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Supervisory Approaches in the Implementation of Game-Based Strategies for Numeracy Improvement

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Abstract: This research investigated how school leaders and master teachers in the District of Calatrava I supervise and the effectiveness of these approaches in promoting the adoption of game-based strategies aimed at enhancing numeracy in public elementary schools. The study examined demographic characteristics, supervisory practices, and the relationship between supervision and instructional outcomes. The findings indicated that most of the school heads and master teachers were academically qualified, with many having pursued advanced degrees, and professionally seasoned, possessing extensive teaching experience. Consistent application of supervisory approaches across all areas, demonstrating strong instructional leadership and dedication to supporting teachers. Game-based strategies were found to be highly effective, reflecting supervisors' ability to promote innovative teaching practices. The Analysis of Variance (ANOVA) revealed no significant differences in supervisory approaches based on age, educational attainment, or length of service. This suggests that supervisory practices are uniform and stable across different demographics. Furthermore, correlation analysis demonstrated a robust positive and statistically significant association between supervisory methods and the efficacy of game-based strategies, emphasizing the crucial role of supervision in ensuring successful implementation. In light of these findings, actionable recommendations were developed for school leaders, master teachers, educators, curriculum developers, the Department of Education, and future researchers to enhance supervisory practices and maintain innovation in numeracy instruction. The study underscored the importance of effective supervision, grounded in experience and academic training, for improving learner outcomes through game-based strategies, particularly in rural and upland settings.

Key points: Game-based Strategies, Numeracy, Mentoring, Coaching, Classroom Observation, Feedback, Effectiveness, Calatrava, Philippines, Quantitative.

CHAPTER 1
INTRODUCTION

Background of the Study

The 2022 PISA results revealed a global numeracy crisis, with OECD countries averaging 472 in mathematics, Singapore (575) and China (552) led the rankings, and many developing nations scored far lower. Game-based learning was shown to be an effective strategy for increasing math motivation, engagement, and achievement between 2020 and 2025. Debrenti (2024) highlighted its function in assisting basic pupils in connecting disparate representations of mathematical concepts, Syamsuddin & Sukmawati (2025) discovered that it greatly enhanced results. Similarly, interactive digital environments that matched Generation Z's technological comfort level improved conceptual understanding and sustained engagement, as demonstrated by Hidayat et al. (2024).

Although research on game-based learning in the Philippines remains limited, recent studies indicate promising outcomes. In an experimental study conducted with fourth graders in Aleosan,

North Cotabato (Cayang & Ursabia, 2024), researchers found that the intervention significantly improved performance. Similarly, Lagmat et al (2024) investigated game-based learning among eighth graders at the University of Sallette High School in Santiago City and reported improved math proficiency. With local divisions such as Central Visayas, also experiencing difficulties with fundamental arithmetic, the Philippines' PISA math score of 355 reveals a significant national numeracy disparity (Echavez, 2024). Innovative solutions are needed to address these challenges, and the supervisory methods employed by school administrators are crucial for their effective implementation. Initiatives like MathGALING, which enhance numeracy through interactive play, have demonstrated promising outcomes (Ferasol et al., 2024). At the nexus of local struggle, national decline, and global urgency, this study investigates how leadership methods use game-based learning in promoting sustainable improvement.

There is currently limited localized data on game-based learning in primary schools, particularly in Calatrava I, Negros Occidental. While secondary and tertiary research indicate promising results, the influence of administrators and teachers on the implementation of game-based learning methodologies in the classroom is often overlooked. This disparity highlights the need for context-specific research to direct leadership training, interventions, and capacity-building in mathematics education. Despite the lack of local evidence, supervisory techniques impacted the implementation of game-based systems globally. In response, this study investigates the effects of supervision and leadership on the adoption of game-based learning in Calatrava.

A paucity of localized research on game-based learning in Negros Occidental, specifically in Calatrava I. While national and international studies highlight numeracy challenges, limited information is available concerning the influence of master teachers and school administrators on the implementation of innovative teaching strategies such as game-based learning within local classrooms. Broader literature frequently overlooks the impact of cultural contexts, resource constraints, and supervisory approaches. Consequently, it remains unclear whether leadership encourages or discourages the adoption of these tactics. Addressing this gap is crucial, as localized evidence can inform professional development, capacity-building initiatives, and targeted interventions aligned with the district's specific needs.

REVIEW OF RELATED LITERATURE AND STUDIES

This section presents a series of literature and studies that strongly support supervisory approaches in game-based learning for numeracy improvement. This research was essential in aiding the researcher in gathering current information about the variables considered in this study.

Numeracy Education

Numeracy, the ability to understand and effectively use mathematical concepts, is a foundational skill essential for success in both academic and professional domains. Its significance was emphasized by the need to navigate an increasingly complex and data-driven world (Manire et al., 2023). Within educational contexts, numeracy education fosters well-rounded individuals capable of applying mathematical reasoning to real-world problems. Despite its importance, numeracy education faced persistent challenges, including insufficient teacher preparedness, limited instructional resources, and an overemphasis on procedural knowledge at the expense of conceptual understanding (Diano Jr et al., 2023). Addressing these challenges requires proactive leadership that identifies barriers and supports effective numeracy practices.

Numeracy, defined as the ability to understand and effetively use mathematical concepts, remained a core competency essential for academic and professional success. Its significance has increasingly recognized in a data-driven world where students must apply critical thinking, problem-solving, and analytical skills to real-world scenarios (Manire et al., 2023). Despite its importance, challenges persisted in the effective teaching of numeracy.

Studies reported that teachers frequently lacked adequate preparation, instructional resources were limited, and there was a strong focus on procedural knowledge rather than conceptual understanding (Diano Jr et al., 2023). Furthermore, Lestari et al., (2024) highlighted that inclusive and differentiated numeracy instruction can improve student engagement and learning outcomes,

especially among learners with diverse abilities, emphasizes the need for leadership that is supported with tailored instructions.

Numeracy was a foundational competency extending beyond basic computation to encompass conceptual understanding, problem-solving, and the application of mathematical concepts in real-life contexts. Manire et al. (2023) emphasized that in an increasingly data-driven world, numeracy equips learners to navigate complex situations, make informed decisions, and engaged critically with information. Despite its importance, effectively integrating numeracy into curricula remained a challenge. Diano Jr. et al. (2023) observed that many teachers prioritized procedural knowledge over deeper conceptual understanding due to limited resources and preparation, which constrained students' ability to meaningfully engage with mathematics.

Early childhood represents a critical period for building numeracy foundations. Ancog et al (2024) demonstrated that play-based learning significantly improved number recognition and counting skills among kindergarten learners, established a foundation for future mathematical competence. Similarly, Syarfina et al. (2023) reported that a digital game, Numb Game, effectively enhanced numeracy skills among children aged four to five, illustrating how age-appropriate, interactive strategies can make early mathematics learning engaging and effective. These findings highlighted that numeracy development was most impactful when interactive and developmentally appropriate teaching strategies were employed, supporting both cognitive growth and positive attitudes toward mathematics. Consequently, school leaders should view numeracy education as a developmental process, encouraging strategies that foster meaningful, hands-on learning beyond rote exercises.

Local research has underscored the potential of structured interventions in to improve numeracy outcomes. For instance, Debrenti (2024) documented that game-like exercises in primary classrooms enhanced learners' confidence and conceptual understanding. Meanwhile, Ramli et. al. (2022) found that digital learning environments combined with structured guidance positively influenced both mathematical achievement and self-efficacy. Collectively, these studies indicated that addressing gaps in teacher preparedness and instructional design, supported by strong leadership, was essential for developing competent numerate learners who can apply mathematics beyond the classroom.

Game-Based Instruction

Game-based learning (GBL) has emerged as a highly effective pedagogical strategy for improving students' numeracy skills by promoting engagement, retention, and conceptual understanding. Research consistently demonstrates that GBL enhances cognitive and affective domains of mathematics learning (Hui & Mahmud, 2023). A quasi-experimental study in Aleosan, North Cotabato, revealed that Grade 4 pupils showed significant improvements in post-test scores following participation in game-based mathematics activities compared to conventional teaching methods (Cayang & Ursabia, 2024). Similarly, Paglomutan (2024) found that Grade 10 students improved both test performance and long-term retention through GBL, confirming its sustained benefits.

In addition, the use of digital tools and gamified applications has further advanced numeracy learning. Malabayabas et al. (2024) implemented the Math-GALING application among Grade 11 students, reporting significant gains in statistics and probability achievement. Mabuti (2024) also documented that GBL improved high school students' mathematics self-efficacy and learning outcomes, emphasizing the link between motivation and achievement. De Lemois et al. (2025) demonstrated that "Fillquation" a game-based learning material, increased students' interest in basic math operations, while Lozano et al. (2023) developed a mobile application using the Octalysis framework for mathematical patterns, showing positive engagement and conceptual understanding among students. These findings highlighted that both non-digital and digital GBL approaches can be highly effective when thoughtfully designed.

The integration of digital tools has amplified the effectiveness of GBL. Malaybayabas et al. (2024) reported that the Math-GALING application improved Grade 11 learners' statistics and probability achievement, while Mabuti (2024) found improvements in high school students' self-efficacy and

learning outcomes through digital game-based methods. De Lemois et al. (2025) introduced "Fillquation" which increased students' interest in basic numeracy operations, and Lozano et al. (2023) developed an Octalysis based app to enhance the learning of mathematical patterns. Similarly, Debrenti (2024) highlighted that gamified exercises in primary education increase engagement and support conceptual understanding. These findings illustrated that both digital and non-digital GBL, when appropriately designed, can effectively improve numeracy learning outcomes across grade levels.

In mathematics education, both international and local studies corroborated the effectiveness of GBL. Tepho and Srisawasdi (2023) found that primary students using tablet-based games demonstrated substantial improvements in mathematical fluency and achievement, particularly among those struggling with the subject. Cayang and Ursabia (2024) documented significant post-test score improvements in Grade 4 pupils in Aleosan, North Cotabato, compared to conventional teaching methods, while Paglomutan (2024) reported that Grade 10 students exposed to game-based strategies exhibited improved retention and deeper conceptual understanding. Ferasol et al. (2024) found that the Math-GALING program reduced math anxiety, increased confidence, and improved numeracy performance, notably among students from lower socioeconomic backgrounds. These studies collectively indicate that GBL enhances engagement, conceptual understanding, and retention, establishing it as a robust instructional approach.

Early Childhood research further supported the importance of interactive game-based approaches. Yunira et al. (2024) demonstrated that interactive multimedia games improved numeracy skills and engagement for four- and five-year-olds, while Celikdemir et al. (2024) found that participatory game design fostered both skill development and a sense of ownership among preschool children. International studies, such as those by Camacho et al. (2022), have shown that reward systems within game mechanics, such as

points and challenges, enhanced student performance and motivation. These findings suggested that the design of games must balance challenges, feedback, and engagement to optimize learning outcomes.

