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Exploring Teacher Approaches to Boost Math Engagement of Elementary Learners

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ABSTRACT

This study explores effective strategies to enhance mathematics learning engagement among Grade 5 learners, employing qualitative interviews with 12 elementary teachers. Key themes identified include Cognitive Teaching Strategies, Behavioral Teaching Strategies, Environmental Teaching Strategies, and the integration of Technology and Interactive Tools. These themes encompass essential elements such as critical thinking, real-world applications, motivation, and collaboration. The findings underscore that mathematics engagement is a multi-dimensional construct shaped by diverse pedagogical approaches, highlighting the significant role teachers play in facilitating meaningful learning experiences. By elucidating these strategies, the study provides valuable insights for educators seeking to foster a more engaging and participatory mathematics learning environment.

INTRODUCTION

Student engagement plays a crucial role in the learning process, as increased engagement builds the foundation for future academic success. (Terrenghi et al., 2019; Abín et al., 2020). When students have confidence in their ability to succeed in mathematics, they are more likely to participate actively and develop a greater enjoyment of the subject (Putwain et al., 2018). However, even with the significance of learner engagement, teachers often lament low engagement levels in Math; hence, it is a primary concern for mathematics educators and researchers to discover strategies to keep learners engaged or help them re-engage after becoming disinterested in their mathematics learning, especially during the formative years of their lives (Grootenboer et al., 2016; Middleton et al., 2023).

There are pedagogical practices affecting learning engagement in mathematics. For Attard (2012), to foster engaging class, teachers need to employ pedagogical repertoire such as meaningful discussions on mathematical concepts, positive and challenging tasks, offering students choice to enhance autonomy, and technology integration to support student-centered learning, while the curriculum is connected to real-life relevance, empowering learners to apply math beyond the classroom.

In the pedagogical practices of teachers targeting mathematics engagement, behavioral, cognitive, and environmental factors are considered in the context of teaching through modeling, as these factors are interplaying with the learners' engagement. Skinner (2016) identifies certain features of learning environments as either enhancing or hindering student engagement and motivation. These features fall into three categories such as social and relational contexts, student experiences, including academic work, and the student's self-perception. There are external influences like classroom environments that foster a negative perception of mathematics—seeing it as difficult, irrelevant, repetitive, and boring (Cobb et al., 2018)—as well as factors from students' home environments, such as parental attitudes towards mathematics (Öqvist & Malmström, 2017).

Moreover, this study will also address the methodological gap since numerous existing studies on learner engagement are quantitative (Kalogeropoulos et al., 2023; Alrajeh et al., 2020). Insights from this research will provide actionable recommendations for teachers to enhance their pedagogical approaches in ways that resonate with their pupils' learning contexts. The findings will contribute to a broader framework for examining the factors influencing student engagement across various subjects, promoting further research in the field of education.

RESEARCH QUESTIONS

This study established a model for mathematics engagement among elementary learners. A qualitative exploration was carried out to identify mathematics engagement for Grade 5 students. The research specifically seeks to address the following question, which will be explored throughout the study:

1. What are the themes that emerged from the interviews on the math engagement of elementary learners?

Research Design

This study explored the strategies to enhance mathematics learning engagement among Grade 5 learners. Phenomenology, as defined by Creswell (2013), is a qualitative research approach that focuses on exploring and understanding individuals' lived experiences in a particular phenomenon. It seeks to describe how individuals perceive and make sense of their experiences, often through in-depth interviews and rich, descriptive data. In the context of this study, phenomenology helps to uncover the unique challenges and coping strategies teachers employ within the complex educational ecosystems they navigate.

Locale of the Study

This study was conducted in selected schools across the three congressional districts of Cotabato Province: the First, Second, and Third Districts, which are located in the heart of Mindanao, Philippines. The province is characterized by its diverse geography, including mountain ranges, plains, and bodies of water, with each district facing unique challenges related to agriculture, urbanization, and infrastructure development.

Research Instrument

This study used an interview guide with a primary question and probing questions, which was assessed for content validity by three experts to ensure relevance and accuracy.

Research Participants

In this study, 12 teachers from the initial sample were purposively selected to participate in the qualitative phase of the study. These teachers underwent in-depth interviews to explore their personal experiences, challenges, and strategies related to numeracy. The qualitative phase provided deeper, contextualized insights into the teachers' lived experiences, offering a more nuanced understanding of the quantitative results.

