**Exploring the Art of Questioning in Mathematics: A Qualitative Inquiry into Master Teachers’ Classroom Practices**

**ABSTRACT:** This qualitative study explores how expert secondary mathematics teachers conceptualize and implement the art of questioning in their classroom instruction. Using an exploratory design, in-depth interviews were conducted with purposively chosen seven (7) master teachers from the Davao Oriental and Mati City divisions to identify key strategies, beliefs, and practices associated with effective questioning. Thematic analysis following Braun and Clarke’s (2021) six-phase framework revealed critical themes, including promoting deeper understanding through strategic questioning, enhancing engagement and lesson flow via interactive questions, planning questions aligned to objectives and instructional flow, adapting questions to student diversity and real-world relevance, addressing non-responsiveness through scaffolding and support, assessing understanding and misconceptions through questioning, and reflecting on questioning effectiveness through student outcomes. These findings underscore the central role of thoughtful questioning in facilitating student-centered, inclusive, and cognitively engaging mathematics learning environments. The study provides practical insights for educators and professional developers aiming to enhance instructional questioning practices in secondary education.

***Keywords:*** *Art of Questioning, Mathematics Education, Qualitative Inquiry, Thematic Analysis, Secondary Teachers*

**INTRODUCTION**

Effective questioning is a cornerstone of mathematics education, significantly enhancing students' metacognitive awareness, problem-solving skills, and conceptual understanding (Bohara, 2024; Reyes & Reyes, 2024). The shift toward inquiry-based and student-centered instruction has underscored the power of well-crafted questions in stimulating mathematical reasoning and deeper learning (Nika & Brailas, 2022; Seyferth et al., 2021). While questions are often regarded as simple teaching tools, their strategic use can inspire higher-order thinking and cognitive engagement (Cline, 2024).

Despite its instructional value, the art of questioning remains underdeveloped in many educational contexts. Barriers such as inadequate teacher training, poor question design, and student disengagement hinder the effective implementation of questioning strategies (Nolan, 2024; Nasir et al., 2023; Tarasenkova et al., 2023). This is particularly evident in the Philippine mathematics education context, where teachers face challenges in aligning their practices with the critical thinking demands of the K–12 curriculum (Frianeza et al., 2024; Bongco & David, 2020). While lesson planning and content delivery have shown consistency, questioning techniques aimed at fostering higher-order thinking, remain insufficiently developed (Dicdiquin et al., 2023).

In this context, understanding the practices of master teachers—educators recognized for their instructional expertise and professional distinction— becomes crucial. As models of effective pedagogy, master teachers provide insights into high-quality questioning strategies that may not be evident in typical classroom settings. According to the Philippine Professional Standards for Teachers (PPST), teachers at the Highly Proficient and Distinguished career stages are expected to model effective teaching strategies, mentor peers, and display exemplary professional practice (Department of Education, 2017). Given the national push for 21st-century skills and learner-centered instruction, investigating how these expert teachers navigate the complexities of classroom questioning provides a practical and policy-relevant contribution to improving mathematics education in the Philippines.

While various frameworks exist for categorizing levels of questioning, such as Bloom's Taxonomy, few studies have explored how expert teachers in the field actually conceptualize and implement questioning strategies. There is a need to understand what effective questioning looks like in practice and how it is experienced and articulated by those with significant classroom expertise. Addressing this gap is crucial to informing teacher development and designing practical tools that support instructional improvement.

This study aims to explore the perceptions and classroom practices of mathematics master teachers regarding the art of questioning. Through in-depth interviews and thematic analysis, it identifies core themes that reflect how expert teachers design, sequence, and reflect upon their questioning strategies. The insights derived from this qualitative inquiry contribute to a more nuanced understanding of how questioning can be leveraged to create more responsive, engaging, and equitable mathematics classrooms.

**THEORETICAL LENS**

This study is anchored in three key educational theories that collectively offer a lens for interpreting teachers’ questioning practices: Bloom’s Taxonomy, the Socratic Method, and Constructivism.

Bloom’s Taxonomy (Cherry, 2024) offers a hierarchical classification of cognitive processes, ranging from basic recall to higher-order thinking skills such as analysis, synthesis, and evaluation. In this study, Bloom’s framework serves as a lens for examining how teachers intentionally craft questions that align with different cognitive levels. When teachers design questions to assess comprehension, stimulate analysis, or provoke evaluation, they are leveraging the taxonomy to scaffold student thinking and guide them toward deeper mathematical understanding (Ina Magdalena et al., 2023; Anand, 2024; Ramos et al., 2024).

Complementing this cognitive structure, the Socratic Method highlights the importance of open-ended, dialogic questioning in fostering critical thinking and inquiry. Rooted in philosophical discourse, this method encourages learners to examine their assumptions, clarify their reasoning, and explore ideas through structured dialogue (Elder, 2022; Overholser & Beale, 2023). In the mathematics classroom, such questioning enhances student-centered learning and supports the development of reflective thinking skills (Seyferth et al., 2022; Ng et al., 2024).

Finally, Constructivism underlines the role of learners as active participants in building knowledge through experience and reflection. Within this paradigm, questioning is not merely evaluative but a catalyst for inquiry, exploration, and metacognitive engagement (Adak, 2022; Conrad, 2022; Park, 2023). Teachers who adopt constructivist approaches use questions to challenge students, promote collaboration, and create opportunities for deeper conceptual connections (Muller, 2020; Rodríguez et al., 2024).