Moreover, the sustainability of GBL required careful alignment with curriculum objectives, inclusive practices, and strong instructional support. In Cebu City, Sulpico et al. (2025) found that implementing GBL in Grade 7 mathematics resulted to improved performance and engagement; however, sustaining these benefits depended on careful game design, inclusive classroom practices, and active leadership support. These findings underscored that GBL was most effective when integrated thoughtfully into pedagogical practice rather than introduced superficially.

Similarly, Morata and Caballes (2024) explored the use of digital game-based learning incorporating class points and highlighted how classroom observations informed the development of professional support programs for teachers. Their findings indicated that school heads who actively observed and engaged with classroom practices were better positioned to identify gaps and provide responsive interventions. Antonio and Tamban (2023) also noted that observation played a key role in understanding the impact of gamification on student performance and attitudes towards mathematics, particularly in post-pandemic learning environments.

In the study by Morata and Caballes (2024), Grade 7 students were introduced to digital game-based learning utilizing Class Point. The researchers highlighted the importance of feedback from classroom observations in influencing the development of a professional program for teachers. Teachers refined their use of gamified tools, resulting in measurable improvements in numeracy skills, thanks to school leaders who actively observed and offered feedback.

Antonio and Tamban (2023) also explored gamification in mathematics instruction, noting that feedback from classroom observations was essential for understanding the impact of game-based strategies on learner engagement and performance. Their findings suggest that when school heads provide timely and specific feedback, teachers are more likely to adjust and improve their instructional methods, resulting in improved student outcomes.

Supervisory Approaches

Recent studies from 2020 onwards consistently highlighted the effectiveness of game-based learning (GBL) in enhancing numeracy skills and emphasized the critical role of supervisory approaches in sustaining this impact. A 2024 systematic review on gamification in mathematics education found that student engagement and retention improved significantly when teachers received structured mentoring and feedback from supervisors, enabling them to refine instructional strategies and align them with curricular goals. Similarly, a 2021-2025 review of GBL in educational contexts underscored the importance of classroom observation and coaching practices for ensuring teachers could adapt game-based strategies to diverse learning environments, thereby maximizing student motivation and performance. Empirical research in 2024 further confirmed that supervisory interventions, such as peer observation and collaborative reflection sessions, strengthened teachers' competence in integrating GBL, leading to measurable gains in students' mathematical achievement. Collectively, these studies affirmed that while GBL was inherently effective in promoting numeracy, its success was strongly mediated by forward-thinking leadership, supervisory support, and systemic backing. School leaders and master teachers act as catalysts, not only initiating GBL practices but also embedding them into the broader teaching culture through continuous supervision, mentoring, and professional development. Thus, the literature from 2020 onwards provides robust evidence that supervisory approaches are indispensable for the meaningful and sustainable integration of game-based instructional strategies in numeracy education.

Supervisory practices, including mentoring, observing, and feedbacking are central to effective leadership. Mentoring enabled school heads to guide teachers in integrating games into instruction, fostering professional growth and enhancing student outcomes, as demonstrated in Project MATH-YAGA (Coronacion, 2024). Classroom observation allowed leaders to monitor the quality of game-based instruction, identify gaps, and inform targeted professional support (Morata & Caballes, 2024; Antonio & Tamban, 2023). Constructive feedback closes the loop by helping teachers refine strategies and align classroom activities with curriculum goals, thereby promoting continuous improvement (Naguit, 2024; Coronacion, 2024). International research supports this approach; for instance, Gümüş,. et al. (2025) found that web-based simulation tools for school leaders increased their confidence and effectiveness in observing recent research highlighted how essential mentoring is as a leadership practice for school leaders in achieving success when it comes to implementing game-based instructional strategies aimed at improving numeracy. As a facet of instructional leadership, mentoring encompasses guiding, coaching, and aiding teachers in the adoption of innovative teaching methods. Through Project MATH-YAGA, Coronacion (2024) showcased this by having school leadership mentor teachers in incorporating games and activities into math teaching, resulting in a notable enhancement in students' numeracy levels.

These mentoring practices are in accordance with the Philippine Professional Standards for School Heads (DepEd Order No. 024, s. 2020), which highlighted "Developing Self and Others" as a core domain. This domain motivated school leaders to assume the role of instructional coaches, fostering their own professional development and pedagogical innovation. When school leaders provide mentorship to teachers utilizing game-based learning, student engagement and math performance increase, as demonstrated by Cayan and Ursabia (2024). Taken together, these students confirmed that mentoring served not just as a supportive function but also as a strategic leadership tool that empowers teachers, improving instructional quality, and fostering quantifiable advances in numeracy outcomes teachers in interactive learning contexts.

Local studies further emphasize the importance of contextually responsive leadership. Alfeche (2025) highlighted that school administrators must balance accountability with teacher autonomy to sustain innovative practices. In GBL implementation, leadership that mentors, observes, and provides meaningful feedback ensures that instructional innovation is not transient but becomes embedded in the school culture. Effective leadership thus bridged the gap between strategic vision and classroom realities, enabling sustainable improvements in numeracy outcomes.

Synthesis

Game-based learning (GBL) has emerged as a dynamic pedagogical approach that integrates play with education to enhance students' numeracy abilities. The literature reviewed emphasized its efficacy across various grade levels and educational settings, demonstrating that GBL enhanced academic performance while also promoting engagement, retention, and motivation. The success of this strategy depends not only on the games themselves but also on the leadership and systemic support that facilitated its implementation.

Research consistently demonstrated that GBL improved numeracy by making abstract mathematical concepts more accessible and engaging. Interactive experiences that promote problem-solving, collaboration, and critical thinking are beneficial for learners. Teachers strengthened these outcomes by receiving organized support through mentoring, classroom observation, and constructive feedback. Through such leadership practices, educators can enhance their teaching methods to ensure they correspond with their curricular aims, making certain that GBL is embedded in teaching rather than merely an additional component.

Furthermore, the literature underscored that the effectiveness of GBL is significantly enhanced by teacher competence. Teachers who demonstrated confidence in both pedagogical methods and technology integration were able to create substantial learning experiences that maintained student motivation. School leaders and master teachers served as catalysts at the systemic level, providing vision, resources, and opportunities for professional development. By involving them, GBL can be incorporated into the broader culture of teaching and learning, as opposed to being applied separately.

To summarize, while game-based instructional strategies proved effective for improving numeracy skills, their success depends on factors beyond the games themselves. Achieving meaningful integration requires progressive leadership, competent teachers, and systemic support. School leaders and master teachers played a crucial role in ensuring the introduction and ongoing integration of Game-Based Learning (GBL) within an educational culture of innovations. Ultimately, the literature affirmed that GBL can transform numeracy instruction into an engaging and impactful learning experience when supported by robust leadership and professional collaboration.

Theoretical Framework

This study examined three fundamental theories that influenced contemporary educational practices, aiming to improve educational leadership and cultivate effective learning environments. Transformational Theory was investigated, emphasizing the importance of inspiring and motivating followers to achieve remarkable results. Instructional Supervision was then examined, with an emphasis on guiding and supporting teachers to enhance the quality of instruction. Finally, Constructivist Learning Theory was analyzed, emphasizing how learners actively construct knowledge through experience and reflection. Collectively, these theories provided useful models for fostering dynamic, learner-centered educational environments.

Transformational Leadership Theory (Burns, 1978; Bass, 1990) highlighted the capacity of leaders to motivate followers through vision, innovation, and personal growth. In the field of education, transformational leaders fulfilled the role of instructional leaders, encouraging teachers to adopt innovative practices such as game-based learning. Since implementing game-based strategies demanded creativity, risk-taking, and a willingness to change, their role is vital. School leaders bolstered teacher commitment and collaboration by cultivating an innovative culture, providing resources and opportunities for professional development, and demonstrating commitment to change. In the realm of numeracy, such leadership encourages the regular application of game-based methods, thereby boosting student engagement and success.

Instructional Supervision underscored the necessity of structured support---such as observation, feedback, coaching, and professional development---for ongoing enhancement of teaching practices. Glickman's (2017) developmental approach emphasizes the need for differentiated support, acknowledging the different stages of growth that teachers experience. In this study, the

theory highlighted school heads' role in steering the effective application of game-based strategies for numeracy. To maintain instructional quality and consistency, teachers require continuous monitoring, mentoring, and opportunities for reflection beyond initial training. Within this study, the theory underscored the pivotal role of school heads and master teachers in guiding the effective integration of game-based strategies for numeracy. Beyond initial training, teachers require ongoing monitoring, mentoring, and reflective practice to sustain instructional quality. Effective supervision thus ensures that gaps were identified, feedback must be constructive, and innovation in numeracy instruction through games is consistently maintained.

The Constructivist Learning Theory posits that learners actively construct knowledge through their experiences, interactions, and reflections (Bruner, 1966), while Piaget underscored the importance of exploration for cognitive development. Vygotsky focused on social interaction and the Zone of Proximal Development (ZPD), where learners can accomplish more with assistance than on their own (Piaget, 1952). Game-based strategies embody these principles by engaging students in problem-solving, providing opportunities for choice, and facilitating participation in activities that mirror real-life scenarios. In numeracy instruction, methods such as puzzles, simulations, and collaborative challenges fostered logical reasoning, teamwork, and a deeper understanding.

These theories coalesced into a coherent framework: transformational leadership shaped the vision and culture of innovation; instructional supervision provided practical support and accountability; and constructivism offered the pedagogical justification for game-based learning. Regarding the enhancement of numeracy in Calatrava 1, this integration emphasized that effective leadership and supervision go beyond administrative duties were vital forces for instructional innovation that directly boosted student engagement and achievement.

