

Beyond numbers: Unveiling mathematics teachers' confidence and creativity in 21st century classrooms

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Abstract

This study explored how mathematics teachers navigate 21st century instruction, especially regarding their confidence and creativity. To fill this gap, this phenomenological study examined the lived experiences of public DepEd mathematics teachers in the Cervantes District, Ilocos Sur, focusing on their beliefs, instructional strategies, and systemic challenges they face in fostering confidence and creativity in modern classrooms. The findings show that teachers have varying levels of confidence in adopting new pedagogical methods, with creativity often constrained by institutional expectations, scarce resources, and strict curricula. Despite these obstacles, teachers employ adaptive strategies such as contextualized problem solving and technology use that demonstrate a strong commitment to meaningful mathematics teaching. The study also reveals that confidence and creativity are closely linked, with a supportive school environment and ongoing professional development playing crucial roles. However, the study did not explore long-term professional development programs, collaborative learning communities, or institutional policies, areas that future research should investigate to better understand systemic supports for 21st century mathematics education.

Keywords: mathematics education, 21st century instruction, teachers' lived experience, teacher beliefs, instructional strategies, phenomenology

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1. Introduction

Mathematics is often called the “language of science,” underpinning reasoning, problem-solving, and innovation. Teaching now emphasizes teacher confidence and creativity, with studies from Finland and Singapore showing confident teachers use inquiry-based learning and digital tools to enhance practice. Empowered teachers adopt modern techniques, boost engagement, and develop critical thinking (Niu, Xu, & Yu, 2025; Gervacio & Galigao, 2025). In the 21st century, teacher self-efficacy improves education by shaping strategies and supporting resilience (Calkins et al., 2024; Hidayah et al., 2023). Higher self-efficacy fosters purpose, retention, emotional intelligence, and effectiveness (Shukri & Matore, 2023), helping teachers meet goals, promote student success, and support mental health by reducing stress and burnout, key in early-career exit (Chang et al., 2022; An & Tao, 2024). Zhang, Alias, and Nordin (2026) say self-efficacy underpins effective teaching, fostering innovation and resilience. Moreover, Salviejo, Ibanez et al. (2024) study preservice math teachers in Central Luzon, linking confidence, creativity, and instructional effectiveness with deep learning and reflection, which predict better performance. This underscores the importance of dispositions that foster creativity and confidence, especially as Filipino teachers face challenges in balancing mastery and innovation. Research shows that creativity in math instruction is often overlooked, with teachers focusing on procedures rather than exploration (Lopez, 2023). Lopez highlights the gap between policy and practice, examining teachers' experiences through qualitative methods.

Confidence levels among individuals vary due to local factors such as resources and community development, influencing creativity in teaching. The relationship between confidence and creativity is often overlooked in research. While some educators excel in inquiry-based and digital settings, systemic challenges hinder others. Districts like Cervantes demonstrate how sociocultural factors impact both confidence and creativity in educational contexts.

Framework of the Study - Furthermore, rapid technological advances, diverse needs, and a focus on creativity require teachers to be confident and creative in math, guided by theories such as Bandura's Social Cognitive Theory, which emphasizes self-efficacy for resilience and innovation (De la Fuente et al., 2023; Zola et al., 2022). Piaget's Constructivist Theory promotes active learning through discovery aligned with developmental stages (Sampel Korompis, 2023; Qorbanpoor, 2022). Amabile's Theory states that intrinsic motivation and expertise foster creativity, encouraging teachers to innovate (Rahayuningsih et al., 2024). Partnership for 21st century learning emphasizes skills like critical thinking and collaboration, favoring project-based learning on real-world issues (Yulhendri et al., 2021). Additionally, Rogers' Theory advocates nurturing environments for self-actualization (Kumari, 2024), while Self-Determination Theory links confidence and creativity to motivation (Gagné et al., 2022). Experiential Theory calls for student-centered approaches connecting ideas to real-world problems, boosting autonomy and engagement (Kong, 2021). This allows teacher facilitators to promote student autonomy and 21st century global skills by increasing teacher motivation, confidence, and innovative math instruction.

