

Factors Influencing Preservice Teachers' Self-Efficacy in Teaching Mathematics During Professional Practice: An Explanatory Sequential Mixed-Methods Study

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Abstract. This explanatory sequential mixed-methods study aimed to determine the factors influencing primary preservice teachers' self-efficacy in teaching mathematics during professional practice. Quantitative data were gathered through a structured survey administered to 104 participants, assessing six experiential dimensions: mastery experience, vicarious experiences, verbal and social persuasion, emotional and physiological states, cognitive self-modelling, and reflective practice. Results revealed that all six domains were rated as extensive, with verbal persuasion and cognitive self-modelling receiving the highest mean scores. Self-efficacy was also rated extensively across four indicators: confidence in delivery, perception of teacher success, satisfaction with teaching practices, and resilience and stress management. Correlation analysis indicated a strong and significant relationship between teaching mathematics during practicum and self-efficacy ($r = .698, p < .001$). Regression results identified mastery experience, emotional states, cognitive self-modelling, and reflective practice as significant predictors of self-efficacy. Thematic analysis from qualitative interviews supported these findings, emphasizing the transformative role of real classroom experience, mentorship, and reflection in building instructional confidence. The study recommends enhancing the design of practicums, mentorship, and reflective components in teacher education programs to effectively support the development of teaching self-efficacy in preservice teachers.

KEY WORDS

1. Self-efficacy
2. preservice teachers
3. teaching mathematics
4. professional practice
5. mixed-methods research

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1. Introduction

Factors influencing primary preservice teachers' self-efficacy in teaching mathematics during professional practice are multifaceted and can significantly impact their confidence and effectiveness as educators. Key issues include the lack of adequate support and mentorship from experienced teachers, which can hinder the development of self-efficacy. Addition-

ally, preservice teachers may struggle with classroom management and student engagement, which can lead to feelings of inadequacy. Emotional factors such as anxiety or math-related self-doubt, along with limited exposure to diverse teaching methods, can further affect their belief in their teaching abilities. These challenges highlight the need for targeted profes-

sional development and mentoring to strengthen preservice teachers' confidence and competence in teaching mathematics. Recent studies have identified several challenges that influence primary preservice teachers' self-efficacy in teaching mathematics during professional practice. Berg et al. (2024) shared that while experienced teachers exhibited higher self-efficacy in teaching mathematics, they also reported more effective pedagogical practices than their less skilled counterparts. This suggests that a lack of experience can hinder preservice teachers' confidence and effectiveness in mathematics instruction. Another challenge is integrating technology into mathematics teaching. Yildiz and Arpaci (2024) said that the Technological Pedagogical Content Knowledge (TPACK) of preservice mathematics teachers and its impact on their intention to use GeoGebra, a dynamic geometry software. This revealed that while TPACK significantly predicted the intention to continue using GeoGebra, facilitating conditions did not have a substantial relationship. This suggests that preservice teachers may struggle with effectively integrating technology into their teaching practices, which can impact their self-efficacy. Additionally, developing self-regulated learning (SRL) skills poses a challenge. Fernández Ortube et al. (2024) conducted a systematic review of SRL interventions for preservice teachers and found that interventions focusing on cognition and metacognition were the most effective. However, it highlighted that many preservice teachers lack adequate self-regulated learning (SRL) skills, which are crucial for both their learning and future teaching practices. In the Philippines, Dua et al. (2022) examined the self-concept, self-efficacy, and attitudes of preservice teachers, as well as their implications for mathematics achievement. The findings indicated that while preservice teachers exhibited favorable self-efficacy and attitudes toward mathematics, their self-concept was fair, suggesting a need for targeted inter-

ventions to enhance their confidence in teaching the subject. Another challenge is integrating technology into mathematics teaching. Bautista (2022) investigated the Technological Pedagogical Content Knowledge (TPACK) confidence of preservice teachers in selected teacher education institutions. The results showed that preservice teachers were confident in their learning experiences related to TPACK, indicating that while they possess some confidence, there is room for improvement in effectively incorporating technology into their teaching practices. Peteros (2023) examined the impact of blended learning on mathematics performance, with a focus on the roles of self-regulation and self-efficacy among preservice teachers. It revealed that while blended learning positively influenced mathematics performance, its effectiveness was moderated by the preservice teachers' levels of self-regulation and self-efficacy, highlighting the importance of fostering these skills to enhance teaching effectiveness. In the context of General Santos City, located in Region XII, preservice teachers encounter numerous challenges that significantly affect their self-efficacy in teaching mathematics during professional practice. Solis et al. (2022) conducted a study to investigate the relationship between preservice teachers' mathematical self-concept, self-efficacy, and attitude about their mathematical achievements. The study revealed that preservice teachers exhibited moderate to high levels of mathematical self-concept, self-efficacy, and attitude, which were statistically correlated with one another and with their mathematical achievement. This suggests that enhancing preservice teachers' self-concept and attitudes toward mathematics can have a positive impact on their teaching effectiveness.

1.1. Review of Significant Literature—

*1.1.1. Preservice Teachers' Self-Efficacy in Mathematics Instruction—*Self-efficacy, as defined by Bandura (1997), is a crucial factor influencing preservice teachers' confidence and

effectiveness in mathematics instruction. Research highlights several determinants including classroom management, teaching strategies, emotional factors, and mentorship (McDaid, 2024; Byrd Giles, 2023; Lavidas et al., 2023).

Programs that integrate reflective practice, mindset development, and collaborative learning (Fu Kartal, 2023; McDaid, 2002) have been shown to enhance teaching confidence and adaptability. Mathematics methods courses, field experiences, and addressing math anxiety are essential for shaping positive attitudes and beliefs in preservice teachers (Lavidas et al., 2023; Leavy et al., 2023; Ballew, 2023).

1.1.2. Sources of Self-Efficacy—Bandura’s four sources of self-efficacy—mastery experiences, vicarious experiences, verbal/social persuasion, and emotional states—have been widely validated:

Mastery experiences are the strongest predictor of teacher confidence (Leavy et al., 2023; Gonulates Gilbert, 2023).

Vicarious experiences such as peer modeling and Communities of Practice (Johnson Burns, 2023; Woodside et al., 2024) reinforce beliefs through observation.

Social persuasion significantly influences motivation and achievement (Kontaş Özcan, 2022; Dagdag et al., 2021).

