics. Although previous research has examined language proficiency, teacher instructional practices, and school leadership, further investigation is needed to understand how school heads' beliefs and perceptions about EMI influence their supervisory decisions, professional development initiatives, and support for teachers. There is also a need to examine how these administrative practices relate to student achievement within the Philippine educational context.

In response to this gap, the present study examines school heads' perceptions of English as a Medium of Instruction, their administrative and instructional interventions, and student achievement in science and mathematics. It seeks to determine how school leadership can support effective EMI implementation while addressing teachers' professional needs and learners' language-related challenges. The findings may provide an empirical basis for developing a management intervention program that strengthens instructional supervision, teacher professional development, collaborative planning, and the delivery of quality science and mathematics education. Ultimately, the study recognizes that academic achievement is influenced by multiple interacting factors, including language proficiency, teacher competence, instructional strategies, learner characteristics, assessment practices, and school leadership.

MATERIALS AND METHODS

This study employed a descriptive-correlational research design to determine the relationship between administrative interventions and students' achievement in Mathematics and Science and Technology. The descriptive component was used to determine the level of administrative interventions and students' achievement, while the correlational component examined the relationship between these variables.

The researcher gathered data through a survey using duly validated research instruments. These instruments focused on classroom monitoring and observation, lesson planning and instructional materials preparation, facilitation of classroom activities and delivery of instruction, and classroom testing and evaluation. The instruments underwent consultation and validation by experts and practitioners in educational management to establish their appropriateness for the study.

The following scales were used to determine the level of administrative intervention and students' achievement in Mathematics and Science and Technology.

The level of administrative intervention was measured using a five-point scale, with corresponding numerical ranges, descriptive levels, and verbal interpretations. A mean score of 4.50 and above was interpreted as very high, indicating that the school head had always performed the duties specified in the instrument. A score ranging from 3.50 to 4.49 was interpreted as high, indicating that the school head had often performed these duties. A score from 2.50 to 3.49 was interpreted as moderate, indicating that the school head had performed the duties at a moderate level. A score from 1.50 to 2.49 was interpreted as low, indicating that the school head had seldom performed the duties. Finally, a score of 1.49 and below was interpreted as very low, indicating that the school head had never performed the duties.

Students' achievement in Mathematics and Science and Technology was interpreted using a five-point scale based on percentage scores. Scores ranging from 81% to 100% were classified as very high, indicating mastery

Table 1: Level of Intervention

Scale	Range Limits	Level	Verbal Description
5	4.50 and above	Very high	This means that the school head has always performed his/her duties.
4	3.50 – 4.49	High	This means that the school head has often performed his/her duties.
3	2.50 – 3.49	Moderate	This means that the school head has moderately performed his/her duties.
2	1.50 – 2.49	Low	This means that the school head has seldom performed his/her duties.
1	1.49 and below	Very Low	This means that the school head has never performed his/her duties.

Table 2: Achievement Level in Mathematics and Science

Scale	Range Limits	Level	Verbal Description
5	81-100%	Very high	This means that the student has mastery in the assessment result.
4	61-80%	High	This means that the student has closely mastered in the assessment result.
3	41-60%	Moderate	This means that the student has moderately towards mastery in the assessment result.
2	21-40%	Low	This means that the students have no mastery in the assessment result
1	0-20%	Very Low	This means that the student has absolutely gained no mastery in the assessment result.

of the assessment content. Scores from 61% to 80% were classified as high, indicating that students had nearly mastered the content. Scores from 41% to 60% were classified as moderate, indicating that students were approaching mastery. Scores from 21% to 40% were classified as low, indicating limited mastery of the assessment content. Finally, scores from 0% to 20% were classified as very low, indicating very limited or no demonstrated mastery of the assessment content.

The study covered the 43 municipalities of Quezon Province, which included public and private secondary schools. The respondents consisted of 229 secondary school heads from 144 public schools and 85 private schools.

The study employed universal sampling, in which all 229 secondary school heads from public and private secondary schools in Quezon Province were included as respondents. This approach was intended to cover the entire identified population of school heads within the study's scope.

The researcher followed several steps in conducting the study. First, the researcher prepared and sent formal letters requesting permission to conduct the study to the Schools Division Superintendent and the heads of public and private secondary schools.

Second, the researcher developed instruments to gather data relevant to the research problems, including information on the school heads' profiles and the level of administrative intervention. To obtain data on students' achievement, the researcher also requested permission from the Schools Division Superintendent to access the secondary schools' achievement results for School Year 2024–2025.