Together, these theoretical lenses guide the analysis of the qualitative data in this study. Bloom's Taxonomy informs the cognitive dimensions of teachers' questioning strategies, the Socratic Method provides a foundation for examining dialogic and reflective practices, and Constructivism shapes the understanding of how questioning supports active, student-centered mathematics learning. Their integration allows a comprehensive interpretation of how expert teachers use questioning to cultivate meaningful, inquiry-driven classroom environments.

**REVIEW OF RELATED LITERATURE**

**The Role of Questioning in Mathematics Education**

Effective questioning is widely recognized as a powerful pedagogical strategy that promotes deeper understanding, critical thinking, and engagement in mathematics classrooms. Tarasenkova et al. (2023) emphasize that well-formulated questions, characterized by clear vocabulary, cognitive challenge, and openness to multiple approaches, enhance students’ problem-solving skills and foster meaningful mathematical dialogue. Similarly, Mason (2020) notes that questions encouraging reflection on mathematical processes rather than solely on answers help learners internalize concepts and foster a positive attitude toward the subject.

Teacher questioning serves both diagnostic and formative purposes. McCarthy et al. (2016) highlight that effective questioning assesses student understanding, guides instruction, and promotes student self-reflection. Aziza (2018) underscores the importance of open-ended questions in stimulating mathematical creativity, while Mahmud et al. (2021) identify prompting and clarification techniques as vital for developing students' reasoning during problem-solving.

**Factors Influencing Teachers’ Questioning Practices**

Several studies have identified key factors influencing the quality and implementation of questioning in mathematics education. Sa’aidin and Mahmud (2023) emphasize the role of teacher training, classroom environment, and question design in supporting effective questioning. However, barriers such as time constraints and insufficient resources may hinder implementation (Tarasenkova et al., 2023).

Professional development plays a critical role in enhancing teachers' questioning practices. According to Aydoğan Yenmez et al. (2018), modeling activities and targeted workshops enable teachers to formulate more varied and cognitively demanding questions. Hendriana et al. (2016) highlight the role of metaphorical thinking training in improving mathematical questioning, demonstrating its capacity to help teachers develop non-routine and conceptually rich questions.

Gender dynamics, student anxiety, and classroom participation influence how questions are posed and received. Research by Ntuli and Godfrey (2020) and Magdefrau (2023) reveal that boys often receive more questions than girls, while Özpınar (2023) notes that anxiety inhibits students’ willingness to ask or respond to questions— emphasizing the need for inclusive and supportive classroom climates.

**Insights from OECD and TIMSS on Questioning Practices in Mathematics**

Questioning practices in mathematics instruction have also been significantly emphasized in recent reports globally. For instance, the findings of the Organisation for Economic Co-operation and Development (OECD) (2018) emphasize the importance of teacher questioning in promoting metacognition and student engagement across high-performing education systems such as Finland, Japan, and Singapore. Similarly, Trends in International Mathematics and Science Study (TIMSS) 2019 data reveal that classrooms with frequent use of cognitively demanding questions show a positive correlation with student achievement in mathematics, particularly in countries like Korea and Canada (Mullis et al., 2020). These global trends support the premise that strategic questioning is a key component of effective mathematics teaching worldwide.

**Questioning in the Philippine Mathematics Context**

In the local context, Andrade (2023) and Cayud-ong and Futalan (2024) highlight how techniques such as the Socratic Method and REACT approach foster critical thinking and student engagement in Philippine classrooms. Their findings suggest that effective questioning can be enhanced by embedding questions within contextualized, technology-enhanced learning environments. These insights underscore the need for culturally and pedagogically responsive questioning practices that reflect the realities of local teaching settings.

While existing studies highlight the value of questioning in mathematics instruction, limited research has explored how expert teachers, particularly master teachers in the Philippines, implement these practices, as most existing literature focuses on general teacher populations. Furthermore, while global frameworks like OECD and TIMSS emphasize the importance of cognitively demanding questions, there remains a gap in how seasoned educators contextualize and translate such practices into actual classroom questioning. These gaps inform the present study’s research questions.

**Research Methodology:**

**RESEARCH QUESTIONS**

This study sought to explore the perspectives and experiences of master teachers regarding the art of questioning in mathematics education. Specifically, it addressed the following research questions:

1. How do master teachers perceive the role of questioning in facilitating student learning and engagement in mathematics?
2. What strategies do they use in planning and implementing effective questioning techniques during instruction?
3. How do teachers differentiate the types and purposes of questions in relation to students’ needs and cognitive levels?
4. What challenges do teachers encounter in applying questioning strategies, and how do they address them?
5. In what ways do teachers reflect on and evaluate the impact of their questioning practices on student understanding and instructional effectiveness?

**RESEARCH DESIGN**

This study employed a qualitative exploratory design to gain a deeper understanding of how master teachers conceptualize and implement questioning in mathematics instruction. Qualitative research is appropriate when investigating complex, context-dependent phenomena where participant perspectives and lived experiences are central (Creswell & Poth, 2018). The exploratory nature of the design allowed for an open-ended investigation into beliefs, strategies, and classroom practices associated with questioning.

**PARTICIPANTS AND SAMPLING PROCEDURE**

Seven master teachers in mathematics were selected through purposive expert sampling, a non-probability technique where participants are chosen based on their expertise and relevance to the research questions (Babbie, 2020; Etikan, 2017). Expert sampling is particularly appropriate in qualitative inquiry, where the goal is to gain insight from individuals with deep, experience-based knowledge (Robinson, 2023; Nyimbili & Nyimbili, 2024). As shown in Table 1, all participants held an "Outstanding" performance rating during the academic year 2023–2024 and had extensive teaching experience in secondary mathematics education within the Division of Davao Oriental and the City of Mati.