Statement of the Problem - This study sought to investigate the lived experiences of mathematics teachers in Cervantes District as they confront the difficulties and opportunities of teaching in the 21st century. It focuses on understanding how their sense of self-efficacy shapes their adoption and implementation of modern instructional strategies designed to enhance student engagement and learning outcomes. Specifically, this study sought to answer the following questions:

- How do mathematics teachers describe their confidence and beliefs in their ability to teach effectively in the 21st century classroom?

- What 21st century instructional strategies do mathematics teachers employ, and how do they integrate these into their teaching practices?
- What challenges and successes do mathematics teachers encounter as they align their teaching practices with 21st century educational standards?

1.1 Teacher's Self-Efficacy

Teachers' confidence and innovative methods are essential for transforming classrooms to meet 21st century skills like critical thinking and digital literacy. The chapter reviews research on teacher self-efficacy, creative math methods, instructional challenges and successes, and the context of Philippine public schools. Marschall (2022) links a math teacher's identity to self-efficacy, with autonomy, current methods, and support increasing confidence. Özben and Kılıçoğlu (2021) discover that math anxiety harms, but positivity boosts self-efficacy. Narayanan et al. (2023) say confidence develops via personal processes influenced by background. Orakcı and Göksu (2023) show that daily teaching grows self-efficacy, with high-confidence teachers innovating. External factors, including resources and environmental conditions, can limit confidence in teaching. Monitoring confidence throughout careers is vital, as initial training enhances it, while challenges like classroom disruptions can diminish it. Targeted training with practical strategies can increase confidence, suggesting that self-efficacy impacts teaching methods, with low confidence often resulting in the use of traditional approaches. Furthermore, educators with high self-efficacy are more capable of utilizing innovative strategies and achieving positive learning outcomes for diverse students (Dulawan & Vadil, 2025).

21st Century Mathematics Techniques - Implementing advanced strategies like inquiry-based learning, technology integration, and professional development is key. Mustafa (2023) emphasizes student centered, real-world applications. Boadu and Boateng (2024) observe that digital tools, collaboration, and motivation improve outcomes. Masjudin (2024) highlights hands-on, open-ended projects and ongoing training. Rahman et al. (2021) note that teachers use STEM, problem-solving, gamified platforms, and digital tools to engage students (Hamzah et al., 2024). Uchang and Limjap (2021) emphasize integrating teachers' knowledge, values, and community understanding with culturally sensitive methods. Furthermore, contemporary pedagogical approaches enhance learning by integrating contextualized enrichment activities, problem-based frameworks, and targeted remediation to support diverse learners in mastering critical competencies, moving beyond rote memorization (Acosta, 2025). Therefore, analyzing systemic successes and barriers is crucial for implementation.

Difficulties and Achievements in Instructional Alignment - Curriculum content must match classroom teaching and assessments. Incikabi and Erbay (2025) discover that cross-disciplinary links enhance problem-solving, yet materials frequently mislead. Qocayeva (2025) notes that textbooks focus on basic math, prompting teachers to develop more modern lessons. This misalignment affects student performance internationally, as standardized tests don't reflect classroom activities. Aquino (2024) observes that exams often overlook critical thinking, discouraging innovation. Disruptions increase anxiety and gaps, requiring remedial plans. Teacher anxiety from past experiences also affects quality. Proper alignment of curriculum, instruction, and assessment is vital for understanding and confidence; gaps harm learning.