Third, to validate the research instruments, the researcher administered them to secondary school heads in another division, the City Schools Division of Lucena. The feedback and results from this process were used to assess the instruments' suitability for the study.

Fourth, the research instruments were reproduced and distributed to the 229 school heads from public and private secondary schools in Quezon Province. The respondents were asked to complete the instruments and provide the information required for the study.

Finally, after the completed instruments were retrieved, the responses were tallied, organized, and entered into a master data sheet. Microsoft Excel was used to encode, organize, and store the collected data for subsequent statistical analysis.

Mathematical Expressions and Symbols

The data gathered were analyzed using appropriate statistical tools to address the research problems.

- The mean was used to determine the level of administrative intervention and students' achievement in Mathematics and Science and Technology.
- The independent-samples t-test was used to determine whether significant differences existed in the level of administrative intervention when the respondents were grouped according to type of school assignment.
- Analysis of variance (ANOVA) was used to examine differences in the level of administrative intervention according to educational attainment and length of experience.
- Pearson's product-moment correlation coefficient (Pearson's r) was used to determine the significance and direction of the relationship between administrative

intervention and students' achievement.

• Stepwise regression analysis was used to identify which indicators significantly predicted the outcome specified in the study.

The statistical computations were performed using the Statistical Package for the Social Sciences (SPSS), Version 11. The results were interpreted using a significance level of (\alpha = 0.05).

RESULTS AND DISCUSSION

This section presents the numerous tables and their interpretations to the result of this study based on the scope of the problems.

The study involved 229 school heads from four districts in the Division of Quezon. District 3 contributed the largest proportion of respondents (32.75%), followed by District 4 (31.00%). Public school heads constituted 62.88% of the respondents, while private school heads represented 37.12%. Regarding educational attainment, the largest group held a master's degree (50.22%). In terms of experience, 50.22% had five years of experience or less. These characteristics provide context for interpreting the administrative practices and achievement results. However, the profile data do not establish that school type, educational attainment, or experience influenced student achievement.

Table 3: Respondents' Profile

Profile variable	Category	Frequency	Percentage
District	District 1	32	13.97%
	District 2	51	22.27%
	District 3	75	32.75%
	District 4	71	31.00%
Type of school	Private	85	37.12%
	Public	144	62.88%
Educational attainment	MA unit's holder	94	41.04%
	MA holder	115	50.22%
	PhD/EdD units	13	5.68%
	PhD/EdD holder	7	3.06%
Length of experience	5 years and below	115	50.22%
	6–10 years	64	27.95%
	11 years and above	50	21.83%
Total respondents		229	100%

The overall mean of 4.00 indicates a high reported level of administrative intervention. Lesson Planning and Instructional Materials Preparation obtained the highest indicator mean (4.13), while Classroom Monitoring and Observation obtained the lowest (3.88). By district, District 3 had the highest reported mean, while District 1 had the lowest. Public school heads reported a slightly higher mean (4.04) than private school heads (3.95). These results suggest that school heads reported involvement

Table 4: Administrative Intervention of Secondary School Heads

Indicator or grouping	Average weighted mean	Descriptive equivalent
Classroom Monitoring and Observation	3.88	High
Lesson Planning and Instructional Materials Preparation	4.13	High
Facilitation of Classroom Activities and Delivery of Instruction	4.00	High
Classroom Test and Evaluation	4.00	High
Overall administrative intervention	4.00	High
By district		
District 1	3.88	High
District 2	4.06	High
District 3	4.50	Very High*
District 4	3.97	High
By school type		
Private	3.95	High
Public	4.04	High

in instructional planning, classroom activities, and assessment. Classroom monitoring and observation may warrant further attention. However, the differences between districts and school types require verified inferential statistics before conclusions about statistical significance can be made.

Table 5: Students' Achievement in Mathematics

Grouping	Category	Average weighted mean	Descriptive equivalent
By district	District 1	3.06	Moderate
	District 2	2.75	Moderate
	District 3	2.89	Moderate
	District 4	2.79	Moderate
	Overall, by district	2.87	Moderate
By school type	Private	2.71	Moderate
	Public	2.93	Moderate
	Overall, by school type	2.82	Moderate

The results show that students' Mathematics achievement was Moderate across all four districts. District 1 obtained the highest mean (3.06), followed by District 3 (2.89), District 4 (2.79), and District 2 (2.75). By school type, public schools recorded a higher mean (2.93) than private schools (2.71), although both were classified as Moderate. These findings indicate opportunities to strengthen Mathematics instruction across districts and school types. School heads may enhance instructional supervision, assessment practices, and targeted learning support. However, these descriptive differences do not establish statistical significance or causation; the results should be verified against the original dataset and corresponding inferential tests.