Emotional and physiological states, especially anxiety, negatively impact performance (Kyaruzi, 2023; Rutledge et al., 2023).

Reflective practice (Aghakhani et al., 2023) and cognitive self-modeling (Spooner et al., 2024) further reinforce self-belief and improve instructional strategies.

1.1.3. Cultural and Instructional Barriers—Cultural norms, entrenched teaching practices, and institutional resistance hinder reform-based teaching (Biberman-Shalev Bar-Tal, 2024). Efforts to implement inclusive, social justice-oriented mathematics teaching remain challenged by curricular and structural constraints (Pourdavood Yan, 2022).

1.1.4. Technology, Attitudes, and Instructional Challenges—Integration of technology into mathematics education poses challenges such as inadequate training, limited resources, and student resistance (Kormos Crawford, 2023; McClellan, 2024). However, effective digital resources and manipulatives, like GeoGebra and children’s literature, improve engagement and confidence (Furner, 2024; Alghamdi, 2023).

Teachers in Irish-medium and multilingual contexts face language-specific instructional challenges (MacKenzie et al., 2024). Ethnomathematics approaches—integrating cultural content into lessons—enhance student engagement and contextual understanding (Mania Alam, 2021).

1.1.5. Confidence, Experience, and Teaching Outcomes—Teachers’ confidence in using evidence-based practices (EBPs) influences their frequency of use, especially in inclusive classrooms (Kennedy, 2024). While experience can lower confidence in adopting EBPs, targeted professional development increases both implementation and teaching efficacy (Alfonso Romero, 2024).

Students’ perceptions of teacher success correlate positively with academic outcomes (Akram, 2019; Ramey, 2024), especially when instruction is perceived as effective, well-managed, and engaging.

1.1.6. Stress, Resilience, and Emotional Regulation—Teacher stress arises from high workloads, administrative tasks, and inadequate support, particularly post-COVID (Ross et al., 2024). Resilience is strengthened by emotion regulation strategies such as expressive suppression (Colomeischi Ursu, 2024) and supported by alignment with teaching philosophy (McCormack et al., 2023).

Among students, personality traits influence stress and resilience; interventions should account for these individual differences (Fruth, 2023). Building resilient learning environments

is essential to sustain teacher well-being and student outcomes.

1.2. Synthesis—The review of related studies highlights several interconnected factors that significantly influence the effectiveness of mathematics teaching. Self-efficacy emerges as a central theme, with research demonstrating a strong correlation between it and teaching confidence, instructional quality, and student outcomes. Factors such as mastery experiences, vicarious learning, verbal persuasion, and emotional regulation are critical in shaping teachers' self-efficacy beliefs. Reflective practices also play a pivotal role, enabling educators to critically analyze their teaching methods and align them with the evolving demands of education. Moreover, resilience and stress management are emphasized as crucial for teachers to navigate challenges, including high workloads, classroom management issues, and the integration of new technologies. Studies reveal that fostering resilience through strategies such as teaching philosophy development and emotion regulation can help mitigate stress and burnout, thereby enhancing teachers' professional satisfaction and effectiveness. The integration of culturally responsive teaching, technology-based strategies, and innovative practices, such as mathematical modeling, further enriches the learning environment, making mathematics instruction more relevant and engaging. Collectively, these findings underscore the need for comprehensive professional development programs that address not only the technical skills required for effective teaching but also the emotional and psychological well-being of educators. By empowering teachers with the tools to manage stress, adapt to diverse student needs, and implement evidence-based practices, these strategies aim to improve the overall quality of mathematics education and foster positive learning outcomes for students.

1.3. Theoretical Framework—The most appropriate theoretical framework for the study

titled "Factors Influencing Primary Preservice Teachers' Self-Efficacy in Teaching Mathematics During Professional Practice" is Albert Bandura's Social Cognitive Theory (SCT), particularly its emphasis on self-efficacy. Bandura (1997) defines self-efficacy as an individual's belief in their ability to organize and execute actions required to achieve desired outcomes. This aligns directly with the study's focus on preservice teachers' confidence in teaching mathematics. Bandura identifies four key sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and emotional and physiological states. These elements resonate with the study's exploration of factors influencing self-efficacy during teaching practice. For instance, mastery experiences, such as successfully conducting a lesson, significantly reinforce a teacher's confidence, while observing skilled mentors or peers provides vicarious learning opportunities. Verbal encouragement and feedback from supervisors or peers' further bolsters self-belief, while the ability to manage emotional and physiological stress strengthens their capacity to perform effectively. Social Cognitive Theory also emphasizes the interaction among personal, environmental, and behavioral factors, referred to as reciprocal determinism (Bandura, 1986). This concept is evident in the professional practice context, where personal confidence, supportive mentorship, and real-world teaching experiences interact to shape the self-efficacy of preservice teachers. Additionally, the theory's application to education has been well-established, with research demonstrating its utility in understanding how self-efficacy impacts teaching practices and learning outcomes (Pajares, 1996). Thus, Bandura's Social Cognitive Theory offers a comprehensive lens for examining the interplay of factors influencing preservice teachers' development of self-efficacy in teaching mathematics. The application of Social Cognitive Theory (Bandura, 1997) to the variables under study—factors influenc-

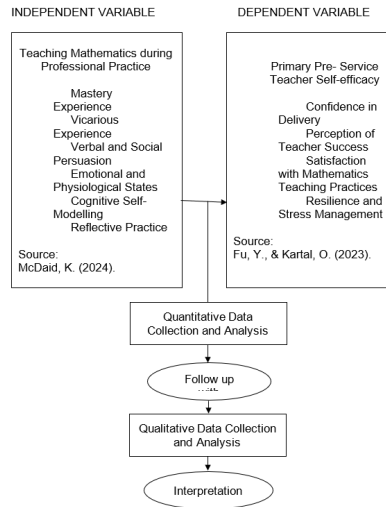


Fig. 1. Conceptual Framework of the Study

ing preservice teachers' self-efficacy in teaching mathematics—provides a robust framework for understanding how confidence is developed and sustained in educational contexts. The four sources of self-efficacy identified by Bandura directly relate to the variables being examined. Mastery experiences, as the strongest predictor of self-efficacy, align with successful teaching practices during professional placements, reinforcing preservice teachers' confidence in their

ability to teach mathematics. Vicarious experiences, such as observing experienced mentors or peers, enable preservice teachers to model effective teaching behaviors, thereby building confidence in their potential. Verbal persuasion, through feedback and encouragement from supervisors, mentors, and peers, supports the development of teaching competence by affirming teachers' capabilities.