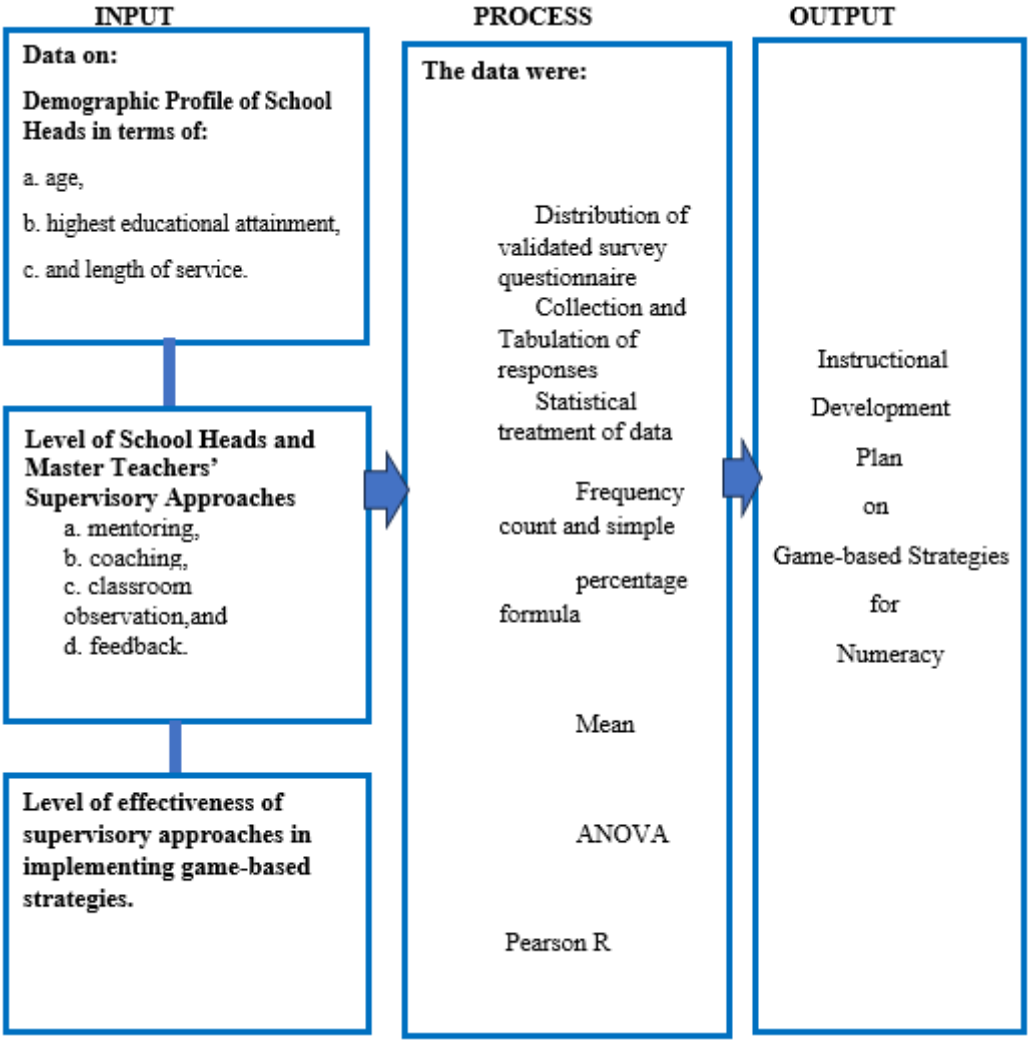

***Figure 1*: Conceptual Framework**

Conceptual Framework

This study was grounded on the concept that the supervisory approaches of school heads and master teachers play a vital role in the successful implementation of game-based instructional strategies for numeracy improvement.

The profile characteristics of school heads and master teachers - such as age, highest educational attainment, and length of service - may influence their performance in supervisory roles and the adoption of innovative teaching approaches. Through continuous supervision and support, teachers become more competent and motivated to utilize game-based learning, which led to better student engagement and improvement of numeracy skills.

The school heads and master teachers' supervisory functions, particularly in mentoring, coaching, classroom observation, and feedback, provide guidance to support teachers in effectively integrating games into numeracy instruction.

Moreover, assessing the effectiveness of these supervisory approaches provides insight into the extent to which teachers were guided in implementing game-based strategies. Effective supervision enhanced teachers' instructional practices, promoted consistent use of game-based methods, and ensured students experienced meaningful and engaging learning activities. Evaluating this effectiveness highlighted the critical role of school heads and master teachers in facilitating pedagogical innovation and improved numeracy outcomes.

Statement of the Problem

This study aimed to determine the level of leadership and supervisory approaches utilized in implementing game-based strategies for numeracy within the District of Calatrava 1, Division of Negros Occidental. Specifically, thi sought to answer the following questions:

1. What is the profile of the respondents in terms of the following:

a. age;

b. highest educational attainment; and

c. length of service

2. What is the level of school heads and master teachers' supervisory approaches employed in game-based strategies for numeracy in terms of the following areas:

a. mentoring;

b. coaching;

c. classroom observation; and

d. feedback

3. What is the level of effectiveness of school heads and master teachers in implementing game-based strategies?

4. Is there a significant difference between the level of school heads and master teachers' supervisory approaches on game-based strategies for numeracy in terms of the different areas when grouped according to profile variables?

5. Is there a significant relationship between the level of school heads and master teachers' supervisory approaches and the level of effectiveness of game-based strategies?

6. Based on the findings, what instructional development plan can be developed?

Hypotheses:

Ho: There is no significant difference between the level of school heads and master teachers' supervisory approaches on game-based strategies for numeracy in terms of the different areas when grouped according to the profile variables.

Ha: There is a significant relationship between the level of school heads and master teachers' supervisory approaches and the level of effectiveness on game-based strategies.

Significance of the Study

The result of this study benefited the following:

Curriculum Planners. This study provided curriculum planners with evidence-based insights on how administrative and supervisory practices influence the integration of game-based strategies in numeracy instruction. The findings supported the refinement of curriculum frameworks that accommodate the diverse instructional approaches. It has also guided planners in ensuring the curricular designs remain responsive to current learning needs.

School Administrators. The results of this study helped school administrators understand how their roles and instructional oversight contribute to the effective use of game-based approaches. The study highlighted specific school practices that promote consistent implementation. These insights strengthened administrative efforts to create and recognize the importance of transformational leadership for motivating teachers to embrace game-based learning, thereby enhancing student engagement and numeracy performance.

Teachers. This study provided teachers with practical guidance on applying game-based techniques to improve numeracy learning outcomes. The findings clarified the institutional conditions that allowed teachers to use these strategies effectively. Through this, teachers gained better direction in designing lessons to promote active participation and improve learner's numeracy skills and performance.

Students. Students benefit from enhanced numeracy instruction shaped by interactive, engaging learning experiences. The study contributed to approaches that made numeracy more enjoyable and less intimidating for learners. Improved participation and comprehension led to better academic outcomes.

Parents. This study demonstrates the crucial role of parents in supporting numeracy development for their children, particularly when game-based strategies are employed. The findings highlighted simple home practices that reinforced classroom training. This strengthened collaboration between families and schools to successfully supported every learner's growth.

DepEd Policymakers. The findings of this study offer valuable insights to the DepEd policymakers regarding how school heads and master teachers supervised and supported the use of game-based strategies in numeracy instruction. By identifying effective supervisory practices, it guided the development of policies that strengthened instructional leadership and promoted innovative, learner-centered approaches. This evidence supported national initiatives aimed at enhancing numeracy performance in basic education.

Future Researchers. Future researchers will benefit from this study as it provides a foundation for further exploration of diverse and new instructional approaches in numeracy. The study's results guided comparative analysis or deeper examinations of school-based factors affecting strategy implementation. It served as a reference for expanding research on emerging instructional methods.

Scope of the Study

This study focused on examining the supervisory approaches of school heads and master teachers in District 1 of the Municipality of Calatrava, Division of Negros Occidental, in relation to the use of game-based instructional strategies for numeracy improvement. This utilized descriptive-correlational-comparative research design and employed a research-developed questionnaire that undergone content validation and reliability testing. Data collection was conducted during the third quarter of School Year 2025-2026. The statistical tools that were used for data analysis include frequency count, percentage, mean, ANOVA, and Pearson-r.

Definition of Terms

This section provides the operational definitions of key terms to ensure clarity and consistency in understanding. These definitions specify how the concepts related to school leadership, supervisory

approaches, and game-based instructional strategies are applied within the context of numeracy improvement.

Age. In the context of this study, this refers to the duration of the identified respondents' existence in relation to their birthdate, classified as either younger or older.

Classroom Management. Operationally, the term refers to classroom management in the context of game-based learning is the collection of instructional and supervisory techniques used by educators and school administrators to guarantee the seamless, efficient, and equitable implementation of interactive, play-oriented strategies in the classroom.

Coaching. Operationally, coaching refers to supporting and aiding teachers to enhance their abilities and performance.

Effectiveness. Operationally, the term refers to the degree to which game-based learning strategies, under the direction of supervisory practices, increase students' numeracy outcomes can be defined as an operational definition of efficacy in the context of your study.

Feedback. Operationally, it alludes to visible activities including corrective instruction, praising good behavior, clearing up misunderstandings, and making recommendations for development.

Game-Based Instructional Strategies. Operationally, this refers to the use of structured games--digital, physical, or interactive to teach numeracy concepts. These strategies aim to enhance engagement by incorporating interactive games, both physical and digital, alongside team building activities and immediate feedback to support learners' understanding and retention of numeracy skills.

Highest Educational Attainment. Operationally, as employed in the survey, describes the greatest degree of education that the respondents have attained.

Implementation. Operationally, this refers to the actual process of applying game-based instructional strategies during classroom instruction, including the preparation, execution, and monitoring of game-based activities.

Improvement. Operationally, this refers to the measurable improvement in learners' numeracy performance as evidenced by assessment results following the implementation of game-based instructional strategies.

Leadership. Operationally, this refers to the school heads' and master teachers' intentional actions, decisions, and practices that support the effective use of game-based instructional strategies for numeracy enhancement.

Length of Service. This word, as used in this study, describes the length of time the respondent has worked for the Department of Education.

Mentoring. Mentoring is a systematic and quantifiable process by which master instructors or school administrators provide ongoing support to teachers as they adopt innovative pedagogical approaches, such as game-based learning. It entails visible activities including frequent coaching meetings, classroom observations, constructive criticism, and best practice modeling.

Numeracy. Operationally, this term refers to learners' ability to understand, apply, and reason with mathematical concepts, including skills in computation, estimation, measurement, and problem-solving.

Supervisory Approaches. Operationally, this refers to supervisory approaches refer to the methods, techniques and support mechanisms used by school heads and master teachers to guide, monitor, and assist teachers in implementing game-based instructional strategies for numeracy improvement.

CHAPTER 2

METHODOLOGY

This chapter presented the research design used to address the specific objectives of the study, along with the locale of the study, respondents, and data gathering instrument. It also discussed the validity, reliability, data gathering procedure, ethical considerations and statistical tools employed.

Research Design

The methodological technique known as descriptive comparative study design centers on characterizing and contrasting two or more groups, circumstances, or occurrences without manipulating any of the variables. It is frequently employed to find parallels and discrepancies across groups, situations, or behaviors. Descriptive research style is particularly useful for studies seeking to provide a clear depiction of current realities, as it focuses on the "what" of a situation rather than the "why," as Voxco (2021) claims. The respondents' demographic profile, including age, highest level of education, and length of service, was ascertained using the descriptive approach. Additionally, the effectiveness of game-based numeracy strategies and the supervisory approaches of master teachers and school heads were described.

The findings from the descriptive, comparative, and correlational analyses served as the basis for the development of an instructional development plan aimed at strengthening leadership and supervisory practices in the implementation of game-based strategies for numeracy.

Respondents of the Study

This study's respondents comprised of 48 school heads and master teachers from District 1 in the Municipality of Calatrava, Negros Occidental Division. Total enumeration was used in this study. This sampling method entails incorporating every individual from the target group. By guaranteeing thorough coverage and removing sampling bias, this method was well-suited for research that sought to encompass all viewpoints within a particular subgroup (Canonizado, 2024).

When the population size was manageable and directly related to the research objectives, total enumeration proved particularly suitable. In this instance, school leaders and master teachers possess distinctive supervisory responsibilities and experiences essential for understanding the implementation of game-based instructional strategies for numeracy. The study encompasses the entire population, which enhances the validity and contextual relevance of its findings, providing a robust foundation for policy recommendations and instructional improvements (Hassan, 2024).