Data Analysis

Thematic analysis was employed to analyze qualitative data. This method enables the researcher to identify, analyze, and report patterns and themes within the data, offering an in-depth exploration of teachers' experiences, challenges, and coping strategies in teaching Math. Thematic analysis requires the identification of patterns or themes in qualitative data. Braun and Clarke (2006) confirmed in their study that it is the first qualitative approach to be studied because it provides key skills that are useful for other types of analytical purposes. Thematic analysis was used to analyze common answers from the participants.

RESULTS AND DISCUSSIONS

Exploring Teacher Approaches to Boost Math Engagement of Elementary Learners

Qualitative data were collected through interviews with elementary teachers to uncover their approaches in fostering mathematics engagement among their learners. The responses were carefully analyzed to identify recurring patterns and themes. Interviews were conducted with 12 elementary school teachers who shared their approaches and strategies in teaching mathematics and thereby increased learning engagement. Through thematic analysis, themes were generated from their categorized responses. Table 2 shows the themes, and the succeeding sections present the discussion of each theme.

Cognitive Teaching Strategies

Cognitive Teaching Strategies refer to instructional practices that aim to enhance students' thinking, understanding, and reasoning in mathematics. These strategies equip learners not just with procedural skills but with the ability to think critically, reflect deeply, and engage actively with mathematical problems. Two major categories fall under this theme: cognitive challenge and strategy building, and real-world and visual application. Each category contains several core ideas that were supported by rich qualitative responses from teacher interviews.

Cognitive Challenge and Strategy Building.

This category captures teaching strategies shared by the participants, and these include those strategies that push learners to think, reflect, and construct mathematical understanding through challenging yet supportive practices. The core ideas under this category are strategies that encourage critical thinking and reasoning; promote metacognition and self-reflection; scaffold learning with clear structures and routines; use varied instructional techniques to address learning diversity; and foster inquiry through questioning and exploration.

Teachers shared that they spend efforts to develop reasoning and analysis among students. Teachers often model problem-solving behaviors or challenge students with cognitively demanding tasks. One teacher shared:

In my experience, modeling problem-solving behaviors—showing them that it is not really difficult—works well, especially with struggling learners. Nung tinuro ko ang division, ipinakita ko sa kanila step-by-step kung paano ito gawin gamit ang drawing at objects. Sabi ng isa, 'Ahh, ganun lang pala!' Doon ko nakita na kapag simple at klaro ang pagpapakita ko ng solusyon, mas naiintindihan nila (In my experience, modeling problem-solving behaviors—showing them that it is not really difficult—works well especially with struggling learners. When I taught division, I showed them step-by-step using drawings and objects. One said, "Ohh, that's all it is!" That's when I saw that when my explanation is clear and simple, they understand it better.)(IDI-12)

The teacher-participants said they intentionally guide learners to think about how they think, which builds ownership and metacognitive skills. As the teachers described:

I remember a time when I tried to provide differentiated activities like puzzles and manipulatives to help them multiply numbers. *May ilan sa kanila na mas mabilis matuto kapag hawak nila ang bagay. Isa sa mga favorite nila 'yung matching game kung saan kailangan nilang itugma ang multiplication problem sa sagot. Nagiging mas motivated sila kasi parang laro.* (I remember a time when I tried to provide differentiated activities like puzzles and manipulatives to help them multiply numbers. Some of them learn faster when they can hold actual objects. One of their favorite activities was a matching game where they had to match the multiplication problem with the answer. They were more motivated because it felt like a game.) (IDI-12).

Teachers also claimed that they scaffold learning with clear structures and routines, which include setting expectations and providing consistent support so learners can learn math in an organized, low-stress environment.

A participant shared:

One of the things I do is set clear expectations of performance. I noticed it builds their confidence because they know what's expected. (IDI-6)

This is also echoed by other teachers:

I remember a time when I tried setting consistent routines in math learning activities. The students became more independent over time. (IDI-5)

For the teachers, they are enabling learners to think about their own thinking, understand their strategies, and reflect on their problem-solving approaches. As teachers shared:

Naalala ko nung pinatry ko sa mga bata na balikan at pag-isipan kung paano nila nasagot ang isang problem sa math. Tinanong ko, 'Paano mo naisip 'yan?' or 'May ibang paraan ka ba?' Mas naging curious sila at mas nagparticipate sa discussion. Nakita ko na mas engaged talaga sila kapag sila mismo ang nag-a-analyze ng sagot nila. (I remember a time when I asked students to go back and think about how they solved a math problem. I asked them, 'How did you come up with that?' or 'Is there another way?' They became more curious and joined the discussion more. I saw that they were really more engaged when they analyzed their own answers.) (IDI-10)