Finally, emotional and physiological states, including the management of stress and anxiety during teaching practice, play a critical role in sustaining confidence and focus. By addressing these interconnected variables, Social Cognitive Theory offers actionable insights into how preservice teachers' self-efficacy can be nurtured through targeted interventions in teacher education programs, ultimately improving teaching

outcomes and student learning experiences in mathematics.

1.4. Statemet of the Problem—The explanatory sequential mixed-methods study aims to determine the Factors Influencing Primary Preservice Teachers' Self-Efficacy in teaching mathematics during professional practice. This study specifically seeks to answer the following problem statement:

- (1) 1. What is the extent of teaching mathematics during professional practice in terms of
 - (1) mastery experience
 - (2) vicarious experiences
 - (3) verbal and social persuasion
 - (4) emotional and physiological states
 - (5) Cognitive self-modelling, and
 - (6) Reflective practice?
- (2) What is the extent of primary preservice teachers' self-efficacy in terms of

- (1) Confidence in delivery
- (2) perception of teacher success
- (3) Satisfaction with Mathematics teaching practices, and
- (4) Resilience and stress management?
- (3) Is there a significant relationship between teaching mathematics during professional practice and the self-efficacy of primary preservice teachers?
- (4) Which among the teaching mathematics during professional practice significantly influences primary preservice teachers' self-efficacy?
- (5) What are the standpoints of the participants regarding the extent of teaching mathematics during professional practice and the self-efficacy of primary preservice teachers?
- (6) What are the standpoints of the participants regarding the significant relationship between teaching mathematics during professional practice and the self-efficacy of primary preservice teachers?

1.5. Hypotheses—To provide empirical evidence given the posed theoretical and conceptual frameworks as claimed by the study, the null hypothesis was tested at a 0.05 alpha level of significance, stating: Null Hypothesis 1 (H1): There is no significant relationship between teaching mathematics during professional practice and the self-efficacy of primary preservice teachers. Null Hypothesis 2 (H2): Teaching mathematics during professional practice does not significantly influence primary preservice teachers' self-efficacy. This study holds significant implications for various stakeholders in the educational landscape.

For the Learners

As preservice teachers gain confidence and efficacy in their teaching, they are more likely to implement effective teaching strategies, which directly benefit student learning outcomes in mathematics. Preservice teachers with high self-efficacy are more likely to engage students actively in lessons, fostering greater interest and participation in mathematics.

For the Pre-service Teachers By understanding the factors that contribute to self-efficacy in teaching, preservice teachers can become more aware of their strengths and areas for improvement, leading to greater confidence in their abilities to teach mathematics. Identifying and addressing the factors that influence self-

efficacy enables preservice teachers to be better equipped for the classroom, promoting a more successful transition from theory to practice.

For the Teachers The study offers insights into the factors that influence preservice teachers' self-efficacy. This can guide in-service teachers on how to better support their peers in enhancing their teaching effectiveness, which can lead to improved teaching strategies. Teachers will gain an understanding of how their mentoring and feedback practices during professional practice can shape preservice teachers' self-efficacy, allowing for more effective mentorship.

For School Principals The study highlights how various factors, including mentor support and professional development, impact the teaching effectiveness of preservice teachers. This information can guide school principals in shaping school policies, mentoring systems, and professional development programs to support new teachers. Principals can use the study's findings to help improve the school's teacher development initiatives, ensuring they are tailored to boosting preservice teachers' self-efficacy and overall effectiveness.

The Education Program Supervisor in Mathematics The findings can inform the development of more targeted professional development programs and curriculum adjustments that aim

to strengthen preservice teachers' self-efficacy in teaching mathematics, thereby enhancing the quality of mathematics education in the school system. The study can serve as a basis for improving teacher preparation programs, especially in mathematics, ensuring that preservice teachers are better equipped with the confidence and skills needed for effective teaching. For Future Researchers This study can serve as a foundation for future research on teacher efficacy in mathematics education. Researchers can build upon these findings to explore similar variables or extend the study to other subjects or educational levels. Future researchers can use the study's methodology to develop more refined tools for assessing self-efficacy and explore how various external factors (e.g., school culture, community involvement) might also influence preservice teachers' confidence and competence in teaching mathematics. This study defined the terms conceptually and operationally to facilitate a better understanding and reference to them when discussing the results in the preceding chapters.

Teaching mathematics during professional practice Refers to the period when preservice teachers apply their theoretical knowledge and teaching skills in real classroom settings, delivering mathematics lessons and managing student learning. This phase enables them to transi-

tion from theoretical understanding to practical teaching, receiving guidance and feedback from mentors. This concept is employed in the study to investigate how various factors, including mentorship, classroom experiences, teaching strategies, and self-reflection, impact preservice teachers' self-efficacy in teaching mathematics. The study examines how these experiences during professional practice shape their confidence and ability to effectively teach mathematics, ultimately contributing to their growth as future educators.

Primary preservice teachers' self-efficacy Refers to the belief and confidence that preservice teachers have in their ability to successfully teach and manage a classroom, specifically in the context of primary education. It encompasses their perception of competence in areas such as lesson planning, student engagement, and classroom management. This concept is employed in the study to investigate the factors that impact preservice teachers' confidence in teaching mathematics during their professional practice. By examining the role of factors such as mentor support, teaching strategies, and classroom experience, the study aims to understand how these influences shape preservice teachers' self-efficacy, ultimately affecting their readiness and effectiveness in teaching mathematics.

2. Methodology

The methodology of this study employs an Explanatory Sequential Mixed-Methods Design to explore the factors influencing primary preservice teachers' self-efficacy in teaching mathematics during their professional practice. The research begins with the quantitative phase, where a survey will be administered to preservice teachers to assess various factors that impact their confidence in teaching mathematics, such as mastery experiences, vicarious experiences, and emotional states. The quantitative data will be followed by qualitative interviews, which will provide deeper insights into how these factors are perceived and experienced in practice. This mixed-methods approach enables a comprehensive understanding of the relationship between teaching experiences and self-efficacy, combining statistical analysis with rich, narrative data to provide a deeper explanation of the findings.