Table 1. Profiles of the Qualitative Participants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Participants | Subjects Taught | Teaching Experience | Field | Performance Rating for SY 2021-2022 |
| Participant 1 | Statistics and Probability; Basic Calculus | 15 years | Mathematics Education | Outstanding |
| Participant 2 | Grade 8 Mathematics | 7 years | Mathematics Education | Outstanding |
| Participant 3 | Grade 7 Mathematics | 7 years | Mathematics Education | Outstanding |
| Participant 4 | Statistics and Probability; Basic Calculus | 8 years | Mathematics Education | Outstanding |
| Participant 5 | Grade 9 Mathematics | 15 years | Mathematics Education | Outstanding |
| Participant 6 | General Mathematics; Statistics and Probability; General Physics 1 and 2 | 12 years | Mathematics Education | Outstanding |
| Participant 7 | Grade 10 Mathematics | 18 years | Mathematics Education | Outstanding |

Given the focused nature of the study and the shared expertise of participants, a sample size of seven was deemed sufficient. In this study, data saturation was identified when no new themes or codes emerged during the final stages of coding, and participant responses consistently reflected overlapping patterns, confirming the adequacy of the sample for thematic analysis. Guest et al. (2020) and Lee et al. (2024) suggest that data saturation— where no new themes emerge—can often be reached within 6–12 interviews, particularly when participants have homogenous backgrounds and experience levels.

**DATA COLLECTION PROCEDURE**

Data were collected through one-on-one semi-structured interviews guided by open-ended questions that explored perceptions, planning and implementation, challenges, and reflections on questioning practices. Interview questions were designed to elicit rich narratives aligned with the study's theoretical frameworks. Prior to the interviews, rapport was built through introductory conversation to ensure participant comfort and openness.

The interviews were conducted either in person or virtually, depending on availability. Each session was audio-recorded (with informed consent) and transcribed verbatim. Ethical clearance was obtained from the Research Ethics Committee of Davao Oriental State University, and written permission was secured from the Department of Education offices of Mati City and Davao Oriental.

**DATA ANALYSIS**

Interview data were analyzed using reflexive thematic analysis, following the six-phase framework of Braun and Clarke (2021). This method involves:

1. Familiarization with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

This reflexive approach emphasizes researcher interpretation and thematic depth rather than mechanistic coding procedures (Braun & Clarke, 2022). An external qualitative expert with a doctoral background in mathematics education reviewed the data to enhance interpretive trustworthiness. Throughout the analysis, themes were interpreted in light of the study’s theoretical lens, which includes Bloom’s Taxonomy, the Socratic Method, and Constructivism, to uncover deeper pedagogical meanings.

**FINDINGS AND DISCUSSION**

Table 2. Themes from Participant Interviews

|  |  |  |
| --- | --- | --- |
| Research Questions | Codes | Themes |
| RQ1 | • Encourages students to think critically and explain reasoning  • Guides discovery through scaffolding  • Stimulates deeper discussion | Promoting Deeper Understanding through Strategic Questioning |
| RQ1 | • Promotes formative assessment and lesson structuring  • Helps assess understanding and adjust instruction  • Creates interactive, engaging environment | Enhancing Engagement and Lesson Flow via Interactive Questions |
| RQ2 | • Aligns with lesson objectives and prior knowledge  • Starts with simple to complex questions  • Includes spontaneous, real-time questioning | Planning Questions Aligned to Objectives and Instructional Flow |
| RQ3 | • Adjusts question difficulty based on student readiness  • Uses varied question types (LOTS, HOTS, metacognitive)  • Connects questions to real-life scenarios | Adapting Questions to Student Diversity and Real-World Relevance |
| RQ4 | • Rephrases or translates questions when needed  • Uses guiding questions and visuals for support  • Applies random calling and peer support strategies | Addressing Non-responsiveness through Scaffolding and Support |
| RQ5 | • Uses verifying and probing questions to uncover misconceptions  • Applies formative questioning to adjust instruction  • Connects questions to authentic contexts | Assessing Understanding and Misconceptions through Questioning |
| RQ5 | • Evaluates success by student participation, clarity of responses, and goal attainment  • Reflects on student growth in confidence and understanding | Reflecting on Questioning Effectiveness through Student Outcomes |

**Theme 1: Promoting Deeper Understanding through Strategic Questioning**

Master teachers consistently highlighted the use of questions that lead students to construct knowledge through reasoning rather than merely recalling information. They shared that asking open-ended questions—particularly “why” and “how” prompts—was central to cultivating deeper understanding. As participants emphasized:

*“It is important for the teacher to know how to ask questions in a way that guides students to think critically.” (P4)*

*“Students should be guided toward discovering the answers through questions; the answers should not be given directly.” (P6)*

This practice reflects the constructivist view that learning occurs through actively making meaning and guided exploration (Conrad, 2022; Park, 2023). Rather than feeding information, teachers become facilitators who allow learners to build their own conceptual frameworks, mirroring Muller’s (2020) emphasis on metacognitive questioning.