Research Instrument

A researcher-developed questionnaire was used in this study, comprising of three parts designed to gather essential data relevant to the research problems. Part I of the instrument gathered demographic information from respondents, including age, highest educational attainment, and length of service. Part II measured the level of school heads and master teachers' supervisory approaches in monitoring and guiding teachers in the implementation of game-based instructional strategies for numeracy improvement, specifically in the areas of mentoring, coaching, classroom observation, and feedback, with five statement items for each area. Part III assessed the level of effectiveness of school heads and master teachers' supervisory approaches, implementing game-based instructional strategies, using the statement items.

To ensure content validity, three experts were evaluated the questionnaire and obtained a mean score of 4.78 interpreted as excellent based on the criteria developed by Carter V. Good and Douglas E. Scates, with the following interpretation ranges: Excellent (4.04-5.00), Very Good (3.28-4.03), Good (2.52-3.27), Fair (1.76-2.51), and Poor (1.00-1.75) . The reliability of the instrument was established using Cronbach's Alpha, a widely applied coefficient in educational and psychological measurement, with acceptable ranges as follows: Excellent (≥ 0.90), Good (0.89–0.80), Acceptable (0.79-0.70), Questionable (0.69-0.60), Poor (0.59-0.50), and Unacceptable (<0.50). A dry run was conducted with 30 school heads and master teachers from another schools of the Division of San Carlos City who are not part of the actual respondents to further assess the reliability of the research instrument which obtained a result of 0.980 excellent.

Data Collection Procedure

The researcher initiated the study by submitting a formal letter to the Schools Division Superintendent of Negros Occidental, requesting permission to conduct the research, in accordance with DepEd Order No.16, s. 2017, which outlined guidelines for research within DepEd schools.

Upon approval, a permission letter was provided to the school heads and master teachers at the selected schools in District I, seeking their consent to proceed. Before administering the questionnaire, respondents were fully informed about the purpose of the study, procedures, and any potential risks and benefits. They will indicate their voluntary participation by signing a written informed consent form. To ensure confidentiality, the respondents' identities will be kept anonymous, and codes or pseudonyms will be used to protect their personal information.

Following the acquisition of all necessary approvals and completing the orientation, the validated survey questionnaire was distributed to all school heads and master teachers' respondents. The data-gathering process was anticipated to take 3-4 weeks, affording respondents adequate time to complete the questionnaires. The researcher subsequently followed up with reminders and collected the completed upon submission. After collection, the responses were checked for completeness, tallied, tabulated, and analyzed using appropriate statistical tools for each research question. All collected data were securely stored and will remain accessible only to the researchers and authorized personnel.

Data Analysis Procedure

In processing the data collected via the questionnaire, the researcher employed both descriptive and inferential statistical tools. Frequency counts and percentages were used to describe the respondents' profiles, specifically regarding age, highest educational attainment, and length of service. The mean was used to determine the level of supervisory approaches in game-based learning (GBL) and their effectiveness when grouped according to profile variables. To test the significant differences in supervisory approaches and effectiveness across the different profile groups, the ANOVA was applied. Furthermore, Pearson correlation r) was used to examine the significant relationships between supervisory approaches and game-based strategies.

Statistical Treatment

In the data collection process, utilizing questionnaires, the researcher employed the following descriptive and inferential statistics:

For problem No. 1, which aimed to determine the profile of the respondents in terms of the following variables, namely age, highest educational attainment and length of service, frequency count and percentage distribution were used.

Formula:

$$\% = \frac{f}{n}x100$$

Where:

% - Percentage

f - Frequency

n- Number of Respondents

100- Constant

For problem No. 2, which aimed to determine the level of school heads and master teachers' supervisory approaches employed of game-based strategies for numeracy in terms of mentoring, coaching, classroom observation, and feedback, the weighted mean was used.

Formula:

$w\bar{x} = s1w5 + s2w4 + s3w3 + s4w2 + s5w1$

Where:

$w\bar{x}$ - Weighted Mean

s – Responses

w – Weight of Scale

The mean scores were interpreted as follows:

Range Score	Verbal Interpretation
4.21 – 5.00	Very High
3.61 – 4.20	High
2.41 – 3.60	Moderate
1.81 – 2.40	Low
1.00 – 1.80	Very Low

For problem No. 3, which aimed to determine the level of effectiveness of school heads' and master teachers' supervisory approaches in implementing game-based instructional strategies, the weighted mean was used.

The mean scores were interpreted as follows:

Range Score	Verbal Interpretation
4.21 – 5.00	Very Effective
3.61 – 4.20	Effective
2.41 – 3.60	Moderately Effective
1.81 – 2.40	Slightly Effective
1.00 – 1.80	Not Effective

For problem 4, which aimed to determine the significant difference between the level of school heads' and master teachers' supervisory approaches on game-based strategies for numeracy in terms of the different areas when grouped according to profile variables, ANOVA was used.

Analysis of Variance (ANOVA). This was employed to determine whether there were significant differences in the extent of supervisory and administrative interventions and the level of teachers' well-being when respondents were grouped according to their demographic profile. ANOVA was appropriate as it allows comparison among more than two groups.

For problem 5, which aims to determine the significant relationship between the level of effectiveness of school heads' and master teachers' supervisory approaches and the level of effectiveness of game-based strategies, Pearson's r was used.

Pearson Product-Moment Correlation Coefficient (Pearson r). This statistical tool was used to determine the significant relationship between the supervisory and administrative interventions and the teachers' well-being. Pearson r was appropriate since the study sought to measure the degree of association between variables.

If the p-value is less than or equal to the level of significant difference which is 0.05, then the null hypothesis will be rejected. If the p-value is greater than the level of significance difference, which is 0.05, then the null hypothesis will not be rejected. The Likert scale will also be used in this study, which was developed by American social psychologist Rensis Likert in 1932 commonly used in research questionnaires to measure attitudes, opinions, or perceptions. It presents respondents with a series of statements accompanied by symmetrical response options, typically structured on five-point scale.

Ethical Considerations

Informed Consent. The researcher was committed to upholding the highest ethical standards. All participants were fully informed about the purpose, procedures, and potential benefits of the study through a written information sheet. They were asked to sign an informed consent form to indicate voluntary participation. It was clearly explained that the research was conducted in fulfillment of the researcher's Master's Degree requirements and that their responses were used solely for academic purposes.

Confidentiality. Participants' identities were kept confidential, and personal identifiers were replaced with codes or pseudonyms to maintain anonymity. All data will be treated in compliance with the Data Privacy Act of 2012 (RA 10173), ensuring that personal information is collected, stored, and processed in accordance with the law. RA 10173 protects participants' privacy by requiring data to be handled solely for its original purpose and restricting all access and disclosure.

Voluntary Participation. Participation in the study was entirely voluntary. Respondents had the right to skip any questions they do not wish to answer and may withdraw from the study at any time without penalty. No coercion or incentives will be provided to influence participation.

Data Protection. Collected data was securely stored, accessible only to the research team, and will be deleted after transcription and analysis. Both physical and electronic data will be protected to prevent unauthorized access or disclosure, in accordance with RA 10173, which mandated the responsible handling of personal information to protect individuals' rights and privacy.

Risk and Mitigation. This study posed no physical risks. However, discussing personal experiences related to leadership and supervision may cause emotional discomfort. To mitigate this, participants were reminded that they may skip questions or withdraw from the study at any time. The researcher ensured that the rights, dignity, and welfare of all participants were respected and protected throughout the research process.

CHAPTER 3

RESULTS AND DISCUSSIONS

This chapter presents the data gathered in relation to the study's objectives analyzed using appropriate statistical tools, and interprets the results of those analyses.

Participants' Demographic Profile

This portion discussed the profile of the respondents in this study. The profile variables included age, highest educational attainment and length of service.

Table 1. Participants' Profile According to Age

(N=48)

Age	Frequency (f)	Percentage (%)
31-40	**10**	**20**
41-50	**19**	**40**
51 AND ABOVE	**19**	**40**
Total	**48**	**100**

Table 1 presented the demographic profile of the participants. The largest proportion fell within the 51 and above age group, followed closely by those participants aged 41–50, representing 40% of the sample collectively. Meanwhile, participants aged 31–40 accounted for 20%, placing them in the younger category. The data suggested that most of the respondents were seasoned school heads and master teachers, especially those aged 41 and over. This indicated that the teaching workforce examined in the study primarily consisted of seasoned professionals with considerable experience and years of service. The smaller percentage of participants aged 31–40, on the other hand, indicates a younger group of educators who may be at the beginning stages of their careers. This distribution underscored the prevalence of experienced teachers, which may influence the perspectives, practices, and professional insights documented in the study.

The predominance of older school heads and master teachers in the study highlighted the importance of supervisory approaches in sustaining innovative practices such as game-based strategies for numeracy improvement. Research suggests that experienced educators frequently possess extensive pedagogical knowledge and classroom management skills, which can support younger teachers in adopting new instructional strategies. Berdos (2022) noted that experienced school leaders' supportive supervision enhances teachers' ability to embrace collaborative and

creative approaches, particularly in mathematics insruction. This was in agreement with Russo et al. (2021), who observed that the effectiveness of games in mathematics was maximized when structured supervision was provided, ensuring alignment with curriculum standards and learning outcomes.

Furthermore, research on game-based learning (Lagmay et al., 2023; Ferasol et al., 2024; Cayang & Ursabia, 2024) consistently demonstrates its was effectiveness in enhancing numeracy skills by promoting engagement and motivation. The effective incorporation of these strategies was largely contingent on supervisory leadership. Experienced school heads were ideally positioned to provide mentoring, oversight, and professional development opportunities, ensuring that game-based methods are utilized as structured pedagogical tools rather than merely playful activities. Their oversight function was essential for connecting conventional teaching methods with contemporary innovations, which improved numeracy results among various groups of learners.

Based on respondents' profiles, the literature suggested that the implementation of game-based strategies benefited from the expertise and authority of older school heads, who dominated this group. Younger educators were guided and supported in adopting game-based methods to improve numeracy, and the acceptance and sustainability of these innovations can be influenced by their supervisory approaches.

Table 2. Distribution of Respondents According to Highest Educational Attainment

Highest Educational Attainment	Frequency (f) Percentage (%)	
With Master's Unit	**28**	**58**
With Master's Degree	**14**	**29**
With Doctorate Unit	**2**	**4**
With Doctorate Degree	**4**	**8**
Total	**48**	**100**

Table 2 shows the highest educational attainment of the participants. The majority hold master's units (28 or 58%), followed by those with a completed master's degree (12 or 29%), while only a small proportion have doctorate units (2 or 4%). This distribution suggested that most of the school heads and master teachers involved in the study were highly qualified, with advanced academic preparation beyond the bachelor's level. This profile is important when it comes to supervisory approaches. School heads who had graduate-level education typically possessed a deeper theoretical understanding, research experience, and professional training, all of which improved their capacity to assess, direct, and assist instructional innovations. Their advanced academic background enables them to critically evaluate the incorporation of game-based strategies in numeracy instruction, ensuring that these methods are not only engaging but also pedagogically sound and in line with curriculum standards.