Table 6: Students' Achievement in Science and Technology

Grouping	Category	Average weighted mean	Descriptive equivalent
By district	District 1	2.75	Moderate
	District 2	2.74	Moderate
	District 3	2.91	Moderate
	District 4	2.86	Moderate
	Overall, by district	2.82	Moderate
By school type	Private	2.68	Moderate
	Public	2.89	Moderate
	Overall, by school type	2.79	Moderate

Science and Technology achievement was Moderate across all districts and school types. District 3 obtained the highest district mean (2.91), while District 2 obtained the lowest (2.74). Public schools had a higher reported mean (2.89) than private schools (2.68). The results indicate that all groups shared the same broad achievement classification, despite some differences in their numerical means. These findings point to an opportunity to strengthen learning in Science and Technology. Further investigation could examine instructional strategies, access to learning resources, students' prior knowledge, and language demands in science instruction. The overall means of 2.82 and 2.79 should be checked for consistency. The reported coefficients indicate very strong positive associations between administrative intervention and achievement in both Mathematics and Science and Technology. For Mathematics, Lesson Planning and Instructional Materials Preparation had the highest

Table 7: Relationship Between Administrative Intervention and Student Achievement

Administrative intervention indicator	Mathematics \	Science and Technology \(r\)
Classroom Monitoring and Observation	0.9604	0.9587
Lesson Planning and Instructional Materials Preparation	0.9745	0.9079
Facilitation of Classroom Activities and Delivery of Instruction	0.9656	0.9669
Classroom Test and Evaluation	0.9499	0.9624
Overall correlation	0.9626	0.9499
Reported interpretation	High correlation	High correlation

reported correlation (\(r=0.9745\)). For Science and Technology, Facilitation of Classroom Activities and Delivery of Instruction had the highest reported correlation (\(r=0.9669\)). These findings suggest that stronger reported administrative intervention was associated with higher achievement scores in the study dataset. However, correlation does not establish causation. The unusually high coefficients should be verified against the original dataset, and the final table should include sample sizes and significance-test results.

CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

Respondents' Profile. The study included 229 school heads from four districts, representing both public and private schools and varying levels of educational attainment and professional experience. Administrative Intervention. School heads' administrative interventions were generally rated High, particularly in lesson planning, preparation of instructional materials, classroom monitoring, instructional delivery, and assessment. Students' Achievement in Mathematics. Students' Mathematics achievement was classified as Moderate across all four districts and both school types. District 1 obtained the highest district mean, while District 2 obtained the lowest. Public schools recorded a higher mean than private schools. Students' Achievement in Science and Technology. Students' achievement in Science and Technology was also classified as Moderate across districts and school types, indicating opportunities to strengthen instruction and improve learning outcomes.Differences in Administrative Intervention and Achievement. The reported statistical analyses suggest possible differences across districts and school types. Relationship Between Administrative Intervention and Achievement. The reported correlation coefficients indicate strong positive relationships between administrative intervention indicators and students' achievement in Mathematics and Science and Technology.

Overall, the findings suggest that although school heads reported high levels of administrative intervention, students' achievement in Mathematics and Science and Technology remained moderate. Strengthening instructional leadership, monitoring teaching practices, improving assessment strategies, and providing targeted academic support may help schools improve student learning outcomes.

REFERENCES

Adams, D., & Hamdhiyya. (2022). Leadership in science instruction: a systematic review of research. *Asia Pacific Journal of Educators and Education, 37*(2), 247–261.

Alzona, E. (1932). *A history of education in the Philippines,* 1565–1930. University of the Philippines Press.

Bibon, M. B. (2022). Teachers' instructional practices and learners' academic achievement in science. *Contemporary Mathematics and Science Education, 3*(1), Article ep22007. https://doi.org/10.30935/conmaths/11816

Canilao, M. L. E. N. (2018). English in the teaching of mathematics: policies, realities, and opportunities. In I. Martin (Ed.), *Reconceptualizing English education in a multilingual society* (pp. 137–161). Springer. https://doi.org/10.1007/978-981-10-7528-5_9

Department of Education. (1987). T*he 1987 policy on bilingual education* (DepEd Order No. 52, s. 1987).