2.1. Research Design—The Explanatory Sequential Mixed-Methods Design is a research methodology that integrates both quantitative and qualitative approaches in a two-phase process, primarily using qualitative data to explain or further explore the findings obtained through quantitative data. In the first phase, quantitative data is collected, often through structured instruments such as surveys or tests, to provide broad, generalizable insights into the research problem (Creswell Plano Clark, 2020). This phase typically involves analyzing numerical data to identify patterns, correlations, or significant relationships among variables. Once these quantitative results are obtained, the second phase consists of collecting qualitative data, typically through interviews, focus groups, or open-ended surveys, to gain deeper insights into the underlying reasons and experiences that contribute to the observed quantitative outcomes (Ivankova et al., 2006). The qualitative phase helps to provide context and meaning to the numerical data, offering a more nuanced understanding of the research problem. This design is particularly beneficial when researchers seek to explain the “why” and “how” behind quantitative findings, offering a richer, more comprehensive view of the phenomena under study. According to Creswell and Plano Clark (2017), the key principle of the explanatory sequential design is to allow qualitative data to explain, validate, or clarify quantitative findings, thereby enhancing the depth and validity of the research conclusions. By combining these methods, researchers can leverage the strengths of both approaches, thereby providing a comprehensive understanding of complex research questions. By combining both quantitative data (to identify patterns and trends) and qualitative data (to provide context and explanations), this research design offers a comprehensive view of the role of digital tools in enhancing English language acquisition and student engagement. The Explanatory Sequential Mixed Methods design helps answer whether digital tools have an impact and how and why these tools affect students’ learning experiences, engagement, and proficiency in secondary education settings. This approach enables a well-rounded understanding, facilitating the development of effective strategies for integrating digital tools into language education. The Explanatory Sequential Mixed-Methods Design is particularly suited to the study of Factors Influencing Primary Preservice Teachers’ Self-Efficacy in Teaching Mathematics during Professional Practice, as it allows for a comprehensive exploration of both the quantitative and qualitative dimensions of the research problem. In the first phase, quantitative data will be collected from preservice teachers using structured surveys or questionnaires designed to assess key factors such as mastery experiences, vicarious experiences, verbal persuasion, and emotional states that impact their self-efficacy in teaching mathematics. The quantitative phase will identify general patterns and relationships, such as whether a higher level of mentor support or positive teaching experiences correlates with greater self-efficacy. Once this data is analyzed, the study’s second phase will involve qualitative methods, such as interviews or focus groups, to delve deeper into the participants’ personal experiences, perceptions, and reflections on how these factors specifically shape their confidence in teaching mathematics. For instance, qualitative interviews could explore how preservice teachers perceive their emotional responses during mathematics lessons or how they interpret feedback from mentors in shaping their belief in their ability to teach. This mixed-methods approach ensures that the study not only provides a broad understanding of the relationship between teaching experiences and self-efficacy but also uncovers the underlying reasons and experiences that explain why and how these factors influence the confidence of preservice teachers. By integrating both methods, the research can offer a more nuanced and well-rounded under-

standing of the dynamics that contribute to self-efficacy in teaching mathematics during professional practice, offering valuable insights for teacher preparation programs.

2.2. Ethical Considerations—In conducting this study on the factors influencing primary preservice teachers' self-efficacy in teaching mathematics, I will ensure that ethical standards are met by obtaining informed consent from all participants and explaining the study's purpose and any potential risks. I will prioritize confidentiality by anonymizing all personal information and ensuring participation is voluntary, with participants free to withdraw at any time. Data collection and analysis will be conducted with transparency and integrity, and I will be mindful of participants' emotional well-being, offering support if needed. Throughout the study, I will adhere to ethical guidelines to ensure that I conduct responsible and respectful research practices.

In this study, I take the privacy and confidentiality of the teacher participants very seriously. I understand that teachers may share personal experiences and reflections on their teaching practices, and it is essential to ensure that their identities and responses are kept confidential. To protect their confidentiality, I will ensure that all data collected through surveys, interviews, or focus groups will be anonymized and de-identified. I will not include any identifying information in the final reports or publications. All research data will be securely stored and accessible only to me for analysis and interpretation. I will also inform the participants that their participation is voluntary, and they can withdraw at any time without consequence, ensuring they feel comfortable and confident in their involvement.

In conducting this study, I am committed to ensuring that the risks, benefits, and safety of all teacher participants are clearly communicated and carefully considered. I understand that while participating in research, teachers

may face some risks, such as feeling uncomfortable when discussing their challenges or self-efficacy. To minimize these risks, I will create a supportive environment and assure participants that their responses will be kept confidential and anonymous. There are no physical risks associated with the study, but emotional or psychological discomfort may arise during discussions about teaching practices. I will ensure that support resources are available for any participants who may feel distressed. As for the benefits, this study could contribute to the improvement of teacher preparation programs, particularly in fostering stronger self-efficacy in teaching mathematics. The insights gained from this research help shape more effective professional development strategies, benefiting both current and future educators. Throughout the study, I will ensure that participants feel safe and respected, with the freedom to withdraw at any time without facing any negative consequences. By addressing these risks and benefits, I aim to establish a research process that is both ethically sound and beneficial to all parties involved.

2.3. Research Respondents—The process of selecting respondents for both the quantitative and qualitative phases of this study will involve a careful approach to ensure a representative and insightful sample. The study will focus on teachers from Katangawan District, General Santos City Schools Division, which has a total of 140 teachers. For the quantitative phase, the sample size will be determined using Slovin's formula to calculate the ideal sample size for a population. Therefore, the calculated sample size is approximately 104 teachers. These teachers will be randomly selected to ensure that the sample is representative of the larger population. Preference will be given to teachers who are actively teaching mathematics at the primary level to ensure the relevance of the data collected. In the quantitative phase of this study, the selection criteria for participants will ensure that the sample is representative and relevant