The school heads and master teachers' level of education is essential in determining how they approach supervision and how effective they are at implementing innovative strategies like game-based learning to enhance numeracy. Research indicated that master teachers with graduate-level training were more adept at offering instructional supervision and technical support. As Concepcion and Labitad (2024) highlighted, consistent and effective supervisory skills significantly improve the teaching performance of master teachers forming the basis for robust school supervisory skills. Likewise, Gestupa (2023) emphasized that master teachers in Taguig and Pateros offered substantial instructional supervision and technical assistance, which directly aided teachers in implementing new classroom instruction strategies.

Finally, Cordova et al. (2024) underscored that leadership strategies for numeracy advancement are frequently shaped by the academic credentials of school heads who tend to exhibit greater aptitude for instructional leadership and innovation, particularly those with advanced degrees. This study's limited number of school heads and master teachers with doctorate units indicated a possible

leadership gap for large-scale innovation; nevertheless, the strong presence of master's-level schools heads offered a solid basis for guiding teachers in using game-based methods for numeracy.

Table 3. Distribution of Respondents According to Length of Service

Length of Service	Frequency (f) Percentage (%)	
6-10 years	**4**	**8**
11-15 years	**11**	**23**
16-20 years	**4**	**8**
21-25 years	**14**	**29**
26 years above	**15**	**31**
Total	**48**	**100**

Table 3 highlighted the distribution of the supervision experience among school heads in Calatrava I District. The majority were veteran school heads with 26 years and above (31%) and seasoned school heads with 21–25 years (31%), followed by mid-career supervisors with 11–15 years (23%), while the smallest group consisted of those with 6–10 years of experience (8%). This distribution reflected a workforce dominated by highly experienced leaders, with only a small proportion of relatively newer supervisors.

The dominance of veteran and experienced school leaders indicated that the district's supervisory methods were primarily influenced by enduring professional experience and institutional knowledge. It was probable that school heads who have served for decades have cultivated robust leadership abilities, possessed an extensive knowledge of curriculum standards, and have verified methods for directing teachers. This enabled them to offer organized oversight, mentoring, and practical support in applying novel approaches like game-based methods aimed at enhancing numeracy.

The distribution of teaching experience among school heads in the Calatrava I District, characterized by a majority veteran (26 years and above) and seasoned (21–25 years) school heads, underscored the importance of experience in shaping supervisory methods. According to Obuta, Salva, and Ferenal (2023), the teacher performance is significantly enhanced by the instructional supervisory skills of school heads, particularly when these school heads possess substantial professional experience, enabling them to offer structured guidance and mentoring. Similarly, Deluta (2023) emphasized that instructional supervision practices such as classroom observation, portfolio supervision, and professional growth initiatives are more effectively supported when conducted by seasoned school leaders who understand teachers' strengths and weaknesses.

Caguite and Ching (2023) underscored the need for adaptability in supervisory practices during the transition back to in-person classes within the realm of innovation, highlighted the vital involvement of seasoned school leaders in reconciling conventional supervisory approaches with emerging instructional needs. This was consistent with Valida (2023), who showed that skills in instructional supervision—such as acting as resource providers, curriculum specialists, and learning facilitators—were directly linked to enhanced student outcomes, particularly in multigrade settings where numeracy challenges are common.

In summary, the literature indicated that the dominance of veteran and seasoned school leaders in this study offered a robust basis for supervisory methods that guaranteed the successful application of game-based strategies. Their vast experience enabled them to reconcile tradition and innovation, leading teachers to incorporate game-based learning in methods that improved numeracy results.

Level of School Heads and Master Teachers Supervisory Approaches Employed in Game-Based Strategies for Numeracy

This portion discussed the profile of the respondents in this study. The level school heads and master teachers' supervisory approaches employed in game-based strategies for numeracy in terms the different areas.: Mentoring, Coaching, Classroom Observation, and Feedback. The data showed a consistently positive result, with all general weighted means falling within the "Very High" range (4.21-5.00).

Table 4.1. Level of Supervisory Approaches of School Heads and Master Teachers in Terms of Mentoring

	SA 5	A 4	N 3	D 2	SD 1	W M	I
1.1 I guide teachers in planning lessons that incorporate game-based strategies for numeracy.	34	10	3	1	0	4.60	VH
1.2 I provide advice to teachers on how to handle challenges in using games for numeracy instruction.	35	9	2	2	0	4.60	VH
1.3 I encourage teachers to explore innovative game-based activities for teaching numeracy.	32	13	2	1	0	4.58	VH
1.4 I support teachers in reflecting on their teaching practices involving game-based strategies.	32	13	2	1	0	4.58	VH
1.5 I offer personal guidance to teachers to improve their skills in numeracy instruction through games.	28	15	4	1	0	4.46	VH
	Overall Weighted Mean					**4.57**	**VH**

WM= Weighted Mean, I= Interpretation
Scale: 5= Strongly Agree(SA),4 = Agree (A),3 = Neutral (N),2 = Disagree (D),1 = Strongly Disagree (SD). Interpretation : VH = Very High (4.21–5.00).

The results in Table 4.1 demonstrate the great efficacy of supervisory tactics used by master teachers and school administrators to mentor students using game-based numeracy strategies. The high degree of alignment between supervisory practices and teacher requirements was highlighted by the continuous "Very High" ratings given to all aspects of supervisory interventions. Interestingly, mentorship had the highest weighted mean (GWM = 4.57), indicating its crucial function in assisting and advising educators in the application of creative tactics. This implies that mentoring is the most successful supervisory strategy for developing teachers' competence and confidence, in addition to being thought to be very effective.

The consistently high ratings affirmed the claims made in the Review of Related Literature that supervisory approaches, especially mentoring, was crucial in leading teachers toward instructional innovation. The importance of mentoring indicated that school heads were heavily involved in developing professional connections, providing tailored support, and promoting teacher development.

Mentoring was rated the highest among interventions, showcasing supervisors' capacity to cultivate professional relationships and offer individualized guidance. This was in agreement with the findings of Obuta, Salva, & Ferenal (2023), which indicated that school heads' instructional supervisory skills significantly improved teacher performance, especially when mentoring was viewed as a developmental tool rather than an evaluative one.

Table 4.2. Level of Supervisory Approaches of School Heads and Master Teachers in Terms of Coaching

	SA 5	A 4	N 3	D 2	SD 1	W M	I
1.1 I encourage teachers to set goals and evaluate their use of game-based strategies in numeracy.	32	13	2	1	0	4.58	VH
1.2 I monitor teachers' progress and give suggestions to improve their instructional practices.	26	19	2	1	0	4.46	VH
1.3 I conduct coaching sessions to enhance teachers' knowledge of game-based numeracy strategies.	27	16	4	1	0	4.44	VH
1.4 I demonstrate teaching techniques using games to help teachers improve their instruction.	26	18	3	1	0	4.44	VH
1.5 I provide step-by-step guidance for teachers implementing game-based numeracy lessons.	26	17	4	1	0	4.42	VH
	Overall Weighted Mean					**4.47**	**VH**

WM= Weighted Mean, I= Interpretation
Scale: 5= Strongly Agree (SA),4 = Agree (A),3 = Neutral (N),2 = Disagree (D),1 = Strongly Disagree (SD). Interpretation : VH = Very High (4.21–5.00).

Table 4.2 shows that coaching obtained a very high grade (GWM = 4.47) across all indicators as a supervisory strategy used by master teachers and school administrators in game-based numeracy strategies. This outcome emphasizes how important coaching is for improving teachers' teaching methods. According to the consistently high ratings, coaching gave teachers the organized, continuous support they needed to confidently incorporate cutting-edge, game-based teaching methods into their lessons.

This research implies that coaching not only improves instructors' pedagogical abilities but also creates a cooperative learning atmosphere that supports ongoing professional development. School administrators can guarantee that instructors have the support and feedback they need to enhance their methods, which will eventually increase student engagement and numeracy accomplishment, by making coaching a top priority as a supervisory tactic. This emphasizes coaching's significance within the larger framework of instructional leadership by highlighting it as a crucial tool for linking theory and practice.

According to Mangadlao & Oropa (2025), effective supervisory programs depended on instructional leadership, with coaching being essential for promoting ongoing improvement and excellence in instruction.

Table 4.3. Level of Supervisory Approaches of School Heads and Master Teachers in Terms of Classroom Observation

	SA 5	A 4	N 3	D 2	SD 1	W M	I
1.1 I observe how students respond and engage with game-based numeracy activities.	29	14	3	1	0	4.44	VH
1.2 I take detailed notes during classroom observations to identify areas for improvement..	27	17	2	1	0	4.42	VH
1.3 I provide constructive feedback based on my observations to guide teachers' improvement.	26	18	2	1	0	4.40	VH
1.4 I use observation checklists or tools to assess teaching effectiveness.	27	16	3	0	0	4.38	VH
1.5 I frequently observe teachers while they implement game-based numeracy lessons.	17	24	6	0	0	4.17	VH
	Overall Weighted Mean					**4.36**	**VH**

WM= Weighted Mean, I= Interpretation
Scale: 5= Strongly Agree(SA),4 = Agree (A),3 = Neutral (N),2 = Disagree (D),1 = Strongly Disagree (SD). Interpretation: VH = Very High (4.21–5.00).

Table 4.3 shows that classroom management, as a supervisory approach in game-based strategies for numeracy, received the lowest general weighted mean (GWM = 4.36) among the dimensions assessed, though it still falls within the "Very High" category. This indicates that while classroom management is recognized as highly effective, it may present more challenges compared to mentoring and coaching. The relatively lower rating for classroom observation suggests that teachers perceive this practice as more formal and evaluative, which can sometimes limit its collaborative potential.

The implication is that supervisory leaders should consider refining observation practices to emphasize constructive feedback and collegial support rather than purely evaluative functions. By reframing classroom management as a shared responsibility and integrating more participatory approaches, school heads and master teachers can enhance teacher receptiveness and maximize the benefits of supervision. Ultimately, strengthening the collaborative dimension of classroom observation could lead to more effective implementation of game-based strategies, fostering both teacher confidence and student engagement in numeracy learning.

Coaching and mentoring are effective supervisory techniques that improve teachers' active learning competencies, according to Phumsaidorn and Julsuwan (2024), who also demonstrated how

structured supervision encourages confidence and creativity in teaching methods. The importance of instructional supervision in multigrade classrooms was also emphasized by Deluta (2021), who pointed out that although classroom observation is crucial, it is frequently seen as more evaluative than collaborative—a finding that is consistent with the comparatively lower ratings for classroom management in your results.

When taken as a whole, these studies confirm that coaching and mentoring are very successful in fostering teachers' professional development and incorporating cutting-edge techniques like game-based learning, but classroom observation needs to be improved to strike a balance between supportive supervision and accountability. In order to ensure that all supervisory approaches significantly contribute to teacher development and student progress in numeracy, this body of work emphasizes the necessity for supervisory leaders to incorporate collaborative practices within observation.