Additionally, this aligns with Bloom’s Taxonomy, where higher-order questions (e.g., analysis, evaluation) enable learners to interpret and justify their thinking (Ina Magdalena et al., 2023; Anand, 2024). The frequent use of probing follow-up questions also signals movement beyond factual recall into reasoning and explanation (Ramos et al., 2024).

The use of such questions echoes the Socratic Method, where dialogue is used to challenge assumptions and refine thought (Elder, 2022; Overholser & Beale, 2023). Teachers shared that they rarely gave direct answers, instead guiding students to find solutions themselves— a key feature of Socratic inquiry.

Thus, questioning, as described by participants, is not merely a classroom management strategy but a pedagogical tool for constructing deep understanding grounded in theory and validated by reflective practice.

**Theme 2: Enhancing Engagement and Lesson Flow via Interactive Questions**

Participants emphasized the importance of strategically integrating questions to stimulate student engagement and facilitate smooth instructional transitions. Questions were used not only to prompt responses but also to create momentum and maintain classroom focus. Teachers shared that interactive questioning made lessons more dynamic and responsive to learners' needs. One participant underscored:

*"Questioning enhances retention and it may create a positive and interactive learning environment, wherein students feel safe and important in their classroom because you ask them questions and they can focus and be confident in answering your questions, in other words, there is a positive learning happening within the environment." (P5)*

This interactive use of questions reflects constructivist pedagogy, which emphasizes social interaction and dialogic learning as key components of cognitive development (Adak, 2022; Park, 2023). By involving students in questioning cycles, teachers foster a learning environment where learners are co-constructors of meaning.

From the lens of Bloom's Taxonomy, this theme relates to applying and analyzing levels—where students move beyond recalling facts to applying understanding in new contexts and articulating their thoughts. Teachers noted that asking to clarify or to redirect questions during discussions helped solidify ideas and kept students actively involved (Ina Magdalena et al., 2023).

Moreover, this practice is consistent with the Socratic Method, where interaction through questioning is not passive but a deliberate form of engaging students in reflective thinking and continuous dialogue (Ng et al., 2024). The quotes above also demonstrate how questioning can shift passive learners into active participants—a principle echoed in Seyferth et al. (2022), who emphasized that open dialogue encourages learner agency.

Overall, questioning served a cognitive function and a motivational and structural role in the classroom—facilitating flow, reinforcing engagement, and making instruction more student-centered and responsive.

**Theme 3:** **Planning Questions Aligned to Objectives and Instructional Flow**

Master teachers consistently emphasized the intentional planning of questions in relation to their lesson objectives and instructional pacing. They shared that questions are carefully thought out in advance and adjusted during teaching based on student feedback and real-time classroom dynamics.

*“I plan my questions by aligning them with the lesson objectives, ensuring they promote critical thinking, conceptual understanding, and active student engagement, also, to ensure alignment with the discussion and written and performance-based assessments.” (P2)*

This reflects a dual approach— structured preparation and flexible delivery. Teachers not only align questions with learning targets but also adjust based on immediate classroom situations. Such practices affirm constructivist principles, where teaching is a responsive and evolving interaction between teacher and learner (Conrad, 2022; Park, 2023).

From a Bloom’s Taxonomy perspective, this theme demonstrates how teachers scaffold questions along different cognitive levels—beginning with LOTS (lower-order thinking skills) and moving to HOTS (higher-order thinking skills). Teachers plan to begin with foundational prompts before leading students toward analysis and evaluation (Anand, 2024; Ina Magdalena et al., 2023).

This approach also resonates with the Socratic Method, where teachers use a sequence of purposeful questions to guide students from initial understanding to critical insight (Overholser & Beale, 2023). The element of spontaneity, informed by student responses, ensures that questioning remains dynamic and learner-responsive—an essential component of dialogic teaching (Ng et al., 2024).

Ultimately, this theme highlights how master teachers treat questioning as a pedagogical tool that requires both intentional design and classroom sensitivity—balancing planning with professional intuition.

**Theme 4: Adapting Questions to Student Diversity and Real-World Relevance**

Master teachers emphasized the importance of tailoring their questions to fit the diverse readiness levels, learning styles, and backgrounds of their students. They shared that effective questioning in mathematics involves assessing comprehension and ensuring inclusivity by adjusting the phrasing, difficulty, or context of questions. Some participants clearly emphasized:

*“I always give questions that relate to real life contexts to relate themselves in a scenario.” (P5)*

*“Students’ abilities must be considered when formulating questions, especially given the diverse learner profiles in the Department of Education. Some students perform below expectations, while others excel, so questions must be contextualized and adapted to suit their varying levels of understanding.” (P4)*

This approach reflects a constructivist orientation, where the teacher scaffolds learning by recognizing the individuality of each learner and providing multiple entry points into mathematical understanding (Adak, 2022; Park, 2023). By modifying questions or providing visual support, teachers actively foster equitable access to content.

The theme also aligns with Bloom’s Taxonomy, particularly in how teachers navigate between LOTS and HOTS based on student capability. They differentiate questioning strategies not just to assess learning but to support progression through cognitive levels (Ramos et al., 2024).

From the lens of the Socratic Method, this personalization of questions is essential for encouraging self-discovery without inducing frustration. By offering guided prompts, clarification, or real-life contextualization, teachers help students bridge abstract concepts with their lived experiences (Ng et al., 2024; Seyferth et al., 2022).

In doing so, questioning becomes a form of differentiation and inclusion, where students with varying abilities and backgrounds are all invited into the learning conversation through thoughtful pedagogical design.