I let pupils identify and correct mistakes in sample solutions. It really helps them grow in their learning process and teaches them to own their thinking." (IDI-3)

Nung tinuro ko ang concept ng subtraction with borrowing, may estudyante akong tahimik. Pero nung sinabi ko na 'Okay lang magtanong,' unti-unti siyang nagtanong ng, 'Bakit po kailangan manghiram sa tens place?' Sabi niya, 'Ah, gets ko na po!' (When I taught subtraction with borrowing, one of my students was quiet. But when I said 'It's okay to ask questions,' she gradually asked, 'Why do we need to borrow from the tens place?' Then she said, 'Ah, now I get it!') (IDI-6)

Moreover, teachers also use various strategies to meet learners' needs, ensuring access to understanding for all. One teacher explained:

I provide different types of instruction. Some kids learn better through visuals, others through hands-on. (IDI-2)

When I use math riddles and puzzles, the students seem to enjoy math more because it feels like a game." (IDI-7)

Use of a mnemonic for easy recall of math concepts... ginawa naming chant: 'Please Excuse My Dear Aunt Sally.' Mas naalala nila ang steps. (IDI-10)

There are also teachers who verbalized that they foster inquiry through questioning and exploration, which involves asking open-ended questions and encouraging students to pose their own questions.

Ginagamit ko ito palagi—ang paggamit ng questioning techniques. Halimbawa, habang tinuturo ko ang odd and even numbers, tinatanong ko sila, 'Anong napapansin mo sa mga numbers na ito?' (IDI-10)

I correct mistakes and reinforce correct solutions. I noticed it builds their confidence when they learn from their errors. (IDI-7)

Nung tinuro ko ang concept ng subtraction with borrowing, may estudyante akong tahimik. Pero nung sinabi ko na 'Okay lang magtanong,' unti-unti siyang nagtanong ng, 'Bakit po kailangan manghiram sa tens place?' (IDI-6)

The findings from this study underscore the importance of integrating Cognitive Teaching Strategies into everyday classroom instruction. Aligned with the insights of Hardman et al. (2015) and Kayabwe, Asimwe, and Nkaada (2016), this study highlighted that teachers who engage students intellectually by modeling problem-solving behaviors and fostering metacognitive questioning enable learners to develop intrinsic motivation and critical thinking skills. Moreover, as Hu, Fan, and Gu (2016) emphasized, a supportive classroom environment with open discussions and constructive feedback amplifies students' cognitive engagement, fostering both perseverance and a deeper love for mathematics.

Real-world and visual application. This category emphasizes the application of mathematics in real-life contexts and the use of visual or experiential tools to make abstract concepts concrete. Teachers shared their teaching practices, which include strategies to connect math to real-life contexts, use everyday tasks and roles to reinforce math concepts, engage learners through movement and play, promote exploration through nature and observation, and support understanding with visual aids.

For the teachers, to increase learners' engagement, they are helping students relate mathematics to their daily experiences. One teacher reflected:

I remember a time when I tried relating math lessons to real life. It really helped my students stay engaged. (IDI-12)

Other teachers also shared that:

Nung tinuro ko ang money and basic operations, ginamit ko ang setting ng palengke—pinagawa ko sila ng role play kung saan may tindera at mamimili. Kailangan nilang magbayad at suklian gamit ang tamang bilang. Mas naging interesado sila at parang naglalaro lang. (When I taught money and basic operations, I used a market setting—we did a role play where some were sellers and others were buyers. They had to pay and give change using the correct amount. The students were more interested and it felt like playtime for them.) (IDI-7)

In my experience, connecting math lessons to the real world works well, especially with struggling learners. When I was teaching measurement, I had them measure objects in the classroom using a ruler, like a pencil, a book, and a table. They understood the concept of centimeters better because they saw and measured it themselves." (IDI-8)

The participants also claimed that they use everyday tasks and roles to reinforce math concepts by integrating math into students' routines and responsibilities. As participants explained:

When I connect the current learning content to things learned before, the students seem to enjoy math more." (IDI-2)

I remember a time when I tried assigning math-related classroom responsibilities (treasurer in the class). It really helped my students stay engaged." (IDI-10)

Teachers also linked lessons to shopping:

I use this regularly—use of play money (set up an eco-friendly farmers' market with play money). It makes math more relatable for them." (IDI-5)

In my experience, comparing prices (of a food or grocery item) works well, especially with struggling learners. I noticed it builds their confidence." (IDI-10, IDI-3)

They also have strategies to engage learners through movement and play, highlighting the value of kinesthetic and game-based learning.