Public school teachers face challenges impacting teaching quality. Escasinas (2025) finds that resource shortages cause stress and burnout. Barrias et al. (2024) report internet issues, and a lack of materials limits new practices. Mokotjo and Mokhele (2021) note that the absence of computer labs and crowded classrooms leads to traditional methods. Furthermore, teachers often face challenges in providing timely support and implementing proactive teaching strategies to address learning disparities. This underscores the necessity for enhanced assessment skills and organized intervention frameworks (Quintin et al., 2026). Despite these issues, learning gaps persist: low motivation, poor parental support, and language barriers, with teachers switching languages to engage students and others. Driven by 21st century, effective classroom transformation relies on a math teacher's confidence and creativity, while also requiring the management of limited resources and curriculum alignment to

enhance teaching practices.

2. Methodologies

This study employed interpretive phenomenological research to explore how individuals interpret life experiences. Murad et al. (2021) describe the approach as a qualitative method focused on personal meanings. Also, Hutagalung et al. (2022) note that qualitative research investigates real-world issues to understand social dynamics, human behavior, attitudes, and cultural practices.

Participants and Data Sources - This study took place in Cervantes, Ilocos Sur, with participants selected through purposive sampling, a common qualitative method for selecting information-rich cases. It involves selecting individuals with substantial knowledge of the phenomenon (Tajik, Golzar, & Noor, 2025). Participants were public DEPED mathematics teachers willing to be interviewed.

Research Instrument - An interview guide was developed to explore how mathematics teachers' self-efficacy affects their adoption of modern instructional strategies in the Cervantes District. The guide aimed to assess teachers' confidence, their use of instructional strategies, and the challenges and successes they experience in meeting 21st century standards. Validated by experts, the guide was confirmed to be clear and aligned with the research questions.

Data Collection Procedure and Ethical Considerations - The study obtained permissions from authorities in Cervantes District, Ilocos Sur, and consent from mathematics teachers for participation. Data collection involved face-to-face interviews, enhancing the quality by capturing personal experiences while ensuring confidentiality and voluntary involvement. Teachers discussed their experiences and challenges with 21st century instructional strategies, which were subsequently transcribed, translated, and thematically analyzed to identify key themes. Measures were implemented to protect the privacy and security of human participants, including obtaining consent before interviews, assuring confidentiality, informing participants about the study's objectives, and securing official approval. Data reporting was accurate, referencing previous work appropriately. AI tools were used to enhance efficiency while ensuring researchers retained oversight and responsibility.

Data Analysis - A thematic analysis was performed on the interview transcripts addressing 21st century teaching challenges and opportunities, following the process outlined by Braun et al. (2024). This involved familiarizing with the data, coding themes, and creating a comprehensive report. The analysis is praised for its flexibility but is also criticized for potential subjectivity and bias stemming from researchers' interpretations.

3. Results and Discussion

3.1 Teachers' Confidence and Beliefs

Theme 1: Content Mastery as the Bedrock of Self-Efficacy

Bandura's theory highlights the significance of mastery experiences in shaping teachers' instructional methods (de la Fuente et al., 2023). While self-assurance is minimally affected by classroom feedback and students' knowledge, content mastery often boosts student engagement.

Preparation and Subject Matter Expertise. Math teachers' confidence is closely tied to their pedagogical preparation and subject knowledge. According to Zakariya and Adegoke (2022) shows that high self-efficacy positively affects instructors' persistence and lesson quality. A comprehensive understanding of the subject enhances teaching confidence, crucial for effective mathematics instruction. Participants noted that mastery of subject matter greatly impacts teaching confidence (P1, P2). While material knowledge is essential for effective mathematics instruction, regardless of any lesson reversals (P7). This implies that self-efficacy is linked to teaching strategies, indicating that confident teachers with strong subject expertise can navigate classroom challenges more

effectively (Olawale & Hendricks, 2024).