**Theme 5:** **Addressing Non-responsiveness through Scaffolding and Support**

Several master teachers acknowledged the common challenge of students remaining silent or hesitant during questioning. However, they did not interpret silence as mere disinterest or inability. Instead, they adopted strategies such as guided prompts, peer support, or using visuals to scaffold understanding and gradually encourage student participation. One participant shared:

*“I use strategies such as scaffolding, using open-ended questions, and checking for understanding to ensure my questions are effective, especially that some students hesitate to respond because they fear giving incorrect answers, particularly in mathematics, where the prevailing mindset is that it is a difficult subject. This perceived difficulty contributes to their reluctance to participate.” (P7)*

This adaptive approach highlights a core tenet of constructivist pedagogy: recognizing that learning is socially supported and built upon prior knowledge. By scaffolding student responses and providing tools to engage, teachers create a psychologically safe environment for thinking and participation (Muller, 2020; Conrad, 2022).

In alignment with Socratic questioning, these techniques maintain the dialogic nature of instruction, even when learners hesitate. Instead of abandoning the question, the teacher rephrases or builds upon it, fostering a supportive climate where students feel encouraged to engage and reflect (Overholser & Beale, 2023; Ng et al., 2024).

Furthermore, such practices reflect Bloom’s emphasis on readiness, as teachers monitor where students are cognitively and respond accordingly. Follow-up and redirecting questions serve not only to reduce anxiety but also to activate reasoning and metacognition (Ramos et al., 2024). Ultimately, this theme shows that effective questioning is not about getting immediate answers; it is about creating pathways for students to find their voice and build confidence through structured support.

**Theme 6:** **Assessing Understanding and Misconceptions through Questioning**

Participants emphasized that questioning serves as a key tool for diagnosing student understanding in real time. Rather than relying solely on formal assessments, they used questions throughout the lesson to uncover misconceptions, clarify ideas, and adjust instruction accordingly. One of the participants reflected:

*“Through questioning, you can trace and verify where students made mistakes and identify their misconceptions in the process. There are times when students arrive at the correct answer but apply incorrect steps or violate certain procedures—issues that can be clarified through guided questioning.” (P3)*

This practice reinforces the formative function of questioning, where teachers continually assess how students process and apply concepts during instruction. According to McCarthy et al. (2016), strategically placed questions provide insights into students' thought processes and help teachers make timely instructional adjustments.

The strategy also supports the constructivist perspective, where learning is monitored and shaped through continuous interaction and feedback (Conrad, 2022; Park, 2023). Teachers act not only as facilitators but also as diagnosticians who use questioning to surface thinking and guide student reasoning.

From the lens of Bloom’s Taxonomy, such questioning spans multiple levels— starting from recall and comprehension but quickly moving into application and analysis, where misunderstandings often reveal themselves (Anand, 2024; Ramos et al., 2024). In relation to the Socratic Method, this approach mirrors the use of probing and clarifying questions to challenge incomplete reasoning and encourage self-correction. As Overholser and Beale (2023) explain, Socratic questioning often highlights contradictions in learners’ thinking, prompting deeper exploration and restructuring of understanding.

This finding is further echoed in the literature. Sa’aidin and Mahmud (2023) emphasize that oral questioning is an effective technique for checking understanding, particularly when learners are encouraged to explain their reasoning. Tarasenkova et al. (2023) also found that real-time questioning sharpens instructional focus and increases student awareness of their own learning gaps. Overall, this theme illustrates that for expert teachers, questioning is not simply a way to measure what students know; it is a tool to expose how students think, recognize what they struggle with, and make informed decisions to support learning at the moment.

**Theme 7:** **Reflecting on Questioning Effectiveness through Student Outcomes**

Participants noted that effective questioning does not end when a student responds; it extends to reflection. Master teachers described how they regularly evaluate their questioning strategies based on student participation, clarity of responses, and learning progression. This practice of reflective teaching helps them refine their techniques and better address students’ conceptual needs. Some participants evidently responded:

*“I believe I need to improve in balancing lower-order and higher-order questions, providing more wait-time, and crafting questions that my students can relate to and apply in real-life situations.” (P3)*

*“I have identified areas for improvement, including diversifying my questioning techniques to incorporate more open-ended and thought-provoking prompts, as well as enhancing my use of wait-time to allow students adequate space to think and respond.” (P7)*

This reflective stance is central to constructivist teaching, where questioning is not static but adaptive and shaped by feedback from learners and contextual demands (Park, 2023; Muller, 2020). Through self-evaluation, teachers refine how they scaffold student learning, aligning with the constructivist view that teachers are not just content transmitters but facilitators of thinking.

This theme also mirrors the Socratic tradition, where iterative reflection on both questions and responses leads to deeper understanding (Elder, 2022; Overholser & Beale, 2023). Teachers, like Socratic guides, reassess their approaches based on whether student thinking progresses in depth and clarity.

Moreover, this finding supports empirical research on the value of reflective questioning practices. McCarthy et al. (2016) emphasized that teacher self-evaluation of questioning is essential for improving instruction and assessing student comprehension. Similarly, Sa’aidin and Mahmud (2023) highlighted that continuous reflection, combined with classroom observation and feedback, supports improving oral questioning practices in mathematics.

In connection with Bloom's Taxonomy, teachers assess the success of their questions by whether students reach higher cognitive levels, not just answering correctly but doing so with understanding, explanation, and confidence (Ramos et al., 2024). Thus, reflection on questioning effectiveness is not merely about measuring participation; it is about deepening instructional intentionality, ensuring that questions lead to meaningful understanding, and supporting the ongoing growth of both student and teacher.