to the research objectives. The study will focus on teachers from Katangawan District, General Santos City Schools Division, specifically those who are actively teaching mathematics at the primary level. This focus ensures that the data collected will be directly related to the experiences and self-efficacy of teachers who are involved in teaching mathematics, which is central to the study's aim of examining the factors influencing primary preservice teachers' self-efficacy in teaching mathematics. Teachers will be randomly selected from the total population of 320 educators to minimize selection bias and ensure a diverse and representative sample across different teaching experiences, school settings, and professional backgrounds. By including a broad range of teachers who are currently teaching mathematics, the study aims to gain a comprehensive understanding of the factors that influence their self-efficacy, providing valuable insights for improving teacher preparation programs and enhancing the overall quality of mathematics instruction at the primary level. For the qualitative phase, a smaller purposive sample of 7 teachers will be selected from the 178 teachers who participated in the quantitative phase. The criteria for selecting participants for the qualitative phase will focus on teachers with at least one year of experience teaching mathematics and those who have mentored preservice teachers during their professional practice. Teachers who have actively participated in professional development programs related to mathematics teaching will be prioritized, as their experiences and insights will provide a deeper understanding of the factors influencing self-efficacy in teaching mathematics. Combining a randomly selected sample for the quantitative phase and a purposively selected sample for the qualitative phase will capture broad, generalizable data and detailed, context-rich insights into the factors that shape preservice teachers' self-efficacy in teaching mathematics.

2.4. Research Instrument—The development and crafting of the survey instruments for both the quantitative and qualitative phases of this study were guided by well-established frameworks and validated tools to ensure their reliability, relevance, and effectiveness in addressing the research questions. The development and crafting of the survey instruments for both the quantitative and qualitative phases of this study were carefully guided by well-established frameworks and validated tools to ensure their reliability, relevance, and effectiveness in addressing the research questions. For the quantitative phase, the survey was designed based on theoretical constructs related to self-efficacy in teaching mathematics, particularly informed by the works of McDaid (2024), Byrd and Giles (2023), and Fu and Kartal (2023), which explore the various factors influencing preservice teachers' self-efficacy. These sources provided a strong foundation for creating specific survey items that target key factors, such as mastery experiences, vicarious experiences, and emotional states. McDaid's research, in particular, offered insights into the dynamics of self-efficacy in the context of teaching mathematics during professional practice, guiding the selection of relevant items. The survey questionnaire designed to assess the extent of teaching mathematics during professional practice employs a 5-point Likert-type scale. This scale is structured to capture the degree of respondents' agreement or perceived frequency regarding key indicators of mathematics instruction. The instrument underwent reliability testing, and the computed Cronbach's alpha coefficient was 0.902, indicating a high level of internal consistency and suggesting that the instrument is highly reliable for data collection. The scale, along with its corresponding descriptive rating and interpretation, is presented below: Range of Mean and Descriptive Rating of Utilization of Digital Tools on English Language Acquisition.

Score	Scale	Descriptive Rating	Interpretation
5	4.20 – 5.00	Very Extensive	The extent of teaching mathematics during professional practice is constantly observed and manifested.
4	3.40 – 4.19	Extensive	The extent of teaching mathematics during professional practice is oftentimes observed and manifested.
3	2.60 – 3.39	Moderately Extensive	The extent of teaching mathematics during professional practice is sometimes observed and manifested.
2	1.80 – 2.59	Less Extensive	The extent of teaching mathematics during professional practice is seldom observed and manifested.
1	1.00 – 1.79	Not Extensive	The extent of teaching mathematics during professional practice is never observed and manifested.

Meanwhile, to determine the extent of primary preservice teachers' self-efficacy, a 5-point Likert scale was used in this study, as presented below;

Score	Scale	Descriptive Rating	Interpretation
5	4.20 – 5.00	Very Extensive	The extent of primary preservice teachers' self-efficacy is always observed and manifested.
4	3.40 – 4.19	Extensive	The extent of primary preservice teachers' self-efficacy is oftentimes observed and manifested.
3	2.60 – 3.39	Moderately Extensive	The extent of primary preservice teachers' self-efficacy is sometimes observed and manifested.
2	1.80 – 2.59	Less Extensive	The extent of primary preservice teachers' self-efficacy is seldom observed and manifested.
1	1.00 – 1.79	Not Extensive	The extent of primary preservice teachers' self-efficacy is never observed and manifested.

For the qualitative phase, the interview guide was shaped by the findings from studies, such as those of Lavidas et al. (2023), which examine preservice teachers' beliefs, attitudes, and anxiety toward teaching mathematics, allowing for a deeper exploration of the emotional and psychological factors that affect self-efficacy. This also helped inform the development of open-ended questions aimed at understanding the personal experiences of teachers in the classroom and how these experiences shape their confidence and teaching practices. The combination of these theoretical bases ensures that the survey instruments are both comprehensive and grounded in current research, addressing the specific nuances of preservice teachers' self-efficacy in teaching mathematics. By utilizing these validated frameworks, the study aims to gather reliable data that will provide meaningful insights into enhancing teacher preparation and support programs.

2.5. *Data Gathering Procedure*—The guidelines governing the procedure for quantitative data collection are strictly by the policies. As part of the formal request, researchers clearly articulate their intentions regarding the collection, analysis, and dissemination of data, ensuring alignment with the research's overarching

objectives. Anticipated concerns or inquiries from recipients are proactively addressed within this communication, thereby providing reassurance concerning ethical safeguards, confidentiality measures, and the potential advantages of the study. The formal request for permission explicitly seeks authorization to proceed, underscoring the crucial importance of their support in facilitating the success of the research.

In the quantitative phase of the study, I will collect data from the structured survey responses and input them into statistical software for analysis. The data will be analyzed using appropriate statistical techniques, including descriptive statistics (e.g., means, frequencies) to summarize overall trends and inferential statistics (e.g., correlation or regression analysis) to examine relationships between technical assistance, teaching practices, teacher competency, and confidence. The results will be presented in tables and graphs to highlight significant patterns. For the qualitative phase, I will transcribe the interview or focus group discussions and then analyze the data using thematic analysis. I will identify recurring themes, patterns, and insights that explain the teachers' experiences with technical assistance and how it influences their teaching. These themes will be organized and coded to link with the findings from the quantitative phase, providing deeper contextual understanding. The combination of both phases will offer a comprehensive view of the role of technical assistance in improving English instruction.

2.6. Data Analysis—The following statistical tools will be used to determine Factors Influencing primary preservice teachers' self-efficacy in teaching mathematics during professional practice.