Table 4.4. Level of Supervisory Approaches of School Heads and Master Teachers in Terms of Feedback

	SA 5	A 4	N 3	D 2	SD 1	W M	I
1.1 After observing game-based numeracy instruction, I provide prompt feedback to teachers.	29	15	2	2	0	4.48	VH
1.2 I provide suggestions for enhancing the effectiveness of game-based numeracy strategies.	27	18	1	1	0	4.44	VH
1.3 My feedback helps teachers become more confident in using games for teaching numeracy.	27	18	1	1	0	4.44	VH
1.4. I follow up to ensure that teachers apply the feedback provided.	26	19	1	1	0	4.42	VH
1.5 My feedback addresses in enhancing the quality of game-based teaching strategies.	25	20	1	1	0	4.40	VH
	Overall Weighted Mean					**4.43**	**VH**

WM= Weighted Mean, I= Interpretation
Scale: 5= Strongly Agree(SA),4 = Agree (A),3 = Neutral (N),2 = Disagree (D),1 = Strongly Disagree (SD). Interpretation : VH = Very High (4.21–5.00).

Table 4.4 reveals that feedback, as a supervisory approach in game-based strategies for numeracy, achieved a very high rating (GWM = 4.43). This indicates that school heads and master teachers are perceived as highly effective in delivering supportive interventions that strengthen teaching practices. The strong rating suggests that feedback is not only timely but also constructive, helping teachers refine their instructional methods and adapt game-based strategies more effectively.

This finding implies that regular, well-organized feedback encourages a culture of ongoing development, where educators are inspired and led to improve their performance in the classroom. Furthermore, good feedback ensures that creative tactics are applied faithfully and confidently by bridging the gap between supervisory leadership and classroom practice. School administrators may support teacher development, promote reflective practice, and eventually raise student engagement and numeracy achievement by keeping this high level of input.

As per Project DAGPAK (2025) by DepEd Camiguin, feedback from classroom observations played a crucial role in addressing learning gaps and enhancing instructional delivery, illustrating the direct impact of supervisory interventions on improving learner outcomes. Even though classroom observation was rated the lowest of the four interventions, it was still seen as very high. This implied that although teachers viewed observation as more formal, it was still an essential supervisory tool.

In summary, the results indicated that supervisory interventions in the Calatrava I District were very effective, with mentoring and coaching being the most powerful catalysts for teacher development and innovation. These methods offered teachers the essential backing to incorporate game-based

strategies into numeracy teaching with confidence, while classroom observation and feedback facilitate accountability and ongoing enhancement.

When linking these results to the results of this study, the exceptionally high evaluations of all supervisory measures corroborate that Calatrava I District school heads and master teachers were both effective leaders and promoters of innovation. Their methods of mentoring, coaching, and providing feedback offered teachers the essential backing needed for them to confidently adopt game-based strategies aimed at enhancing numeracy skills. Meanwhile, classroom observation guaranteed accountability and conformity with curriculum standards.

Table 4.5. Level of Supervisory Approaches of School Heads and Master Teachers in Terms of Different Dimensions

Key Dimensions	**Weighted Mean**	**Descriptive Rating**
Mentoring	4.57	Very High
Coaching	4.47	Very High
Classroom Observation	4.30	Very High
Feedback	4.43	Very High
Overall	**4.44**	**Very High**

Table 4.5 showed the different supervisory approaches of school heads and master teachers in implementing game-based strategies for numeracy are highly evident.

Among the dimensions, *Mentoring* obtained the highest rating (M=4.57), followed by *Coaching* (M=4.47) Feedback (4.43) and the lowest rating obtained by Classroom Observation (M=4.30) all were beneficial to teachers, more thorough scaffolding during real-world implementation may increase the efficacy of game-based numeracy training.

The findings suggest that since mentoring offers individualized and ongoing support, it is the best supervisory strategy for assisting teachers in implementing game-based numeracy initiatives. In order to maximize its impact, classroom observation may need to be reframed as collaborative rather than evaluative, even if coaching and feedback are still crucial because they provide constructive criticism and reinforce abilities. Overall, these results indicate that while supervisory support is important, teachers' capacity to successfully implement game-based tactics can be further strengthened by more organized scaffolding, such as lesson modeling, the provision of readily usable resources, and reflective workshops.

According to a 2024 study titled Leveling Up Mathematical Skills: The Effectiveness of Game-Based Learning, elementary students' performance in mathematics significantly improved as a result of game-based learning interventions, underscoring the significance of supervisory support in assisting teachers with implementation.

Level of Effectiveness of Supervisory Approaches in Implementing Game-Based Strategies

This portion showed how effective supervisory approaches were in implementing game-based strategies to enhance numeracy. The ratings yield important information about how much supervisory interventions help teachers use innovative, game-based approaches to improve learners' numeracy skills. The study highlighted the vital importance of supervision for making sure that instructional innovations were not just implemented but also effectively maintained in classroom practice, as evidenced by an examination of these results.

Table 5. Level of Effectiveness of Supervisory Approaches in Implementing Game-Based Strategies

	VE 5	E 4	ME 3	SE 2	NE 1	WM	I
1.1 I encourage teachers to explore digital and traditional games to enhance numeracy.	32	15	0	0	1	4.6	VE
1.2 I provide guidance on integrating game-based strategies in numeracy lessons.	25	22	1	0	1	4.52	VE
1.3 I recognize teachers who successfully apply game-based strategies.	30	16	0	1	1	4.52	VE
1.4 I provide opportunities for teachers to practice and apply learned strategies..	29	17	0	1	1	4.50	VE
1.5 I provide timely feedback after observing game-based numeracy activities.	26	20	0	1	1	4.44	VE
1.6 I observe teachers' numeracy lessons to assess the use of game-based strategies.	26	20	0	0	2	4.42	VE
1.7 Classroom observations lead to visible improvement in teaching numeracy through games.	26	20	0	0	2	4.42	VE
1.8 Teachers exhibit motivation/effort to enhance their numeracy instruction after receiving feedback.	25	21	0	1	1	4.42	VE
1.9 I monitor and support teachers' progress after coaching sessions.	25	21	0	0	2	4.40	VE
1.10 I regularly conduct mentoring sessions focused on improving numeracy instruction.	23	22	1	1	1	4.35	VE
	Overall Weighted Mean					**4.46**	**VE**

WM= Weighted Mean, I= Interpretation
Scale: 5 = Very Effective (VE), 4 = Effective (E), 3 = Moderately Effective (ME), 2 = Slightly Effective (SE), 1 = Not Effective (NE).
Interpretation: VE – Very Effective (4.21 – 5.00 Very Effective)

The consistently high levels of effectiveness of school heads and master teachers in implementing game-based strategies, reflected in the overall weighted mean of 4.46 (interpreted as very effective), provided compelling empirical evidence of the strong supervisory leadership within the district. This result indicated that supervisory approaches was not only being implemented but perceived by teachers as highly effective in guiding the integration of game-based strategies for numeracy improvement.

The finding indicated that supervisory leadership became crucial for maintaining instructional innovations. The school heads' ability to offer consistent guidance, technical support, and encouragement implied by the extremely high effectiveness rating enabled teachers to adopt game-based strategies with confidence. This was in accordance with the principle that effective supervision goes beyond mere administration to include instruction, as it has a direct effect on teaching practices and student outcomes.

Education has long recognized supervision as a crucial means of enhancing teaching performance and maintaining instructional innovations. According to Obuta, Salva, and Ferenal (2023), the instructional supervisory skills of school heads significantly improved teacher performance. They noted that mentoring, coaching, and feedback offered structured guidance and instilled confidence in teachers to adopt new methods. In the same vein, Casuyon and Bautista (2024) underscored that master teachers' abilities in supervision and technical assistance were reliably effective in enhancing classroom practices, illustrating the crucial importance of supervisory competence for maintaining innovation.

Significant Difference between the Level of School Heads and Master Teachers on Supervisory Approaches on Game-Based Strategies for Numeracy when grouped According to Profile Variables

This section investigated the notable differences in the respondents' profiles, concentrating on key demographic variables such as age, highest level of education achieved, and tenure. These variables offered crucial context for comprehending how supervisors' backgrounds and professional experiences affected their methods of implementing game-based strategies for enhancing numeracy. The study sought to determine if variations in demographic characteristics were linked to different supervisory practices by examining these differences. In doing so, it aims to provide insights into how

instructional leadership effectiveness was influenced by experience, academic preparation, and generational perspectives.

Table 6.1. Analysis of Variance on the difference of Supervisory Interventions with regard to Age

N = 48

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.730	1	0.730	1.264	0.267
Within Groups	26.582	46	0.578		
Total	27.313	47			

0.05 - Level of Significance df – Degree of Freedom

Age

Table 6.1 presented the results of the analysis of variance (ANOVA) on the level of leadership and supervisory approaches in implementing game-based strategies for numeracy when grouped according to age. The test yielded F (1,46) = 1.264 with a p-value = 0.267, indicated that there was no statistically significant difference in supervisory approaches across age groups. This suggested that respondents, regardless of age, reported similar levels of supervisory support and leadership effectiveness in the implementation of game-based strategies.

The absence of significant differences across age groups implied that supervisory approaches in the district were consistently applied and experienced uniformly by teachers and school heads, whether they belong to younger or older age categories. This finding validated the notion that effective supervision is not dependent on the age of the school heads but rather on the quality and consistency of supervisory practices.

This finding was anchored to the Review of Related Literature and supported studies that highlighted the effectiveness of mentoring, coaching, feedback, and classroom observation as supervisory interventions when applied systematically, regardless of demographic differences. It emphasized that supervisory leadership in the Calatrava I District was both inclusive and standardized, guaranteed that all educators received equal support in embracing innovative practices like game-based strategies for enhancing numeracy.

The discovery that supervisory methods showed little variation among different age groups aligned with literature indicating that factors such as professional competence and leadership skills, rather than age, determining the effectiveness of supervision. The interpersonal, leadership, and supervisory skills of public school heads in Sibonga District were examined by Trongco & Benolirao (2023), found that supervisory competence was consistently rated highly across respondent groups, with no significant differences linked to demographic variables such as age. This showed that the effectiveness of supervision was more linked to institutional support and professional development than to generational differences.

Table 6.2. Analysis of Variance on the Level of Effectiveness of Supervisory Approaches with regard to Highest Educational Attainment

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.176	1	3.176	4.050	0.051
Within Groups	36.074	46	0.784		
Total		47			

0.05 - Level of Significance df – Degree of Freedom

Highest Educational Attainment

Table 6.2 presented the analysis of variance (ANOVA) on the respondents' level of leadership and supervisory approaches in implementing game-based strategies for numeracy when grouped according to highest educational attainment. The test yielded F(1,46) = 4.050 with a p-value > 0.051, indicated that there was no statistically significant difference in supervisory approaches across educational attainment levels. This means that whether respondents had master's units, completed master's degrees, or doctorate units, their reported level of leadership and supervisory practices remained consistent.

The lack of notable differences in educational attainment implied that supervisory methods in the district were applied and experienced uniformly, irrespective of the academic qualifications of the school heads and master teachers. This finding suggested that effective supervision was more influenced by professional competence, experience, and the institutional supervisory frameworks guiding practice than by the highest degree earned.