“*My confidence in teaching math is strong*” (P3, P4), *ken growing kasi I understand the content of my lessons...*” [My confidence in teaching math is increasing due to my understanding of the lessons], as expressed by one participant (P4). This emphasizes that well-prepared teachers enhance learning and comprehension, as prepared lessons are crucial for achieving educational objectives and ensuring effective instructional flow. However, one participant (P3) expressed uncertainty about whether all students will learn, indicating concerns about student retention in the classroom. According to Quiño and Corpuz’s (2021), classroom practices in the Philippine K–12 curriculum are highly influenced by teachers’ self-confidence. High self-efficacy teachers are more adept at applying new tactics, enhancing student learning, and transferring 21st century talents. This is consistent with the current study, which stresses the need for confidence and pedagogical preparedness for math teachers dealing with modern concerns.

The Deterioration of Confidence due to Student Non-retention. Teachers’ self-efficacy can decline when students fail to retain information, impacting their morale and teaching confidence. High self-efficacy improves teacher resilience and creative engagement methods (Jerrim et al., 2025). Participants noted that while students may appear happy, confusion arises from a lack of understanding (P1). Low retention rates, particularly in math, can diminish teacher confidence, as highlighted by one participant: “*nung pumunta na sila ng grade 8..., walang retention. Iyon yung nakapagpababa ng confidence ko,*” [No retention when they reached grade 8. That’s what made me feel less confident] (P3). Additionally, another participant highlighted that quiz results indicate substantial learning gaps, with only a few students achieving high scores (P7). This implies that math teachers recognize the long-term effectiveness impacts. Teacher dissatisfaction arises when students lose skills, necessitating remediation, which raises concerns about its efficiency amid the 21st century demand for rapid competency improvement. Bandura’s self-efficacy hypothesis suggests that confidence is bolstered by success and diminished by failure (de la Fuente et al., 2023; Zola et al., 2022). Moreover, Tabassum (2025) found a positive correlation between student achievement and teacher self-efficacy.

Theme 2: The Reflective Practitioner: Feedback and Peer Collaboration

This theme explored the social construction of confidence in schools, shaped by student perspectives and teacher guidance (DepEd Order No. 42, s. 2016). Feedback and collaboration promote growth where diverse viewpoints enhance understanding, which aligns with Vygotsky’s social learning theory, emphasizing peer interaction in technology-rich classrooms (Mudi & Samanta, 2024).

Constructive utilization of Student Feedback. Students are increasingly vocal about their opinions on teaching methods, expressing sentiments such as “*Sir is like this or that*” (P6) and *acknowledging the challenge of retaining lessons. Furthermore, the statement “sincerely nga ibagada ngay tay karerekna da...”* [sincerely say what they feel] (P1). It also indicated that anonymous feedback is frequently the most beneficial. This proactive feedback method allows educators to adjust their strategies based on student input. One participant emphasized that students communicate their understanding without fearing a loss of confidence (P3). Another participant emphasized the necessity for students to express concerns regarding teaching methods, allowing teachers to adjust their strategies (P8). This reflects a contemporary educational approach that prioritizes the unique experiences of learners, enhancing student engagement and self-efficacy. According to Röhl et al. (2025) and Finefter-Rosenbluh and Berry (2024) indicates that student perceptions can guide improvements in teaching quality and encourage democratic participation. Additionally, Chen (2023) found that student evaluations lead to enhanced instruction, particularly influencing teachers who receive lower ratings to make necessary changes.

Empowerment Through Learning Action Cells. Peer collaboration among math teachers fosters an environment of support and strategy sharing, which helps alleviate anxiety when teaching challenging material. As noted by one participant (P9), teachers frequently seek help from one another, creating a culture of expert scaffolding. Participants emphasize the value of Learning Action Cells (LAC) sessions among mathematics teachers (P1, P3, P6, P7), noting both formal and informal gatherings for sharing experiences and support.