The Mean Score and Descriptive Interpretations

It will be used to address the first statement problem regarding the extent of teaching mathematics during professional practice, and the

second, the importance of primary preservice teachers' self-efficacy.

Pearson's r or Pearson Product-Moment Correlation Coefficient

Will be used to answer problem number 3, which concerns the significant relationship between teaching mathematics during professional practice and the self-efficacy of primary preservice teachers.

A simple Linear Regression Analysis

Will address statement 4, examining the significant influence of teaching mathematics during professional practice on the self-efficacy of primary preservice teachers. In addressing statements five and six, the implementation of a systematic data analysis approach within the qualitative phase of this study facilitates a comprehensive exploration of participants' insights. Data collected from semi-structured interviews are transcribed verbatim and subsequently verified for completeness and accuracy. A thematic analysis is conducted, commencing with an immersion in the data to discern initial patterns and recurring themes. Key phrases are meticulously coded, with similar codes being categorized into broader themes that correspond with the principal research objectives. These themes undergo additional refinement and scrutiny to ensure they are substantiated by the data and yield significant interpretations. Transparency is emphasized throughout this process by meticulously documenting decisions and maintaining consistency in the coding and theme development. This structured approach ensures that the analysis is both exhaustive and dependable, thereby enabling the study to present robust qualitative findings that complement the quantitative results. Following the completion of initial coding, the researcher will develop themes, systematically organizing the codes into coherent groups that illuminate the underlying patterns within the data (Creswell, J.W., and Creswell, J., 2023) All data processing and analysis were performed using Jeffrey's Statistics Amazing

Program (JASP) version 0.12.20. When results were yielded, discussions and interpretations followed.

Sequence, Emphasis, and Mixing Procedures The sequence of data collection begins with the quantitative phase, where surveys are distributed to a larger group of teachers to assess factors influencing preservice teachers' self-efficacy in teaching mathematics. This phase helps identify broad patterns and relationships among variables, providing a foundational understanding of the research problem. Once the quantitative data is analyzed, the study proceeds to the qualitative phase, where a smaller, purposively selected sample of participants is interviewed. This sequential design ensures that the qualitative phase builds upon the quantitative findings, offering more profound insights into the personal experiences and contextual factors that shape self-efficacy in teaching mathematics. The emphasis in this study is placed on the qualitative phase, which is intended to provide a deeper exploration of the factors identified in the quantitative phase. While the quantitative data provides a broad overview of relationships and trends, the qualitative data enables an in-depth understanding of the personal and con-

textual elements that influence preservice teachers' confidence in teaching mathematics. This emphasis on qualitative data ensures that the study not only identifies general trends but also explores the reasons behind those trends, ultimately providing a richer, more comprehensive view of the research problem. Lastly, the mixing procedures in this study involve integrating the quantitative and qualitative data during the analysis and interpretation stages. In the mixing process, the quantitative results help guide the development of interview questions for the qualitative phase, ensuring that the two phases are interconnected. After data collection, the quantitative and qualitative findings will be compared, contrasted, and synthesized to provide a holistic understanding of the factors affecting preservice teachers' self-efficacy. This blending of data allows for a more nuanced interpretation, as the qualitative insights can help explain or elaborate on the quantitative patterns, ensuring that the research findings are both comprehensive and meaningful. Through the effective use of these procedures, the study ensures that both data phases contribute to a unified understanding of the research question.

3. Results and Discussion

This chapter presents the results and analysis of the study on the factors influencing primary preservice teachers' self-efficacy in teaching Mathematics during professional practice. Guided by an explanatory sequential mixed-methods design, the chapter begins with quantitative findings on the extent of teaching practice experiences—specifically mastery experience, vicarious experience, verbal and social persuasion, emotional and physiological states, cognitive self-modelling, and reflective practice—and their relationship with self-efficacy indicators such as confidence in delivery, perceived success, teaching satisfaction, and stress management. Inferential statistics are used to examine the significance and predictive strength of these factors. The subsequent qualitative phase elaborates on these results through participant narratives, offering deeper insights into the observed relationships. The integration of both strands provides a comprehensive understanding of how various teaching practice experiences shape the development of self-efficacy among primary preservice teachers.

3.1. Extent of Teaching Mathematics During Professional Practice—Teaching Mathematics during professional practice refers to the experiential component of teacher education programs wherein preservice teachers apply their pedagogical knowledge and instructional strategies in authentic classroom settings. This phase is pivotal in bridging theoretical learning with practical teaching, allowing future educators to integrate mathematical content knowledge with practical teaching methodologies. Recent studies have underscored the significance of this phase in shaping preservice teachers' self-efficacy. For instance, Fu and Kartal (2023) found that participation in mathematics methods courses significantly enhanced preservice teachers' self-efficacy and growth mindset, emphasizing the role of structured coursework in professional practice. Similarly, a study by Byrd and Giles (2023) highlighted that preservice teachers' confidence in teaching mathematics

is closely linked to their experiences during professional practice, particularly in areas such as lesson planning and classroom management. Moreover, the integration of innovative teaching tools and reflective practices during professional practice has been shown to bolster preservice teachers' confidence. A study by Fayda-Kinik (2024) revealed that the use of teaching materials and resources during professional practice positively influenced preservice teachers' self-efficacy, especially when coupled with reflective exercises.

3.1.1. Mastery Experience—Table 1 presents the descriptive results on the extent of teaching mathematics during professional practice as perceived by the participants, specifically in terms of mastery experience. With a mean average of 3.87, all five indicators were interpreted as extensive, indicating that mastery experiences were consistently observed and perceived by primary preservice teachers throughout their teaching practicum.