When I timed puzzle-solving, the students seemed to enjoy math more. I tried to let them dance while counting. It really helped my students stay engaged. (IDI-8)

I let them do mathematics while playing. It makes math more relatable for them. (IDI-3)

Furthermore, promoting exploration through nature and observation is also done by the teachers since, for them, doing so encourages outdoor learning and connecting math to the physical environment.

I allow outdoor measurement activities (measuring the table, the height, or the length of an object they found). It makes math more relatable for them." (IDI-2)

When I let them classify objects (square, rectangle, etc.), the students seem to enjoy math more. (IDI-9)

I remember a time when I tried to observe and do the math—count the birds, flower petals, etc. It really helped my students stay engaged. (IDI-12)

In order to support understanding, teachers use visual aids as this makes abstract concepts more accessible through visuals.

I remember a time when I tried to use visuals for them to solve the given problem. It really helped my students stay engaged. (IDI-5)

In my experience, using pictures for easy understanding works well, especially with struggling learners. I noticed it builds their confidence. (IDI-12, IDI-3)

The findings of this study emphasize the importance of contextual and experiential learning in enhancing students' engagement in mathematics. Real-life tasks such as role-playing and measuring tangible objects made math more meaningful and accessible, supporting the idea that authentic, hands-on activities deepen understanding (Gallagher et al., 2022). Additionally, interactive strategies involving play, movement, and exploration were found to significantly increase learner engagement, reinforcing the view that active learning approaches improve focus, retention, and motivation (Chavan & Yoshikawa, 2017).

The results further highlight the need for curriculum and school policies that integrate real-world connections, visual supports, and kinesthetic activities into the mathematics classroom. Visual aids such as diagrams and pictures proved particularly effective, especially for learners struggling with abstract reasoning (Alibali et al., 2014). Overall, the findings suggest that moving away from purely procedural teaching toward a dynamic, inquiry-driven, and multimodal approach can foster deeper learning and more inclusive math instruction.

Behavioral Teaching Strategies

Behavioral teaching strategies focus on enhancing student motivation, engagement, and learning outcomes through structured reinforcement, individualized approaches, and accountability. Teachers use differentiated instruction, reinforcement systems, and motivational techniques to shape learning behaviors. In this study, this is represented by the theme: Positive Reinforcement and Motivation.

Positive Reinforcement and Motivation. This group of strategies emphasizes the strategic use of praise, rewards, encouragement, and engaging activities to promote students' motivation, confidence, and active participation in math learning. Teachers draw from a variety of behaviorist techniques, such as differentiated instruction, verbal affirmations, praise notes, and reward systems, to reinforce desired behaviors and maintain learner engagement.

The interview data reveal that elementary teachers frequently employ behavioral teaching strategies grounded in positive reinforcement and motivation to enhance student engagement in mathematics. These strategies focus on encouraging participation, building learner confidence, and sustaining attention through rewards, praise, differentiated instruction, and engaging classroom practices. The consistent use of these approaches reflects a commitment to creating a learning environment where students feel recognized, supported, and capable of succeeding in math.

Teachers emphasize the importance of catering to individual needs to ensure that all learners, especially those who struggle, feel included and confident. One teacher shared,

I use this regularly—cater to individual needs. It makes math more relatable for them. (IDI-10)

Another teacher emphasized how this approach benefits students with learning difficulties:

In my experience, catering to individual needs works well, especially with struggling learners. (IDI-11)

A more detailed reflection from a teacher illustrated how visual aids and tailored learning styles increase students' understanding and confidence:

One of the things I do is cater to the individual needs of students. For example, when I was teaching multiplication, I noticed that some understood better with drawings or visual aids. So while some students worked on drills, others used counters and pictures. I saw that they all became more confident when the method matched their learning style. (IDI-8)

By adapting instruction to individual learning styles, these teachers create personalized learning pathways that reinforce students' strengths, thereby increasing their motivation to engage in math.