This result, anchored to the Review of Related Literature, corroborates studies that highlighted the effectiveness of mentoring, coaching, classroom observation, and feedback as supervisory interventions when applied systematically, regardless of demographic or academic differences. As an illustration, a study conducted by Casuyon & Bautista (2024) underscored the consistent effectiveness of master teachers' supervisory and technical assistance skills in guiding teachers, irrespective of the teachers' possession of master's units or completion of graduate degrees. In the same vein, Obuta, Salva, & Ferenal (2023) discovered that there was a stronger connection between supervisory skills and leadership style as well as professional development than there was with formal educational attainment.

This consistency was vital for game-based strategies aimed at enhancing numeracy. This showed that regardless of their own educational qualifications, school heads ans master teachers were all able to assist teachers in embracing innovative practices. The finding strengthened the notion that factors such as experience, training, and leadership competence play a greater role in shaping supervisory effectiveness than academic credentials alone.

Table 6.3. Analysis of Variance on the difference of Level of Leadership and Supervisory Approachess with regards to Length of Service

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.730	1	0.730	0.385	0.538
Within Groups	87.249	46	1.897		
Total	87.979	47			

0.05 - Level of Significance *df – Degree of Freedom*

Length of Service

Table 6.3 presented the results of the Analysis of Variance (ANOVA) on the frequency of leadership and supervisory approaches received by respondents when grouped according to length of service. The test yielded F (1,46) = 0.385 with a p-value = 0.538, indicating that there was no statistically significant difference in supervisory approaches across groups based on years of service. This means that whether respondents were mid-career, seasoned, or veteran school heads, the level of leadership and supervisory support they reported was consistent.

The absence of significant differences across length of service suggested that supervisory approaches in the district were uniformly applied and experienced, regardless of how long respondents had been in the profession. This finding implied that supervisory effectiveness was not dependent on tenure but rather on the institutional consistency of supervisory practices such as mentoring, coaching, classroom observation, and feedback.

Anchored to the Review of Related Literature, this result supported studies emphasizing that supervisory practices were most effective when standardized and system-driven rather than influenced by individual characteristics like years of service. For example, Gestupa (2023)

highlighted that master teachers' supervisory and technical assistance skills were consistently effective across different teacher profiles, while Casuyon & Bautista (2024) noted that supervisory competence was shaped more by training and leadership style than by length of service.

Relationship of the Participants between the Level of School Heads and Master Teachers Supervisory Approaches and the Level of Effectiveness of Game-Based Strategies

This portion of the study examined the relationship between the supervisory approaches of school heads and master teachers and the level of effectiveness of game-based strategies for numeracy improvement**.** By analyzing this relationship, the study sought to determine how leadership and supervision influenced the implementation and outcomes of game-based strategies, thereby highlighted the extent to which supervisory support contributed to enhancing learners' numeracy skills. This analysis provided valuable insights into whether effective supervision directly correlates with the perceived success of game-based approaches in classroom instruction.

Table 7. Supervisory Approaches and the Level of Effectiveness of Game-Based Strategies

Variable	n Pearson's r Sig. (2 failed)
Level of Supervisory Approaches	48 0.985 0.011

Table 7 presented the correlation analysis between the level of supervisory approaches and the level of effectiveness of game-based strategies for numeracy improvement. The test revealed a very strong positive correlation (r = 0.985) with a p-value = 0.002, indicating that the relationship between the two variables was statistically significant. This means that as the quality and consistency of supervisory approaches increase, the effectiveness of game-based strategies in numeracy also improves.

The outcome illustrated that supervisory methods such as mentoring, coaching, classroom observation, and providing feedback were essential for the effective implementation of game-based strategies. The robust correlation indicated that effective oversight directly bolstered teachers' capacity to adopt innovative instructional methods, resulting in better numeracy outcomes for students. This discovery confirmed the claim that supervisory leadership goes beyond administration to encompass instruction, influencing teachers' adoption and maintenance of innovations. Teachers were more confident and able to incorporate game-based learning into their math instruction when school heads offered steady mentoring and constructive feedback. On the other hand, weak or inconsistent supervision can impede the effectiveness of these strategies.

Mentoring, coaching, classroom observation, and feedback were long-established supervisory methods that were crucial for reinforcing instructional practices and guaranteeing the effective application of innovative strategies. As noted by Obuta, Salva, and Ferenal (2023), the instructional supervisory skills of school heads significantly improved teacher performance, with mentoring and coaching providing teachers confidence and structured guidance in adopting new methods. In the same vein, Casuyon and Bautista (2024) pointed out that master teachers' skills in supervision and technical support were reliably effective at enhancing teaching performance, showed that supervisory competence was crucial for maintaining instructional innovations.

Paglomutan (2024) showcased that while game-based strategies in mathematics led to notable enhancements in student performance, their effectiveness hinged on organized supervisory support to assist teachers in their application. This highlighted the robust link identified in the current research between supervisory methods and the efficacy of game-based strategies, corroborating that effective supervision directly bolsters teachers' capacity to incorporate innovative practices into their classroom teaching. Collectively, these studies confirmed the conclusion that supervisory leadership was a crucial factor in instructional effectiveness, ensuring that innovations like game-based learning were not only implemented but also successfully maintained to enhance numeracy outcomes.

CHAPTER 4

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

SUMMARY OF FINDINGS

This descriptive–correlational-comparative study investigated the supervisory approaches employed in the implementation of game-based strategies for numeracy improvement in public elementary schools within the District of Calatrava I, Negros Occidental, during the School Year 2025–2026. The study involved 48 school heads and master teachers as respondents, from whom data were collected using a validated and reliable researcher-developed questionnaire. The gathered data were subjected to both descriptive and inferential statistical analyses to determine patterns, relationships, and the extent to which supervisory practices influence the effectiveness of game-based strategies in enhancing numeracy skills.

The major findings of the study are as follows:

Profile of the School heads and Master Teacher-Respondent

The study revealed that the majority of school heads and master teachers belonged to the age groups 41–50 years and 51 years and above, each comprising 40% of the respondents. In terms of educational attainment, a significant proportion (58%) had completed a master's unit. Teaching experience was fairly distributed across groups, with the largest segment (31%) having rendered 26 years or more of service. These demographic characteristics highlighted a supervisory workforce that was both academically qualified and professionally seasoned, providing a strong foundation for guiding the implementation of game-based strategies for numeracy improvement.

Level of School Heads and Master Teachers Supervisory Approaches Employed in Game-Based Strategies for Numeracy

The overall weighted mean of 4.46 indicated that School Heads and Master Teachers employed supervisory approaches across all domains to a significant extent. This showed that they consistently and effectively used supervisory practices, highlighted their strong dedication to guiding and supporting the implementation of instructional strategies.

Level of Effectiveness of School Heads and Master Teachers in Implementing Game-Based Strategies

School heads and master teachers were found to be very effective in implementing game-based strategies, as indicated by an overall weighted mean of 4.46.

Differences between the Level of School Heads and Master Teachers Supervisory Approaches on Game-Based Strategies in terms of Different Domains

Analysis of Variance (ANOVA) revealed no significant differences in the level of supervisory approaches on game-based strategies in terms of different domains when school heads and master teachers were grouped by age, highest educational attainment and length of service.

Relationship Between Level of School Heads and Master Teachers Supervisory Approaches and the Level of Effectiveness of Game-Based Strategies

A very strong positive correlation was found between supervisory approaches of school heads and master teachers and the level of effectiveness of game-based strategies ($r = 0.985$) with a p-value = 0.002, indicating that the relationship between the two variables is statistically significant.

Instructional Developmental Plan Formulation

Based on the findings, a comprehensive instructional developmental plan was designed to enhance supervisory approaches in support of the implementation of game-based strategies for numeracy improvement in the District of Calatrava I. The plan integrated evidence-based strategies that directly addressed identified gaps, particularly in supervisory practices, teaching methodologies, and resource accessibility. At the same time, it reinforced effective supervisory approaches that had

been shown to positively correlate with improved numeracy outcomes, thereby ensuring a more systematic and sustainable framework for instructional leadership and classroom innovation.

Conclusion

Based on the comprehensive analysis of data collected from 48 public elementary school heads and master teachers in the District of Calatrava I, Negros Occidental, the following conclusions have been derived:

Profile of the School heads and Master Teacher-Respondents

The demographic profile of school heads and master teachers in the District of Calatrava I demonstrated a supervisory workforce that was both academically competent and professionally experienced. With the majority belonging to the 41–50 and 51 years and above age groups, and a significant proportion holding master's units, these leaders possessed the maturity and advanced preparation necessary for effective instructional supervision. Furthermore, the substantial teaching experience, particularly the large segment with 26 years or more of service, underscores their depth of expertise and practical knowledge of classroom realities. Collectively, these attributes provided a solid foundation for the successful adoption and supervision of game-based strategies for numeracy improvement, ensuring that implementation was guided by seasoned judgment, evidence-based practices, and a strong commitment to educational advancement.

Level of School Heads and Master Teachers Supervisory Approaches Employed in Game-Based Strategies for Numeracy

The findings confirmed that School Heads and Master Teachers consistently applied supervisory approaches across all domains. Their effective use of these practices reflects a strong commitment to instructional leadership and underscores their vital role in guiding and supporting the successful implementation of teaching strategies.

Level of Effectiveness of School Heads and Master Teachers in Implementing Game-Based Strategies

The result of the study demonstrated that school heads and master teachers were very successful in applying game-based methods for enhancing numeracy. Their reliable and adept use of these methods demonstrated a firm commitment to innovative teaching practices and strong instructional leadership. This effectiveness highlighted their crucial responsibility for the successful incorporation of game-based strategies into classroom teaching, which ultimately promoted improved numeracy outcomes among students.

Differences between the Level of School Heads and Master Teachers Supervisory Approaches on Game-Based Strategies in terms of Different Domains

The analysis showed that supervisory approaches to implementing game-based strategies were consistently applied across all domains, irrespective of differences in age, educational attainment, or length of service among school heads and master teachers. This implied that supervisory practices were consistent and reliable, demonstrating a collective dedication to instructional leadership that goes beyond demographic differences. Such consistency highlighted the dependability of supervisory methods in aiding the successful incorporation of game-based strategies aimed at enhancing numeracy.

Relationship Between Level of School Heads and Master Teachers Supervisory Approaches and the Level of Effectiveness of Game-Based Strategies

The findings demonstrated a very strong and statistically significant positive correlation between the supervisory methods employed by school leaders and master teachers and the efficacy of game-based strategies aimed at enhancing numeracy skills. This showed that the success of game-based strategies in improving numeracy outcomes increased with the consistency and effectiveness of supervisory practices. This finding emphasized how crucial effective instructional supervision was

for ensuring that innovative teaching methods were applied consistently and led to significant enhancements in student learning.

Recommendations

Based on the findings and conclusions of this study, the following actionable recommendations were put forth for key stakeholders to enhance supervisory approaches in implementing game-based strategies aimed at improving numeracy in public elementary schools. These recommendations held special significance for rural and upland areas like the Calatrava District I, where effective supervision, resource accessibility, and innovative teaching practices were vital for improving learner outcomes.