Discussions of challenges foster a collaborative environment that enhances teaching methods and builds self-confidence (P1, P7). The exchange of strategies helps refine professional identities and adapt to educational expectations. Benefits include collaborative problem-solving and acquiring new teaching techniques (P3, P6), creating a supportive community where teachers learn from each other's successful classroom management. Therefore, observing and enhancing LAC sessions among math teachers is significant for improving communication and collaboration. Quemado (2025) indicates that LAC fosters a strong professional learning community where educators share knowledge and assess strategies. Consistent collaborative sessions contribute to sustained growth in instructional practices.

3.2 21st Century Instructional Strategies

Theme 3: Technological Integration and Scaffolding

Technology significantly enhances math education by improving visual and interactive learning. It supports the TPACK framework, clarifying complex concepts and helping teachers manage workloads through automation (Kholid et al., 2023), thus allowing focus on relevant content for students.

Leveraging Software for Visualization. Teachers' methods for teaching visually intensive subjects have evolved due to tools like PowerPoint and GeoGebra. *"I use technologies and applications like GeoGebra,"* said one participant (P2), indicating a preference for interactive visual strategies, with one noting the effectiveness of GeoGebra in helping students visualize mathematical equations through graphs (P6). This approach facilitates a more accessible understanding of abstract concepts, as demonstrated by another participant who found teaching graphing and inequalities much more effective with GeoGebra's support (P7) and encouraged peers to use the application to verify answers in conic sections (P10). These technologies significantly enhance students' comprehension of mathematical transformations, making learning more tangible and engaging. This aligns with Jovevski et al. (2024), who found that the integration of digital tools markedly enhances both primary students' academic success and the teaching of mathematics compared to traditional methods.

AI and Digital Tools for Lesson Efficacy. Participants noted the positive impact of technology (P1) on its ability to facilitate lesson delivery and streamline assessment preparation. One participant mentioned the ease of using technology stating, *"For example, ChatGPT, I need to make a quiz; magre-research lang ako sa ChatGPT, lalabas na yung pwede kong i-quiz pati rin exam pinadali na"* [I use ChatGPT to make a quick quiz or exam] (P3). Another participant emphasized ChatGPT's role in supplementing textbooks and generating quick activities, saying it simplifies workload management by providing ready-to-use quiz materials and exam preparations (P5). Teachers find AI tools significantly enhance their teaching efficiency and reduce the time spent on developing practice problems manually. Digital tools enhance efficiency and allow educators to create customized materials, like varied quiz formats and simplified word problems. This reduces administrative burdens, enabling a focus on student support and engagement. However, a participant highlighted a call for moderation in technology use to foster critical thinking among students (P7). This shift in educators' responsibilities enables them to enhance educational quality by leveraging available resources. Chiu's (2024) study further supports this notion: AI integration in teaching supports differentiated instruction by allowing teachers to adapt learning materials to students' various skills and learning requirements.

Theme 4: Active Pedagogies and Contextualized Learning

This theme advocates for student-centered learning, with instructors in Cervantes District using active methods like discovery and problem-solving to enhance higher-order thinking. Aransado et al. (2026) demonstrate that connecting math to real-life applications enhances student engagement, critical thinking, and perseverance, effectively motivating them to create solutions.

Fostering Discovery and Collaborative Inquiry. The importance of allowing pupils to have the AHA was highlighted by the participants. One participant expressed a desire to transition from being a lecturer to a facilitator,

encouraging student participation in group activities through collaborative strategies (P4). Teachers intentionally establish student-centered environments to foster autonomous inquiry, as exemplified by another participant's description of creating activities that enable children to explore and discover topics independently (P7). Teachers' introduction of new lesson definitions reflects active engagement, as supported by a participant's use of targeted tasks: *"I design activities where students discover the topic on their own..."* (P1). This method demonstrates how discovery learning promotes critical thinking and gives students a sense of control over their education, moving them from passively absorbing knowledge to actively asking questions.