Many teachers rely on fun and engaging activities to keep students motivated during math lessons. These activities not only stimulate student interest but also create a positive and joyful classroom atmosphere. For example, teachers said:

One of the things I do is fun and interesting activities. (IDI-7)

I tried to use fun and interesting activities. It really helped my students stay engaged. (IDI-11)

A vivid classroom example came from a teacher who transformed a math lesson into an exploratory game:

Pinagawa ko sila ng 'shape hunt' sa classroom—hinanap nila ang mga bagay na may hugis na bilog, parisukat, tatsulok, atbp. Sobrang enjoy sila, parang laro lang pero natututo sila. Mas naging engaged talaga sila sa lesson.

(I asked them to do a 'shape hunt' around the classroom—finding objects that are circular, square, triangle, etc. They really enjoyed it, like they were just playing, but they were learning at the same time. It really helped them stay engaged.) (IDI-3)

Such engaging strategies function as positive reinforcers by associating math with enjoyment and discovery, which sustains students' attention and enthusiasm.

Moreover, teachers are also encouraging self-monitoring and ownership of learning. Teachers also reported that allowing students to monitor their own learning helps build responsibility and internal motivation. One teacher stated:

I encourage students to monitor their own learning. It makes math more relatable for them. (IDI-6)

When I encourage students to monitor their own learning, the students seem to enjoy math more. (IDI-10)

These statements reflect the belief that self-monitoring not only reinforces academic skills but also empowers students to take ownership of their progress.

Similarly, providing feedback also gives an advantage for learning engagement in Math. For the teachers, they consistently use positive verbal reinforcement as a way to build students' confidence and affirm their efforts. One teacher noted:

One of the things I do is provide positive reinforcement. I noticed it builds their confidence. (IDI-11)

Kapag nagbibigay ako ng positive reinforcement, napapansin ko na mas nae-enjoy ng mga bata ang Math. Nung tinuro ko ang skip counting, binibigyan ko sila ng star stickers kapag tama ang sagot nila o kapag nagpakita sila ng effort. Minsan simpleng 'Good job!' lang, pero kita mong proud sila sa sarili nila.

(When I provide positive reinforcement, I notice that students enjoy Math more. When I was teaching skip counting, I gave them star stickers for correct answers or when they showed effort. Sometimes just saying 'Good job!' was enough, and you could see they were proud of themselves.) (IDI-10)

This consistent reinforcement cultivates a positive emotional climate that motivates students to persist even in challenging tasks. Then teachers claimed they are also modeling a positive attitude toward math. Teachers influence students' motivation by modeling positive attitudes toward mathematics.

I show positive attitude towards mathematics. (IDI-1)

Kahit medyo mahirap, sinasabayan ko ng ngiti at sinasabi ko, 'Kayang-kaya natin 'to!' Nagugulat ako kasi nahahawa sila—nagiging mas willing silang subukan kahit nagkakamali pa.

(Even though it was a bit difficult, I smiled and told them, 'We can do this!' I was surprised because they caught on to the energy—they became more willing to try even if they made mistakes.) (IDI-5)

By expressing confidence and optimism, teachers indirectly reinforce perseverance and risk-taking in math. Some teachers write personalized praise notes to motivate students. One teacher observed:

When I using praise notes for learners, the students seem to enjoy math more. (IDI-8)

Nagbibigay ako ng maliit na sulat na may message tulad ng 'Great effort today!' o 'You tried your best and it shows!' Nilalagay nila sa notebook nila o ipinapakita sa magulang. Mas lalo silang ginaganahang matuto.

(I gave out small notes with messages like 'Great effort today!' or 'You tried your best and it shows!' They would put them in their notebooks or show them to their parents. It really motivated them to keep learning.) (IDI-11)

These tangible tokens of recognition help students internalize their success and feel valued. Similarly, implementing reward systems to reinforce behavior is also used to reinforce participation and achievement.

One of the things I do is use reward systems.(IDI-3)

Another detailed a point-based system:

Gumamit ako ng point system—bawat tamang sagot ay may puntos, at kapag nakaipon sila, may maliit na premyo gaya ng stickers o badge. Sobrang proud sila tuwing may nare-receive sila, at mas nagiging determinado silang matuto.

(I used a point system—each correct answer earned them points, and when they collected enough, they got a small prize like stickers or a badge. They were so proud whenever they received something, and it made them more determined to learn.) (IDI-9)

Another teacher shared a recognition strategy:

Nung tinuro ko ang place value, may 'Math Star of the Day' ako—yung pinaka-active o may biggest improvement, binibigyan ko ng star card. Abot-tenga ang ngiti nila! At yung iba, gusto rin maging star, kaya todo effort sila.