For School Heads

School Heads were encouraged to strengthen their instructional leadership by consistently applying supervisory approaches that supported the effective integration of game-based strategies in numeracy instruction. They were encouraged to establish the practice of regular monitoring and coaching to guarantee adherence to the use of game-based activities. Encourage joint planning with master teachers and classroom teachers to create engaging, learner-centered numeracy lessons. Support professional growth by arranging training and workshops centered on innovative teaching methods and effective supervision. Guarantee the accessibility of resources by leveraging school funds, partnerships, and community support to supply materials necessary for game-based learning. Exemplify best practices in supervision by showing how evidence-based methods can improve numeracy outcomes.

For Master Teachers

Master Teachers were encouraged to maximize their expertise and leadership roles in strengthening the implementation of game-based strategies for numeracy improvement. They were encouraged to act as instructional mentors by demonstrating the effective use of game-based strategies in teaching. Promote peer learning via demonstration lessons, joint planning sessions, and the exchange of effective strategies. Assist school leaders in overseeing and assessing the incorporation of game-based strategies to ensure adherence and consistency. Adjust teaching strategies to accommodate the varied needs of learners, especially in rural and upland settings, through the contextualization of games to align with local realities. Encourage innovation through trials of new game-based activities and the documentation of effective practices for broader implementation in schools. Promote reflective practice among teachers, helping them evaluate the effects of game-based strategies on learner performance and make adjustments as needed.

For Teachers

Teachers were encouraged to actively integrate game-based strategies into their numeracy instruction, ensuring that classroom practices are both engaging and effective. They were encouraged to embrace learner-centered methods through the use of games that encourage active involvement, teamwork, and problem-solving. Adapt game-based activities to align with local realities and resources, ensuring they are pertinent and accessible to learners in rural and upland areas. Work together with lead teachers and school administrators to plan, carry out, and assess game-based lessons, making sure they align with supervisory guidance. Employ the available teaching resources in inventive ways, adding low-cost or local materials to maintain game-based learning. Participate in reflective practice by routinely evaluating how game-based tactics affect learner performance and modifying your approaches as needed. Exchange effective methods and cutting-edge developments with colleagues to foster a collaborative culture and ongoing enhancement of numeracy teaching.

For Curriculum Planners

Curriculum Planners were encouraged to integrate game-based strategies into the formal curriculum for numeracy instruction, ensuring alignment with supervisory approaches and instructional goals. They were encouraged to incorporate game-based learning activities into numeracy modules to

enhance engagement and focus on learners. Create adaptable curriculum guides that enable teachers to tailor game-based strategies to various situations, especially in rural and upland schools. Offer explicit criteria and reference points for evaluating how effective game-based approaches are in enhancing numeracy results. Work together with principals and master teachers to guarantee that supervisory practices are in line with curriculum expectations and instructional innovations. Include training elements in curriculum development initiatives to ensure teachers have the skills necessary for effective design and implementation of game-based activities. Promote the contextualization and localization of game-based strategies, making certain that activities are aligned with learners' cultural backgrounds and the resources at their disposal.

For Department of Education

The Department of Education was encouraged to institutionalize and strengthen support systems that enhanced supervisory approaches and promoted the effective implementation of game-based strategies for numeracy improvement. Specifically, DepEd was encouraged to Create national policies and guidelines that officially incorporate game-based strategies into numeracy teaching to ensure uniformity across schools. Offer ongoing professional development initiatives aimed at school leaders, master teachers, and classroom teachers that concentrate on supervisory techniques and innovative pedagogical approaches. Provide sufficient resources and funding to aid in the creation, adaptation, and distribution of instructional materials for game-based learning, especially in rural and upland schools. Set up monitoring and evaluation mechanisms to gauge how effective supervisory approaches are and how game-based strategies affect learner outcomes. Promote equity and inclusivity by customizing interventions to address the specific challenges faced by geographically isolated and disadvantaged schools, so that all learners can take advantage of innovative strategies.

For Future Researchers

Future researchers were encouraged to build upon the findings of this study by exploring broader and deeper dimensions of supervisory approaches and game-based strategies for numeracy improvement. They were encouraged to broaden the research scope to encompass additional districts or regions, facilitating comparative analysis across various educational contexts. Examine the long-term effects of supervisory practices and game-based strategies on learners' numeracy performance and overall academic success. Investigate further variables like teacher motivation, learner engagement, resource allocation, and community support to achieve a more comprehensive understanding of the factors affecting effectiveness. Record effective methods and difficulties faced during the implementation process to offer actionable guidance for curriculum planners, school leaders, and policymakers.

INSTRUCTIONAL DEVELOPMENTAL PLAN

Enhancing Supervisory Approaches for Effective Implementation of Game-Based Strategies in Numeracy Improvement

Calatrava I District, Negros Occidental

School Year 2026–2027

Goal

To strengthen and sustain supervisory approaches (mentoring, coaching, classroom observation, and feedback) that directly support teachers in effectively implementing game-based strategies for numeracy improvement across all grade levels.

Framework of the Plan

1. Capacity Building for Supervisors

Mentoring Workshops: Train school heads and master teachers on structured mentoring techniques that emphasize relationship-building and personalized guidance.

Coaching Clinics: Provide hands-on training in instructional coaching, focusing on integrating game-based strategies into numeracy lessons.

Observation Protocols: Standardize classroom observation tools to ensure observations are supportive rather than evaluative.

Feedback Training: Develop skills in delivering constructive, actionable feedback that encourages innovation.

2. Teacher Professional Development

Game-Based Pedagogy Training: Conduct seminars and workshops on designing and implementing game-based activities for numeracy.

Peer Learning Circles: Establish collaborative groups where teachers share experiences, challenges, and best practices in using game-based strategies.

Model Lessons: Supervisors and master teachers demonstrate exemplar game-based numeracy lessons for replication.

3. Supervisory Support Systems

Regular Mentoring Sessions: Schedule one-on-one or small group mentoring sessions to address specific teacher needs.

Instructional Coaching Cycles: Implement coaching cycles (pre-conference, observation, post-conference) tailored to game-based numeracy instruction.

Feedback Integration: Ensure feedback from observations is linked to actionable steps for improving game-based strategies.

Monitoring Tools: Develop rubrics/checklists to track the integration and effectiveness of game-based strategies in classrooms.

4. Resource Development

Game-Based Strategy Guidebook: Create a manual of numeracy games, aligned with curriculum standards, for teachers to use.

Digital Repository: Establish an online platform containing lesson exemplars, video demonstrations, and supervisory tools.

Instructional Materials: Provide ready-to-use game kits and digital applications for numeracy learning.

5. Evaluation and Continuous Improvement

Quarterly Review Meetings: Supervisors and teachers review progress, challenges, and successes in implementing game-based strategies.

Impact Assessment: Use student performance data in numeracy to measure the effectiveness of supervisory approaches.

Feedback Loop: Incorporate teacher and learner feedback into refining supervisory practices.

Recognition Programs: Acknowledge teachers and supervisors who demonstrate excellence in implementing game-based strategies.

Interpretation of Alignment with Results

1. The very high ratings for mentoring, coaching, feedback, and observation validate their inclusion as core pillars of the plan.
2. The no significant differences across age, attainment, and service length imply that the plan can be applied uniformly across all supervisors, ensuring inclusivity.

3. The strong positive correlation (r = 0.985) confirms that strengthening supervisory approaches will directly enhance the effectiveness of game-based strategies, making supervision the key driver of innovation in numeracy instruction.

Supporting Literature

1. Obuta, Salva, & Ferenal (2023) emphasize that supervisory skills significantly enhance teacher performance.
2. Casuyon & Bautista (2024) highlight that master teachers' supervisory competence strengthens instructional innovations.
3. Gestupa (2023) notes that supervisory practices are crucial in maintaining instructional quality across teacher profiles.
4. Paglomutan (2024) demonstrates that game-based strategies improve mathematics performance, but require structured supervisory support.

Program Proposal

Title: Strengthening Supervisory Approaches for Effective Implementation of Game-Based Strategies in Numeracy Improvement

General Objective

To enhance the effectiveness of supervisory approaches (mentoring, coaching, classroom observation, and feedback) in supporting teachers' implementation of game-based strategies for numeracy improvement.

Specific Objectives

1. Build the capacity of school heads and master teachers in mentoring, coaching, observation, and feedback.
2. Provide teachers with professional development on game-based pedagogy for numeracy.
3. Establish supervisory support systems that ensure consistent monitoring and guidance.
4. Develop instructional resources to aid teachers in implementing game-based strategies.
5. Evaluate the impact of supervisory approaches on the effectiveness of game-based strategies.

Program Components

1. Capacity Building for Supervisors

- Conduct workshops on mentoring and coaching.
- Train supervisors on supportive classroom observation techniques.
- Provide seminars on delivering constructive feedback.

2. Teacher Professional Development

- Organize training sessions on game-based numeracy strategies.
- Facilitate peer learning circles for sharing best practices.
- Demonstrate model lessons integrating game-based approaches.

3. Supervisory Support Systems

- Implement regular mentoring sessions.
- Establish coaching cycles (pre-conference, observation, post-conference).
- Use standardized monitoring tools to track implementation.

4. Resource Development

- Create a guidebook of numeracy games aligned with curriculum standards.
- Develop a digital repository of lesson exemplars and supervisory tools.
- Provide instructional materials and digital applications for numeracy games.

5. Evaluation and Continuous Improvement

- Conduct quarterly review meetings to assess progress.
- Use student performance data to measure impact.
- Gather teacher and learner feedback for refinement.
- Recognize outstanding supervisors and teachers.

Activity	Responsible Person(s)	Timeframe
Supervisor mentoring & coaching workshops	District Supervisor, School Heads	Q1
Teacher training on game-based strategies	Master Teachers, Trainers	Q2
Implementation of coaching cycles	School Heads, Master Teachers	Q2–Q3
Resource development (guidebook, repository)	Curriculum Developers, ICT Coordinators	Q3
Evaluation & recognition program	District Supervisor, School Heads	Q4

Figure 2. Proposed Timeline

Responsible Persons

- **District Supervisor** – Overall program oversight
- **School Heads** – Implementation of supervisory approaches
- **Master Teachers** – Mentoring and technical assistance
- **Curriculum Developers/ICT Coordinators** – Resource development
- **Teachers** – Implementation of game-based strategies

Budget Outline

- Training workshops (venue, materials, resource speakers) – ₱50,000
- Resource development (guidebook, instructional kits) – ₱30,000
- Monitoring and evaluation tools – ₱20,000
- Recognition program – ₱10,000

Total Estimated Budget: ₱110,000

Expected Outcomes

- Supervisors demonstrate enhanced mentoring, coaching, observation, and feedback skills.
- Teachers effectively integrate game-based strategies into numeracy instruction.
- Learners show improved numeracy performance through engaging, game-based activities.
- Supervisory practices become standardized and institutionalized across the district.

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