Table 1. Extent of Teaching Mathematics During Professional Practice in Terms of Mastery Experience

No	Mastery Experience	Mean
Descriptive Interpretation		
1. Successful completion of teaching mathematics lessons during professional practice enhances confidence in teaching the subject.	3.95	Extensive
2. Positive student feedback during mathematics lessons contributes to a sense of accomplishment in teaching.	4.02	Extensive
3. The ability to manage classroom challenges while teaching mathematics leads to a stronger belief in one's teaching abilities.	3.81	Extensive
4. Effective planning and delivery of mathematics lessons during professional practice strengthens teaching competence.	3.84	Extensive
5. Observing student progress and improvement in mathematics as a result of instruction increases confidence in teaching the subject.	3.72	Extensive
Mean Average	3.87	Extensive

The highest-rated item was “Positive student feedback during mathematics lessons contributes to a sense of accomplishment in teaching” (M = 4.02), highlighting that affirming re-

sponses from students significantly contribute to the development of teaching self-efficacy. This supports the findings of Fu and Kartal (2023), who emphasized that student reactions during classroom engagement positively influenced preservice teachers' growth mindset and confidence in mathematics teaching. Similarly, Fayda-Kinik (2024) found that classroom experiences characterized by student responsiveness and progress foster a stronger belief in teaching efficacy. The second-highest rated item, "Successful completion of teaching mathematics lessons during professional practice enhances confidence in teaching the subject" ($M = 3.95$), aligns with Bandura's (1997) theory of self-efficacy, where mastery experience is the most influential source of self-belief. In a recent empirical study, Byrd and Giles (2023) validated that preservice teachers who had consistent, successful teaching experiences during their field practice reported significantly higher levels of teaching confidence. Additionally, the item "The ability to manage classroom challenges while teaching mathematics leads to a stronger belief in one's teaching abilities" ($M = 3.81$) reinforces the importance of developing classroom management competence during professional practice. Lin and Thomas (2022) explored the correlation between classroom man-

The highest-rated item was "Learning from the teaching methods of others during professional practice increases confidence in implementing similar strategies" ($M = 3.89$), followed closely by "Witnessing the growth and development of students in mathematics as a result of peer or mentor teaching" ($M = 3.83$), and "Watching peers successfully manage mathematics lessons fosters confidence in teaching the subject" ($M = 3.82$). These results emphasize the powerful influence of modeling, both by mentors and peers, on the formation of teaching self-efficacy. Recent empirical studies support

agement success and mathematics teaching self-efficacy, concluding that preservice teachers who successfully handled instructional difficulties perceived themselves as more competent educators. The other items—related to lesson planning ($M = 3.84$) and observing student progress ($M = 3.72$)—also demonstrated extensive influence. These results are supported by Gómez-Blancarte et al. (2021), who reported that structured and well-prepared teaching plans during field exposure enabled preservice teachers to deliver more effective mathematics instruction, subsequently improving their self-confidence. In summary, the results in Table 1 confirm that mastery experiences, particularly those characterized by positive student interaction, effective lesson delivery, and problem-solving in real classroom settings, play a crucial role in enhancing preservice teachers' self-efficacy in mathematics education.

3.1.2. Vicarious Experiences—Table 2 displays the participants' responses regarding the extent of vicarious experiences during their professional practice. All five indicators were rated as extensive, with a mean average of 3.81, suggesting that preservice teachers greatly benefit from observing others during their teaching practicum.

these findings. Fu and Kartal (2023) demonstrated that exposure to effective mathematics instruction by mentor teachers fosters greater pedagogical confidence and strategy adoption among preservice teachers. Their study underscored the role of classroom modeling in enhancing self-efficacy and cultivating a growth mindset in mathematics teaching. Similarly, Fayda-Kinik (2024) revealed that preservice teachers who observed structured and well-executed mathematics lessons from experienced educators displayed a higher inclination to replicate such methods in their own practice. Sahin

Table 2. Extent of Teaching Mathematics During Professional Practice in Terms of Vicarious Experiences

No	Vicarious Experi- ence	Mean
Descriptive Interpretation		
1. Observing experienced teachers effectively teach mathematics during professional practice provides valuable insights into teaching strategies.	3.79	Extensive
2. Watching peers successfully manage mathematics lessons fosters confidence in teaching the subject.	3.82	Extensive
3. Seeing students respond positively to mathematics lessons taught by mentors or peers enhances belief in one's own teaching potential.	3.74	Extensive
4. Learning from the teaching methods of others during professional practice increases confidence in implementing similar strategies.	3.89	Extensive
5. Witnessing the growth and development of students in mathematics as a result of peer or mentor teaching strengthens the belief in effective teaching practices.	3.83	Extensive
Mean Average	3.81	Extensive

and Cevikbas (2022) further emphasized that vicarious learning through observation promotes reflective teaching and boosts confidence, especially when mentor teachers explicitly discuss their instructional decisions. Meanwhile, Agyei and Voogt (2021) found that preservice teachers who participated in collaborative peer learning environments reported a stronger belief in their teaching competence due to shared strategies and mutual observation. Moreover, the item “Seeing students respond positively to mathematics lessons taught by mentors or peers enhances belief in one’s own teaching potential” ($M = 3.74$) supports assertion that vicarious reinforcement plays a central role in self-efficacy development. Observing students engage and perform well under the guidance of others helps shape preservice teachers’ expectations of their own potential success. In summary, the results affirm that vicarious experiences, particularly those involving mentor modeling, peer teaching, and positive student outcomes, serve as critical scaffolds in building the confidence and readiness of primary preser-

vice teachers to teach mathematics effectively.

3.1.3. Verbal And Social Persuasion—Table 3 presents the responses of primary preservice teachers on the extent of verbal and social persuasion experienced during their professional practice. The results show that all five indicators were rated as extensive, with a mean average of 3.86, indicating that positive verbal feedback and social support from mentors, peers, and students played a significant role in strengthening the participants’ teaching confidence. The highest-rated item was “Praise for effective teaching strategies during mathematics lessons increases motivation to continue developing teaching skills” ($M = 3.95$), suggesting that acknowledgment of success contributes directly to motivational growth and instructional perseverance. This was closely followed by “Positive reinforcement from students or colleagues reinforces the belief in one’s ability to effectively teach mathematics” ($M = 3.90$) and “Supportive comments from colleagues during professional practice enhance belief in the ability to teach mathematics effectively” ($M = 3.88$).

These results underscore the power of encouraging verbal interactions in reinforcing teachers' perceived capabilities.