Department of Education. (2012). *Guidelines on the implementation of the Mother Tongue-Based Multilingual Education* (MTB-MLE) (DepEd Order No. 16, s. 2012).

Department of Education. (2016). P*olicy guidelines on the National Assessment of Student Learning for the K to 12 Basic Education Program* (DepEd Order No. 55, s. 2016).

Department of Education. (2025a). *Administration of the National Achievement Test for Grade 6 for School Year 2024–2025* (DepEd Memorandum No. 024, s. 2025).

Department of Education. (2025b). *Policy on the medium of instruction for Kindergarten to Grade 3 effective School Year 2025–2026* (DepEd Order No. 020, s. 2025).

Department of Education. (2026). *Administration of the Computer-Based National Achievement Test for Grade 12 for School Year 2025–2026* (DepEd Memorandum No. 014, s. 2026).

Ferrell, V., & Garner, J. K. (2023). Administrators' capacity for supporting reform-oriented science instruction: an urban school district case study. *Science Education, 107*(5), 1238–1268. https://doi.org/10.1002/sce.21803

Godes, A. R., & Dioso, E. (2024). School heads' instructional supervisory practices and the performance of the teachers: a correlational study. Psychology and Education: *A Multidisciplinary Journal, 23*(7), 857–873. https://doi.org/10.5281/zenodo.13310054

Hallinger, P., Liu, S., & Chen, L. (2025). Principal instructional leadership and teacher attitudes: a meta-analytic review, 1989–2024. *European Journal of Education, 60*(4), Article e70199.

Macaro, E. (2018). *English medium instruction: a and language in policy and practice.* Oxford University Press.

Morata, J. A., & Fulay, K. C. (2024). Language in math: narratives of mathematics teachers in the shift of medium of instruction in the time of pandemic. *Journal of Education, Learning, and Management, 1*(2), 41–47. https://doi.org/10.69739/jelm.v1i2.175

National Clearinghouse for English Language Acquisition. (2020). *Integrating language while teaching mathematics* [Teaching practice brief].

National Museum of the Philippines. (2014). *Baybayin: Mga sinauna at tradisyunal na panulat sa Pilipinas* [Baybayin: Ancient and traditional writing systems in the Philippines].

Özdemir, N., Gümüş, S., Kılınç, A. Ç., & Bellibaş, M.

Ş. (2024). A systematic review of research on the relationship between school leadership and student achievement: an updated framework and future direction. *Educational Management Administration & Leadership, 52*(5), 1020–1046.

Prabjandee, D., & Nilpirom, P. (2022). Pedagogy in English-medium instruction (EMI): some recommendations for EMI teachers. *rEFLections, 29*(2), 421–434. https://doi.org/10.61508/refl.v29i2.260690

Ramos, R. B., & Bauyot, M. M. (2024). Exploring the impact of school leadership on professional development in Panabo City Division, Philippines: a mixed-method explanatory research study. *Asian Journal of Education and Social Studies, 50*(7), 467–485.

Republic Act No. 9155. (2001). *Governance of Basic Education Act of 2001*. https://lawphil.net/statutes/repacts/ra2001/ra_9155_2001.html

Republic Act No. 12027. (2024). *An Act discontinuing the use of the mother tongue as medium of instruction from Kindergarten to Grade 3, providing for its optional implementation in monolingual classes, and amending for the purpose Sections 4 and 5 of Republic Act No. 10533, otherwise known as the "Enhanced Basic Education Act of 2013."*

Richards, J. C., & Pun, J. (2022). Teacher strategies in implementing English medium instruction. *ELT Journal, 76*(2), 227–237. https://doi.org/10.1093/elt/ccab081

Ruiz-Cecilia, R., Medina-Sánchez, L., & Rodríguez-García, A.-M. (2023). Teaching and learning of mathematics through CLIL, CBI, or EMI—*A systematic literature review. Mathematics, 11*(6), Article 1347.

Shen, J., & Wu, H. (2025). The relationship between principal leadership and student achievement: a multivariate meta-analysis with an emphasis on conceptual models and methodological approaches. *Educational Administration Quarterly, 61*(2), 234–281.

UNESCO. (2024). *Why multilingual education matters.* https://articles.unesco.org/sites/default/files/medias/fichiers/2024/02/imld-2024-cn-en.pdf