(When I taught place value, I had a 'Math Star of the Day'—the most active or most improved student got a star card. Their smiles were ear-to-ear! And the others wanted to be the star too, so they gave their best.) (IDI-12)

There are also teachers who enhance motivation by involving students in tracking their own performance or completing assignments at home.

When I let pupils tally his/her own score, the students seem to enjoy math more. (IDI-1)

Another described how sending home activity sheets was beneficial:

Kapag pinapadala ko ng activity sheets sa bahay, mas nakikita kong nae-enjoy ng mga bata ang Math. Nung tinuro ko ang telling time, nagpagawa ako ng worksheet na may pictures ng clocks na kailangang lagyan ng tamang oras. Sabi ng ibang bata, tinulungan daw sila ng magulang nila at mas na-explain pa sa kanila. Nung binalik nila ang sagot, excited pa silang ikuwento kung paano nila ginawa.

(When I allow them to bring activity sheets home, I notice that the students enjoy Math more. When I taught telling time, I gave them a worksheet with pictures of clocks that they had to label with the correct time. Some of them said their parents helped and explained things further. When they returned the sheets, they were excited to share how they worked on them.) (IDI-3)

The findings of this study show that positive reinforcement and motivation are foundational to effective behavioral teaching strategies for improving math engagement among elementary learners. Teachers used differentiated instruction, verbal praise, reward systems, and engaging activities to foster supportive learning environments, consistent with the emphasis on active participation and motivation discussed by Chavan and Yoshikawa (2017). These strategies align with research by Skinner (2016), which highlights the role of supportive relational contexts in promoting students' engagement and persistence.

Moreover, encouraging students' self-monitoring and celebrating small successes helped build confidence and enjoyment in learning mathematics, echoing the findings of Gallagher et al. (2022) regarding the benefits of tailoring instructional approaches to students' individual needs. Overall, the study suggests that reinforcing positive behaviors, offering meaningful encouragement, and maintaining high expectations can significantly enhance students' perseverance, motivation, and overall engagement in mathematics.

Environmental Teaching Strategies

Based on this study's data, environmental Teaching Strategies refer to the intentional use of physical, social, and technological elements in the learning environment to support and enhance student engagement in mathematics. These strategies help foster participation, collaboration, motivation, and a deeper understanding of mathematical concepts by shaping how students interact with content, peers, and their surroundings. These are strategies encompassing collaborative and peer learning and technology, and interactive tools.

Collaborative and peer learning. This theme highlights the strategies tapping into the ways students learn with and from others, whether through informal conversations, peer tutoring, group tasks, or mentoring relationships. It creates a classroom culture of shared responsibility and support. This includes talking about math outside the class, using the think-pair-share approach, implementing math team challenges, one-on-one tutoring sessions, and involving parents in assignments.

Several teachers shared that extending math beyond the classroom into casual settings helps students connect math to real-life situations:

In my experience, talking about math outside of class works well. (IDI-7)

Talking about Math even outside of formal lessons. Sometimes during recess, I'd ask, 'If you have ₱50 and the juice costs ₱20, how much change will you get?' It feels like casual conversation, but they're learning. They begin to understand that Math is used in real life, too. (IDI-11)

While we were arranging chairs for a school program, I asked how many rows we could make if we had 25 chairs and wanted 5 per row. They had to think but were happy, especially when they realized Math is really useful. (IDI-8)

These informal learning opportunities promote authentic engagement and help students view math as part of daily life.

Meanwhile, teachers are also using the Think-Pair-Share Approach. Teachers found that structuring group work using "think-pair-share" enables students to learn more effectively through discussion and peer explanation.

When I was teaching how to solve word problems, I first let them think of their own answer, then paired them up to compare solutions. After that, a few students shared with the class how they solved it. Math became more relatable to them because it felt like teamwork, and they understood better when their classmates explained. (IDI-9)

I tried to use the 'think-pair-share' approach. (IDI-3)

This method fosters active participation and allows students to learn from multiple perspectives. Similarly, peer tutoring builds student confidence and encourages collaboration:

May batang marunong na sa regrouping, tinulungan niya 'yung partner niya step by step. Mas naging relatable ang Math kasi paliwanag na ng kaibigan nila, at hindi sila nahihiyang magtanong. (One student who already understood regrouping helped their partner step by step. Math became more relatable because it was explained by a friend, and they weren't shy to ask questions.) (IDI-9)

Peer mentoring also played a role in engagement as this approach is believed by teachers to empower learners to take on teaching roles and support each other's growth.