Teachers employ peer scaffolding to deepen student comprehension through collaborative explanation within Vygotsky's Zone of Proximal Development, benefiting both peer tutors and those needing additional support (Mudi & Samanta, 2024). This highlights the need to balance direct instruction and exploration, emphasizing the importance of guiding low-performing students while promoting peer collaboration. As supported by one participant: *"Hinayaan ko sila na magdiscover nung lesson ginaguide ko lang sila"* [I let them discover the lesson and guide them] (P3). According to Siregar (2026), discovery learning through group engagement fosters active knowledge production, enhancing mathematics collaboration and communication among students, while cooperative tactics improve engagement and problem-solving skills (Dewi & Wulandri, 2025).

Real World Application and Problem-Based Scenarios. Teachers are adopting innovative techniques to integrate mathematics into classroom learning, moving beyond traditional textbooks. By using real-life examples and outdoor activities, lessons become more relatable and engaging (P4). For instance, one participant stated: *"nu panagalam ti height ti mysa building using clinometer"* [determining the height of a building by using a clinometer] (P7) and taking students outside enhances their understanding of practical applications (P8), particularly in trigonometry, solidifying the relevance of mathematical concepts in everyday life. Additionally, participants highlighted how teachers stress practical uses of math, such as budgeting for shopping and daily activities, which helps students recognize its importance. One example shared includes students budgeting their allowances for food and transportation in boarding houses, linking mathematical concepts to their immediate circumstances (P2, P3). This problem-based approach allows students to apply arithmetic to real-world scenarios, where solutions are not singular, preparing them for 21st century challenges that require informed financial and environmental choices. Real-world math instruction connects teachings to everyday life, increasing students' enthusiasm and confidence in practical arithmetic skills like budgeting and measuring, according to a resource by Legarde (2026).

3.3 Challenges and Successes Encountered

Theme 5: Systematic and Infrastructural Bottlenecks

Teachers are enthusiastic about their roles, but systemic issues like time constraints and resource shortages create a gap between strategy and reality. As a result, they often resort to good enough approaches, showing resilience in the face of limited resources.

The Reality of Time Constraints. Learning is hampered when class periods are shortened to 45 minutes. One participant observed that there is little time left for active teaching after the material is introduced: *"The 45 minutes are not enough. Nagi-introduce ka lang, may nagpasaway na...."* [You were just introducing, and someone already misbehaved] (P2, P4). Teachers are unable to accomplish daily goals because of this restriction. Teachers frequently prioritize teaching competence over depth when they are short on time, since discovery learning and group activities take a lot of time. Another participant observed, *"Using the technology helps students understand, because when they see the clips, they are very attentive. However, if you use technology for everything, it is time-consuming"* (P8), highlighting the logistical difficulties these methods provide during brief intervals. This was supported by another participant where unexpected disruptions, like a typhoon (P3), can exacerbate this issue, resulting in frustration for students and fatigue for teachers stemming from tight schedules. This demonstrates that teachers experience stress due to their inability to control behavior, employ interactive techniques, and cover important subjects during brief class hours (Abelgas et al., 2024). This highlights a disconnect between the

requirement to promote deep student knowledge and pacing expectations, forcing teachers to prioritize brief lectures over interactive activities in order to meet deadlines.