Collectively, the seven themes highlight the multidimensional role of questioning in mathematics instruction, as experienced and articulated by expert teachers. These themes demonstrate how questioning serves not only cognitive but also motivational, reflective, and inclusive functions in the classroom. Synthesizing these insights, Figure 1 presents a conceptual model that illustrates the interconnection of the emergent themes and their alignment with the study’s theoretical lenses—Bloom’s Taxonomy, the Socratic Method, and Constructivism. The model emphasizes that effective questioning is not a singular strategy, but a complex, intentional practice rooted in theory, responsive to learner diversity, and central to meaningful mathematics learning.

A diagram of a math problem

AI-generated content may be incorrect.

*Figure 1.* Conceptual model of the art of questioning in mathematics instruction, illustrating how the seven emergent themes align with Bloom’s Taxonomy, Constructivism, and the Socratic Method

**CONCLUSION**

This study explored how master teachers in secondary mathematics conceptualize and implement the art of questioning in the Philippine classroom. Seven themes emerged: (1) promoting deeper understanding through strategic questioning, (2) enhancing engagement and lesson flow via interactive questions, (3) planning questions aligned to objectives and instructional flow, (4) adapting questions to student diversity and real-world relevance, (5) addressing non-responsiveness through scaffolding and support, (6) assessing understanding and misconceptions through questioning, and (7) reflecting on questioning effectiveness through student outcomes. These interconnected themes illustrate how expert teachers use questioning not merely to check understanding but to guide learning, build confidence, and support inclusivity actively. Framed by Bloom's Taxonomy, the Socratic Method, and Constructivism, the study presents a conceptual model that captures questioning as a dynamic, theory-informed pedagogy. The findings highlight the value of targeted professional development and contribute to the discourse on responsive, learner-centered mathematics instruction.

**IMPLICATIONS AND RECOMMENDATIONS**

The results of this study underscore the essential role of questioning as a powerful pedagogical tool in mathematics education, particularly within the Philippine classroom context. Master teachers in this study demonstrated how strategic questioning enhances conceptual understanding, encourages reflective thinking, and fosters inclusive participation. These findings imply that effective questioning should be recognized not merely as a technique for checking understanding but as a dynamic process that deepens learning and supports equity in diverse and often resource-constrained educational settings.

In terms of practice, Filipino mathematics teachers are encouraged to approach questioning with greater intentionality— planning questions that align with learning goals and adapting them to students' varying levels of readiness and engagement. The ability to scaffold responses, address misconceptions, and create a safe environment for students to participate actively is especially relevant in Philippine classrooms, where students often hesitate to speak up due to cultural norms or fear of making mistakes.

Professional development efforts should prioritize the art of questioning as a core instructional competency. In the Philippine setting, where class sizes are typically large, and student diversity is pronounced, in-service training should include strategies for designing progressive questioning sequences, promoting equitable participation, and using formative questioning to adjust instruction. Programs such as lesson study, peer mentoring, and coaching can be institutionalized at the school or division level to foster collaboration among teachers in improving classroom discourse.

At the policy level, educational leaders and curriculum planners may consider incorporating questioning practices into teacher evaluation frameworks and classroom observation tools. Doing so affirms the pedagogical value of questioning and encourages sustained attention to its development. This is particularly important in the Philippines, where recent curricular reforms emphasize learner-centered approaches and critical thinking, yet classroom questioning remains largely focused on factual recall.

Future research may build on this study by examining how questioning strategies such as confidence, metacognitive awareness, and achievement influence student outcomes. In the Philippine context, further studies may also explore regional variations in questioning practices or compare how teachers in public and private schools approach questioning in relation to institutional culture and resources. Additionally, future inquiry may include the student voice, investigating how learners perceive different questioning approaches and how these impact their engagement and understanding.

This study was limited to master teachers in secondary mathematics from Davao Oriental and Mati City divisions. As a qualitative inquiry, its findings prioritize depth of understanding over broad generalizability. While the insights offer valuable implications for instructional practice, they may not fully reflect the experiences of mathematics teachers in other regions or contexts.

**Ethical Approval and Consent:**

The interviews were conducted either in person or virtually, depending on availability. Each session was audio-recorded (with informed consent) and transcribed verbatim. Ethical clearance was obtained from the Research Ethics Committee of Davao Oriental State University, and written permission was secured from the Department of Education offices of Mati City and Davao Oriental.

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Details of the AI usage are given below:

1. The name, version, model, and source of the generative AI technology used by the author are the following: ChatGPT (GPT-4o), developed by OpenAI. Source: https://chat.openai.com

2. The AI Tool was used to assist with refining grammar, improving coherence, clarifying responses to reviewer comments, crafting transitions, finding related literature, summarizing findings, and formatting citations in APA 7th edition.

3. The prompts used are the following:

* “Can you help me polish this paragraph based on the reviewer’s comment?”
* “Revise this sentence for academic tone.”
* “Please help me refine this conclusion of the study.”
* “Refine this paragraph as a concluding part of the findings and discussions.”
* “Please search the reference for the Philippine Standards for Professional Teachers to provide a citation for master teachers as models of pedagogy in the Philippine context.”
* “Please transform this reference into APA 7th edition format.”
* “Enhance this transition from the review of related literature to the research questions for a smooth flow.”