When I peer mentor, the students seem to enjoy math more. (IDI7)

I remember a time when I tried to peer mentor. It really helped my students stay engaged. (IDI-9)

Teachers are also implementing math team challenges. Group-based competitions and activities motivate students through shared effort and gamified learning:

We did a group relay game—each team member had to answer a multiplication flashcard before their group could move forward. Because it was a team effort, they enjoyed it more and learned even if it was challenging. (IDI-4)

When I taught solving word problems, I divided them into small groups and gave each group a different problem to solve together. There was teamwork, discussion, and everyone was more active. (IDI-2)

Some teachers provided individualized support, recognizing that quieter or struggling students may benefit from focused attention:

Kapag nagkakaroon kami ng one-on-one math tutoring sessions, mas nakikita kong nae-enjoy ng mga bata ang Math. Nung tinutulongan ko ang isang bata sa place value, mas naipapaliwanag ko sa kanya nang dahan-dahan gamit ang blocks at drawings. Nawala ang hiya niya sa pagtatanong, at tuwing tama ang sagot niya, ngumiti siya ng malaki—doon ko nakita na mas nag-eeenjoy siya. (When we have one-on-one math tutoring sessions, I notice that students enjoy Math more. I explained it slowly using blocks and drawings. He became less shy about asking questions, and he smiled every time he got the answer right.) (IDI-9)

Involving parents in assignments is another strategy that teachers employed. Parental involvement bridges the gap between home and school, reinforcing learning beyond the classroom. Teachers fostered collaboration by involving families in students' learning:

When I ask their parents to help in assignments, the students seem to enjoy math more. (IDI-10)

Ask their parents to help with assignments. (IDI-6)

The findings suggest that fostering collaborative and peer learning within the classroom builds a socially supportive environment that significantly enhances student engagement, confidence, and conceptual understanding in mathematics. Strategies such as think-pair-share, peer tutoring, and group challenges mirror the emphasis by Hu, Fan, and Gu (2016) on the importance of interactive and supportive classroom environments. These collaborative structures not only deepen students' understanding but also create a sense of belonging that strengthens their motivation to participate.

Peer interactions also offer immediate feedback, promote modeling of positive behaviors, and help reduce the anxiety often associated with making mistakes, especially for struggling learners. This supports the conclusions of Skinner (2016), who emphasized the relational factors that drive engagement, and aligns with Chavan and Yoshikawa's (2017) findings that active, social learning processes foster both cognitive and emotional investment in learning. Overall, promoting collaboration in math classrooms emerges as a vital strategy for cultivating more resilient, motivated, and successful learners.

Technology and interactive tools. This theme is about teachers integrating digital tools, games, apps, and hands-on materials to make math more interactive, visual, and enjoyable. These strategies help modernize instruction and support diverse learning styles.

Teachers found that apps increased student motivation and self-confidence:

I let them use an app with visual blocks to divide numbers. Every time they completed a level, there was a reward sound or animation. They were excited and more confident because they could do it on their own. (IDI-12)

I tried incorporating interactive math apps. It really helped my students stay engaged, bisag lisod pa ang competency. (IDI-3)

Apps create opportunities for independent exploration and immediate feedback. Also, interactive boards allow for collaborative problem-solving in a gamified format:

I tried using a digital whiteboard for an interactive math lesson, and it really helped my students stay engaged. When I taught skip counting, I let them take turns writing the correct numbers on the whiteboard. It felt like a game to them, and everyone wanted to join. They could instantly see the results, and it made them participate more actively. (IDI-7)

Teachers are also incorporating educational games. Games like board games and guided online play make practice fun and effective:

I use board games, especially when teaching multiplication tables. I created a game like 'Snakes and Ladders', but they had to answer a multiplication fact before rolling the dice. It became exciting for them, and they remembered the answers better because they kept repeating them while playing. (IDI-11)

I allow online games (guided by the teacher on how to do it). (IDI1)

These strategies combine learning with play to keep students interested and practicing regularly. For the participants, hands-on experiences help solidify abstract concepts by engaging students in tactile and imaginative tasks:

When I taught measurement, I gave them rulers and asked them to measure objects around them, like pencils, books, and desks. They understood the concept of centimeters better because they did the measuring themselves. (IDI-6)

When I taught adding money, we turned the classroom into a marketplace. Some were sellers, others were buyers using play money. They had to compute the total and the change. It felt like a game, but they learned a lot." (IDI-7)

Role-playing immerses students in authentic problem-solving scenarios that connect directly with everyday life.