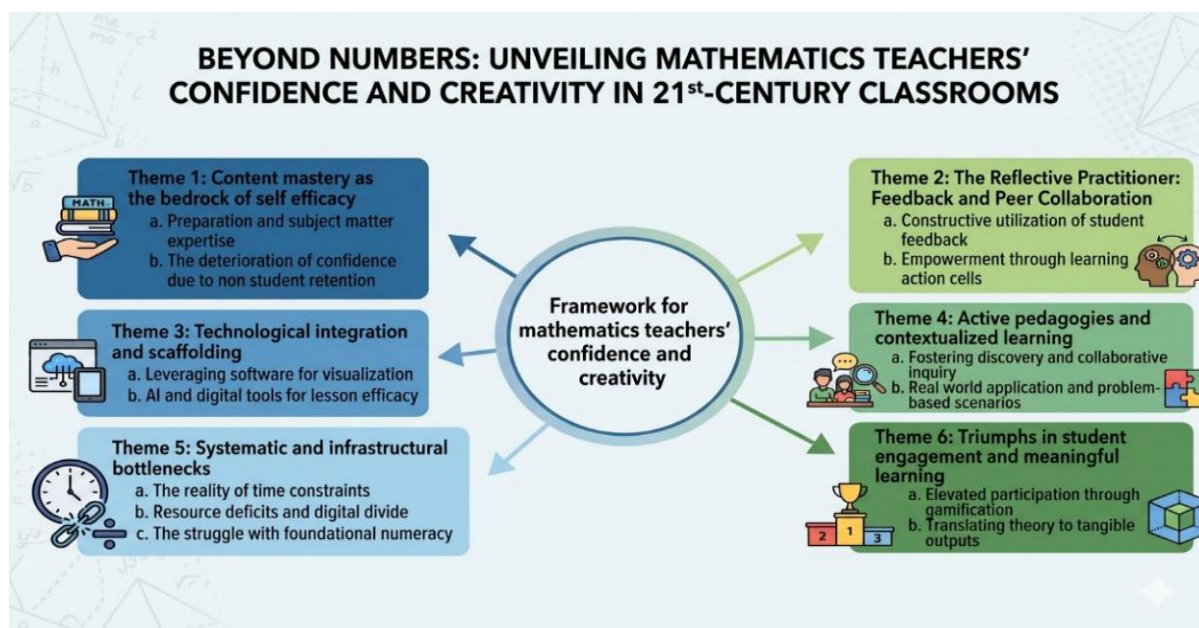
Resource Deficits and Digital Divide. A critical challenge identified is the widening gap in foundational skills, particularly in numeracy. One participant remarked, *“although mathematics teaching is improving, the numeracy level of learners today is very low, and teachers always need to adjust to meet the low-level learners”* (P2). This gap poses a significant barrier during secondary transitions, with students struggling with basic arithmetic. Participants expressed the pandemic’s impact, as it led to a reliance on module-based learning that diminished students’ ability to memorize vital concepts, like multiplication tables (P3, P8). Consequently, teachers often find themselves managing dual curricula: the current one and the skills that were not mastered. Furthermore, the presence of only a few high-achieving students reflects the class’s overall diversity (P7). This struggle highlights how foundational mathematics skills impact higher-order thinking and the ability to engage with advanced curricula. Teachers often need to provide remedial instruction to address gaps in basic arithmetic, which is essential for 21st century skills. Palma and Escandallo (2025) stress the importance of developing intervention materials to bridge the divide between curriculum goals and students’ foundational skills.

Theme 6: Triumphs in Student Engagement and Meaningful Learning

Despite challenges, it highlighted small victories that motivate teachers. Strategies like gamification and hands-on projects demonstrate that creative, human-centered approaches can promote meaningful math learning, even with limited resources.

Elevated Participation Through Gamification. Gamification has proven to be a powerful hook for students who are uninterested in mathematics. One participant elaborated on how structured gamified elements maintain classroom control and visual focus, sharing: *“I use tools like spin the wheel to help keep students focused on the lesson. I also use a timer to help students become responsible with their time and prevent them from playing during activities”* (P6). This was supported by the participants by giving prizes or rewards using ticket points (P4, P6) to enhance a playful learning environment, and the teacher reduces the need for scolding and increases intrinsic motivation. This strategy effectively engages students by catering to their desire for achievement. Merely placing students in groups is insufficient; activities must be enjoyable and engaging. One participant highlighted the use of puzzles to enhance engagement (P10) and creating problem-solving ‘fire stations’ that students must complete to progress, showcasing an immersive approach to collaborative problem-solving (P1). This is supported by Pacturan et al. (2024) study; the integration of game mechanics engages disengaged learners and transforms stressful classrooms into dynamic learning spaces, highlighting a shift from disciplinary scolding to reward-based practices.