**REFERENCES**

Adak, S. (2022). Constructivism and it’s socio-philosophical implication in education. *Scholarly Research Journal for Interdisciplinary Studies, 9*(71). <https://doi.org/10.21922/srjis.v9i71.10203>

Anand, B. (2024). *Types of Learning: Domains of Learning-Cognitive, Affective, and Psychomotor, Learning Theories, Experiential Learning 3*. <https://www.researchgate.net/publication/383704726>

Andrade, R. R. (2023). Contextualized question-embedded video-based teaching and learning tool: A pathway in improving students' interest and mathematical critical thinking skills. *International Journal of Science, Technology, Engineering and Mathematics, 3*(2), 39-64. <https://doi.org/10.53378/352990>

Aydoğan Yenmez, A., Erbas, A.K., Çakıroğlu, E., Cetinkaya, B., & Alacaci, C. (2018). Mathematics teachers’ knowledge and skills about questioning in the context of modeling activities. *Teacher Development, 22*, 497 - 518.

Aziza, M. (2018). An analysis of a teacher’s questioning related to students’ responses and mathematical creativity in an elementary school in the UK. *International Electronic Journal of Elementary Education, 10*(4), 475–487. <https://doi.org/10.26822/iejee.2018438138>

Babbie, E. R. (2020). *The practice of social research* (15th ed.). Cengage Learning.

Bohara, C. L. (2024). An analysis of questioning strategies in secondary mathematics classroom. *Journal of Musikot Campus, 2*(1), 1–22. <https://doi.org/10.3126/jmc.v2i1.70783>

Bongco, R. T., & David, A. P. (2020). Filipino teachers' experiences as curriculum policy implementers in the evolving K to 12 landscape. *Issues in Educational Research, 30*(1), 19–34. <https://www.iier.org.au/iier30/bongco.pdf>

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. Sage. uk.sagepub.com

Braun, V., & Clarke, V. (2022). Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a knowing researcher. *International Journal of Transgender Health, 24*(1), 1–6.

Cayud-ong, F. A., & Futalan, M. C. Z. (2024). Mathematics teachers' strategies for improving students' critical thinking skills. *Journal of Interdisciplinary Perspectives, 2*(7), 1-1. <https://ejournals.ph/article.php?id=23971>

Cherry, K. (2024, April 12). How Bloom's Taxonomy can help you learn more effectively. *Verywell Mind*. <https://www.verywellmind.com/blooms-taxonomy-and-learning-7548280>

Cline, B. (2024.). *Asking effective questions.* Chicago Center for Teaching and Learning. Retrieved from <https://teaching.uchicago.edu/node/47>

Conrad, B. (2022). Constructivism. *Routledge*. <https://doi.org/10.4324/9781138609877-REE32-1>

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Department of Education. (2017). *Philippine Professional Standards for Teachers*. DepEd Order No. 42, s. 2017. https://www.teacherph.com/philippine-professional-standards-for-teachers/

Dicdiquin, J. B., Mobo, F. D., & Cutillas, A. L. (2023). Evaluating the effectiveness of professional development programs for junior high school mathematics teachers in improving mathematics instruction in the K to 12 curriculum in the Philippines. *International Journal of Multidisciplinary: Applied Business and Education Research, 4*(4), 1143–1153. <https://doi.org/10.11594/ijmaber.04.04.12>

Elder, L. (2022). *Socratic questioning*. Routledge. <https://doi.org/10.4324/9781138609877-REE214-1>

Etikan, I. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal, 5*(6). <https://doi.org/10.15406/bbij.2017.05.00149>

Frianeza, E. D., Maravilla, H. D., Relox, R. D., Dagaraga, S. J. S. L., Cruz, C. A. Dela, Solomon, E. H., & Mohammad, N. K. (2024). Challenges in the Philippine educational system and its impact towards teachers’ instruction strategies and professional growth. *Journal of Pedagogy and Education Science, 3*(01), 63–71. <https://doi.org/10.56741/jpes.v3i01.414>

Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLOS ONE, 15*(5), e0232076. <https://doi.org/10.1371/journal.pone.0232076>

Hendriana, H., Rohaeti, E.E., & Hidayat, W. (2016). Metaphorical thinking learning and junior high school teachers' mathematical questioning ability. *Journal on Mathematics Education, 8*, 55-64.

Ina Magdalena, Aan Nurchayati, Astika Nurhayati Saputri, Nur Zakia Amanda, Naufal Habibie, Sashy Noviana Waluyo, & Diana Khoirun Nisa. (2023). Analisis Taksonomi Bloom Dalam Mengidentifikasi Tingkat Kesulitan Pertanyaan Soal Dalam Mata Pelajaran Matematika Di Sekolah Dasar. *Jurnal Pendidikan, Bahasa Dan Budaya, 2*(3), 141–150. <https://doi.org/10.55606/jpbb.v2i3.1988>

Lee, J. L. C., Chan, K. O. W., Kwan, R. Y. C., & Wong, A. Y. L. (2024). Vitality at home: a phenomenological study of tele-exercise in women aged 80 and older. *European Review of Aging and Physical Activity : Official Journal of the European Group for Research into Elderly and Physical Activity, 21*(1), 25. <https://doi.org/10.1186/s11556-024-00360-9>

Magdefrau, J. (2023). Differential teachers’ attention to boys and girls in mathematics whole class interaction sequences. *Journal of Education, Teaching and Social Studies, 5*(3), p103. <https://doi.org/10.22158/jetss.v5n3p103>

Mahmud, M. S., Sulaiman, T., Ayub, A. F., & Yunus, A. S. M. (2021). Implementation of oral questioning in assessing student learning in mathematics teaching in primary schools. *Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12*(5), 137-143. <https://doi.org/10.17762/turcomat.v12i5.805>

Mason, J. I. (2020). Effective questioning and responding in the mathematics classroom. In G. Ineson & H. Povey (Eds.), *Debates in mathematics education* (2nd ed., pp. 131–142). Routledge.