When I taught subtracting money, we set up a small store in front of the class, and there were 'customers' buying items. They really enjoyed it because it felt real." (IDI-8)

These tools act as ongoing reference points that students can independently use to support their learning. Classroom visuals help reinforce understanding by making abstract concepts consistently visible:

When I taught place value, I had a wall chart showing ones, tens, and hundreds with examples. When they got confused, they just looked at it. Math became more relatable to them because it was always visible and easy to refer to." (IDI-9)

"When I used numbers and word displays inside the class and these were colorful pictures to capture their attention. (IDI-5)

The findings indicate that the use of technology and interactive tools, such as educational apps, digital whiteboards, and gamified platforms, significantly enhances student engagement in mathematics. This supports the argument of Gallagher et al. (2022), who emphasized the importance of adapting instructional materials to fit diverse learner needs. By transforming abstract concepts into concrete, relatable experiences, these tools cater to a wide range of learning styles and foster greater accessibility and motivation.

Furthermore, immediate feedback, visual reinforcement, and opportunities for self-paced learning offered by technology align with the recommendations of Viseu and Oliveira (2012) regarding the importance of meaningful and responsive instructional support. In addition, the findings resonate with Chavan and Yoshikawa's (2017) advocacy for active and dynamic learning experiences that sustain student attention and deepen understanding. Overall, integrating technology thoughtfully into math instruction provides an effective pathway to promote inclusive, engaging, and effective learning environments.

Table 2. Themes on the Teaching Approaches for Math Engagement of Elementary School Learners

Global Themes	Basic Themes	Core Ideas
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Cognitive Strategies	Teaching	Cognitive Challenge and Strategy Building	<ul style="list-style-type: none"> -encourage critical thinking and reasoning -promote metacognition and self-reflection -scaffold learning with clear structures and routines -use varied instructional techniques to address learning diversity -foster inquiry through questioning and exploration
		Real-World and Visual Application	<ul style="list-style-type: none"> -connect math to real-life contexts -use everyday tasks and roles to reinforce math concepts -engage learners through movement and play -promote exploration through nature and observation -support understanding with visual aids
Behavioral Strategies	Teaching	Positive Reinforcement and Motivation	<ul style="list-style-type: none"> encourage participation build learner confidence, and sustain attention through rewards, praise -differentiate instruction engaging classroom practices
		Collaborative and Peer Learning	<ul style="list-style-type: none"> -talk about math outside the class -use the think-pair-share approach -implement math team challenges -one-on-one tutoring sessions -involve parents in assignments
Environmental Strategies	Teaching	Technology and Interactive Tools	<ul style="list-style-type: none"> -use interactive math apps -use digital whiteboards -incorporate educational games -hands-on and role-playing activities -environmental visual aids

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

This section employed a qualitative approach through an interview using structured questions. The responses of the 12 participants were analyzed using thematic analysis. Based on the interview results of Grade 5 teachers, revealed core themes on how they promote engagement in mathematics: Cognitive Teaching Strategies, Behavioral Teaching Strategies, Environmental Teaching Strategies, and Technology and Interactive Tools. These were further categorized into basic and core ideas, including critical thinking, real-world application, motivation, and collaboration.

Conclusion

It is concluded in this study that mathematics engagement is a multi-dimensional construct influenced by cognitive, behavioral, environmental, and technological strategies. Teachers play a crucial role in shaping these dimensions through their instructional approaches. The validated five-factor model provides a meaningful framework for planning effective classroom practices that foster not only comprehension but also enjoyment and active participation in math.

Recommendations

Based on the conclusions of the study, the researcher offers the following recommendations of the study.

1. Teachers integrate the identified engagement strategies—particularly those that encourage critical thinking, real-world application, collaboration, motivation, and the use of technology—into their regular mathematics instruction.

2. Teachers are encouraged to employ varied, learner-centered approaches such as inquiry-based tasks, role-playing, and interactive digital tools to meet the diverse needs and preferences of Grade 5 learners.
3. School administrators should support this shift by providing professional development programs and classroom resources that enable the practical application of the strategies outlined in this study.
4. Curriculum developers and education planners are also encouraged to align instructional content with the validated five-factor model of mathematics learning engagement, ensuring that materials foster not only conceptual understanding but also learner participation and enjoyment.

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