Translating Theory to Tangible Outputs. The highest level of success in education occurs when students create tangible projects. One participant’s Treasure Hunt activity, transforming the school map into a Cartesian plane, is a prime example: *“I made the map of Cervantes National High School in the Cartesian plane...”* (P10), enhancing their understanding of coordinates through a real-world context. This method incorporated competitive, station-based movement for spatial navigation. Another participant described a group division strategy where only those solving the first station could progress (P3). Additionally, teachers guided students in constructing empirical measuring tools, such as a clinometer used in a height measurement activity involving a building (P7). These tangible outputs illustrate proof of learning, as students transitioned to “mini mathematicians” through hands-on activities like building models and real-world problem-solving. One participant noted a significant shift from textbook graphics to interactive learning, requiring students to create tools like handmade dice for understanding probability (P6). Another participant validated this by observing students recording outcomes from their dice, successfully differentiating simple and compound events (P9). Traditional math curricula often depend on abstract numbers and symbols, but the Embodied Cognition framework suggests that physical movement can enhance understanding (Gordon & Ramani, 2021; Nathan et al., 2022). By moving on a grid, students connect abstract math concepts to real-world spaces, thereby reducing cognitive load and making concepts more tangible (Nathan



4. Conclusion and Recommendation

Conclusion - This study examined the experiences of mathematics instructors in Cervantes District, focusing on how their self-efficacy effects the adoption of innovative practices to promote student engagement and learning. Results indicated teachers' confidence links to material mastery and flexibility. Learning Action Cells (LAC) and other social networks support resilience in the face of adversity. To boost engagement, educators combine conventional teaching techniques with digital tools, artificial intelligence, and discovery-based learning. Despite difficulties including short class durations, inadequate infrastructure, and basic abilities, teachers use innovative tactics such as tying topics to real-world issues, gamification, and tangible results.

Significance of the Findings - By examining the experiences and strategies of public mathematics teachers in the Cervantes District, the study provides valuable insights into educational practices. It addresses a gap in knowledge regarding how local educators navigate 21st century challenges, including digital limitations and brief class periods. The findings emphasize the roles of Learning Action Cells (LAC), teacher self-efficacy, and hybrid teaching methods in enhancing student engagement, underscoring the need for these insights to improve educational quality and mathematical instruction frameworks.

Recommendation - Based on the data, math teachers should stress advanced techniques and peer support, use LAC sessions for improvement, and hold seminars on fusing conventional and digital methods. Procedures requiring traditional or digital education should be specified in curriculum guidelines. Digital infrastructure can be upgraded with MOOE monies, and arithmetic deficiencies beyond 45-minute classes can be filled with brief "Numeracy Remediation Blended Blocks."

Practical Educational Implications - Based on the findings of this study, several practical applications are identified for educators, learners, and school administrators:

- **For Teachers/Practitioners:** Teachers should integrate AI and digital tools along with traditional instruction and engage in Learning Action Cell (LAC) sessions to share advanced math teaching techniques and benefit from peer support.
- **For Students:** Students are encouraged to enhance their fundamental mathematics skills and adapt to modern digital learning by cultivating discovery-based habits and participating in focused Numeracy Remediation Blended Blocks.

- **For School and Administrators:** School administrators should utilize School MOOE funds to enhance digital infrastructure and provide practical training workshops to offer ongoing technical support and boost teachers' confidence in their teaching abilities.

AI Use Disclosure: We used ChatGPT-5.6, Gemini 1.5 Flash, Canva, Quillbot, and Grammarly for language/grammar editing, idea generation, arranging ideas, code suggestions, figure drafting, and revising text. All outputs were reviewed, verified, and edited by the authors, including factchecking, re-analysis, citation checks, and redrawing figure. No confidential or personally identifiable data were entered into AI tools. The authors take full responsibility for the content.

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