McCarthy, P., Sithole, A., McCarthy, P.J., Cho, J., & Gyan, E. (2016). Teacher Questioning Strategies in Mathematical Classroom Discourse: A Case Study of Two Grade Eight Teachers in Tennessee, USA. *Journal of Education and Practice, 7*, 80-89.

Muller, A. (2020). What is Constructivism. In *Constructing practical reasons* (pp. 6–32).

Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). *TIMSS 2019 international results in mathematics and science*. TIMSS & PIRLS International Study Center, Boston College. <https://timssandpirls.bc.edu/timss2019/international-results/>

Nasir, R., Siahaan, U. M. J., & Prafianti, R. A. (2023). Analysis of mathematical instruction barriers in terms of developing students’ mathematical reasoning. *Vygotsky: Jurnal Pendidikan Matematika dan Matematika*, *5*(1), 65–76. <https://doi.org/10.30736/voj.v5i1.723>

Ng, I. K. S., Tham, S. Z. L., Loh, C. W. N., & Teo, D. B. (2024). When I say … Socratic questioning. *Medical Education*, *58*(9), 1029–1031. <https://doi.org/10.1111/medu.15397>

Nika, S. D., & Brailas, A. V. (2022). Interaction in the mathematics class: The shaping process of inquiry-based learning. *European Journal of Education and Pedagogy*, *3*(2).

Nolan, E. C. (2024). An examination of the development of a secondary mathematics preservice teacher's use of effective questioning. *School Science and Mathematics*. <https://doi.org/10.1111/ssm.18311>

Ntuli, E., & Godfrey, A. (2020). Wearable technology: Improving mathematical classroom discourse using Pivothead eyeglasses. In S. Chelliah & S. L. Clarke (Eds.), *Handbook of research on innovative pedagogies and best practices in teacher education* (pp. 18–29). IGI Global. <https://doi.org/10.4018/978-1-5225-9232-7.ch019>

Nyimbili, F., & Nyimbili, L. (2024). Types of purposive sampling techniques with their examples and application in qualitative research studies. *British Journal of Multidisciplinary and Advanced Studies, 5*(1), 90–99. <https://doi.org/10.37745/bjmas.2022.0419>

OECD. (2018). *Teaching for the Future: Effective Classroom Practices to Transform Education*. OECD Publishing. https://doi.org/10.1787/9789264293243-en

Overholser, J. C., & Beale, E. E. (2023). The art and science behind Socratic questioning and guided discovery: A research review. *Psychotherapy Research*. <https://doi.org/10.1080/10503307.2023.2183154>

Özpınar, İ. (2023). Secondary school students’ attitudes and teacher‑student views on questioning in mathematics course. *International e‑Journal of Educational Studies*, *7*(14), 359–380. <https://doi.org/10.31458/iejes.1238226>

Park, S. (2023). Constructivism. In T. J. Biersteker & S. E. Eckert (Eds.), *International organization and global governance* (pp. 133–143). Routledge. <https://doi.org/10.4324/9781003266365-13>

Ramos, R. A., Gutierrez, M. C., & Caguete, R. R. (2024). Measuring student performance in mathematics in the modern world course using bloom’s and solo taxonomies. *Int. J. Mat. Math. Sci, 6*(3), 78-84.

Reyes, J. D., & Reyes, Z. Q. (2024). A Model of Teaching Metacognition in Solving Mathematical Word Problems. *International Journal of Contemporary Sciences (IJCS), 1*(11), 728–747. <https://doi.org/10.55927/ijcs.v1i11.11591>

Robinson, R. S. (2023). Purposive sampling. In F. Maggino (Ed.), *Encyclopedia of quality of life and well‑being research* (pp. 5645–5647). Springer. <https://doi.org/10.1007/978-3-031-17299-1_2337>

Rodríguez, A., Domínguez Gálvez, D. L., & Solórzano Álava, W. L. (2024). Comparación del método socrático y el constructivismo en la educación moderna. *Revista Científica de Innovación Educativa y Sociedad Actual “ALCON”*, *4*(4), 105–117. <https://doi.org/10.62305/alcon.v4i4.212>

Sa’aidin, M.F., & Mahmud, M.S. (2023). Oral Questioning Strategies of Mathematics Teachers in Teaching and Learning Mathematics: A Systematic Literature Review. *International Journal of Academic Research in Progressive Education and Development*.

Seyferth, A., Ratna, A., & Chung, K. C. (2022). The art of questioning. *Plastic and Reconstructive Surgery, 149*(5), 1031–1035. <https://doi.org/10.1097/PRS.0000000000009064>

Tarasenkova, N., Akulenko, I., Hnezdilova, K., Chashechnikova, O., Kirman, V., Serdiuk, Z., Kolomiets, O., & Zaporozhets, A. P. (2023). Efficient questioning in teaching mathematics: Teachers’ attitudes and practices. *Revista Romaneasca pentru Educatie Multidimensionala, 15*(1), 216–246. <https://doi.org/10.18662/rrem/15.1/694>