Table 3. Extent of Teaching Mathematics During Professional Practice in Terms of Verbal and Social Persuasion

No	Verbal And Social Persuasion	Mean
Descriptive Interpretation		
1. Receiving positive encouragement and constructive feedback from mentors strengthens confidence in teaching mathematics.	3.73	Extensive
2. Supportive comments from colleagues during professional practice enhance belief in the ability to teach mathematics effectively.	3.88	Extensive
3. Praise for effective teaching strategies during mathematics lessons increases motivation to continue developing teaching skills.	3.95	Extensive
4. Feedback from peers and mentors that highlights teaching successes boosts confidence in teaching mathematics.	3.82	Extensive
5. Positive reinforcement from students or colleagues reinforces the belief in one's ability to effectively teach mathematics.	3.90	Extensive
Mean Average	3.86	Extensive

Recent literature affirms these findings. Fayda-Kinik (2024) emphasized that consistent, constructive feedback from mentors and peers significantly enhances self-efficacy among preservice teachers, especially in subject-specific contexts like mathematics. Similarly, Ng and Cheung (2021) found that verbal affirmations and peer coaching were key drivers in promoting preservice teachers' instructional confidence and classroom readiness. O'Neill and Stephenson (2022) further supported the claim that positive social persuasion in practicum settings contributes to an upward trajectory of teacher motivation, goal orientation, and professional growth. Additionally, the item "Receiving positive encouragement and constructive feedback from mentors strengthens confidence in teaching mathematics" ($M = 3.73$) reflects the importance of mentorship in building novice teacher competence. In line with this, Gibbs and Atkinson (2023) reported that the verbal support offered by cooperating teachers during clinical

practice fosters an affirming learning environment, which preservice teachers often cite as instrumental in their development. Collectively, the findings in Table 3 highlight that verbal and social persuasion—through praise, constructive feedback, and affirming interactions—plays a critical role in empowering preservice teachers to believe in their capacity to deliver effective mathematics instruction.

3.1.4. Emotional And Physiological States—Table 4 presents the participants' responses on the extent of emotional and physiological states experienced during the teaching of mathematics in professional practice. All five indicators were interpreted as extensive, with an overall mean average of 3.99, indicating that emotions and bodily responses significantly influenced preservice teachers' instructional effectiveness and self-efficacy. The highest-rated item was "Positive emotions experienced during successful mathematics lessons contribute to increased confidence in teaching" (M

= 4.17), highlighting the crucial role of emotional reinforcement in strengthening teaching confidence. This was followed by “Feelings of anxiety or nervousness before teaching mathematics lessons can impact the effectiveness of instruction” (M = 4.00), suggesting that even temporary emotional discomforts can influence

performance. The items addressing physical stress (M = 3.91), emotional reactions (M = 3.90), and enthusiasm (M = 3.97) similarly received high mean scores, affirming the integral connection between internal states and instructional outcomes.

Table 4. Extent of Teaching Mathematics During Professional Practice in Terms of Emotional and Physiological States

No	Emotional And Physiological States	Mean
Descriptive Interpretation		
1. Feelings of anxiety or nervousness before teaching mathematics lessons can impact the effectiveness of instruction.	4.00	Extensive
2. Positive emotions experienced during successful mathematics lessons contribute to increased confidence in teaching.	4.17	Extensive
3. Physical signs of stress or tension during mathematics instruction can hinder the ability to teach effectively.	3.91	Extensive
4. Experiencing excitement and enthusiasm while teaching mathematics enhances engagement and teaching performance.	3.97	Extensive
5. Emotional reactions, such as frustration or relief, during mathematics lessons can influence overall self-efficacy in teaching the subject.	3.90	Extensive
Mean Average	3.99	Extensive

Contemporary research supports these findings. Martínez-Sierra et al. (2022) found that preservice mathematics teachers’ emotional experiences—especially anxiety and joy had a direct influence on their perceived teaching competence. Likewise, Pereira and Costa (2023) emphasized that emotional self-regulation plays a vital role in lesson delivery, with excitement and satisfaction fostering engagement and resilience in the teaching process. In a related study, Yüksel and Karatas (2021) observed that high levels of teaching anxiety in mathematics practicum negatively affected the confidence and instructional clarity of preservice teachers. Furthermore, Chang et al. (2024) highlighted that emotional awareness and management contribute to improved classroom communication,

particularly in challenging subjects like mathematics, where content-related stress is common. The authors concluded that teacher training programs should incorporate emotional coping strategies to support preservice teachers in developing instructional composure and classroom presence. Overall, the findings in Table 4 suggest that the emotional and physiological landscape of preservice teachers, ranging from anxiety and stress to enthusiasm and relief, has a significant impact on their ability to teach mathematics effectively. Acknowledging and addressing these internal experiences are essential in enhancing teaching readiness and self-efficacy during professional practice.

3.1.5. Cognitive Self-Modelling—Table 5 presents the participants’ perceptions of their

engagement in cognitive self-modelling during the teaching of mathematics in professional practice. All five items were rated as extensive, yielding a mean average of 3.92, which indicates that preservice teachers frequently engaged in mental rehearsal, visualization, and reflective cognition to enhance their instructional preparedness and confidence.

Table 5. Extent of Teaching Mathematics During Professional Practice in Terms of Cognitive Self-Modelling

No	Cognitive Modelling	Self-	Mean
Descriptive Interpretation			
1. Reflecting on successful teaching experiences in mathematics helps strengthen confidence in future teaching efforts.	3.92		Extensive
2. Visualizing the successful delivery of mathematics lessons improves preparedness and belief in teaching abilities.	3.82		Extensive
3. Recalling positive outcomes from past mathematics lessons enhances the belief in one's ability to handle future teaching challenges.	3.92		Extensive
4. Mentally reviewing teaching strategies that worked well in mathematics lessons reinforces the ability to replicate successful teaching practices.	3.92		Extensive
5. Imagining overcoming challenges in teaching mathematics boosts the confidence to manage difficult situations in the classroom.	4.01		Extensive
Mean Average	3.92		Extensive

The highest-rated item was “Imagining overcoming challenges in teaching mathematics boosts the confidence to manage difficult situations in the classroom” ($M = 4.01$), followed closely by three indicators with equal ratings ($M = 3.92$), namely: reflecting on successful teaching experiences, recalling positive outcomes, and mentally reviewing effective strategies. These findings suggest that cognitive simulation and the internalization of prior teaching successes are valuable practices that contribute to the development of teaching self-efficacy. These results align with recent research. Rashid and Singh (2022) identified mental visualization and reflective thinking as critical self-regulatory processes that enhance preservice teachers' belief in their instructional capacities, especially in mathematics education, where content-related anxiety is prevalent. In

a related study, Beck and Hallman (2021) reported that when preservice teachers engaged in cognitive modelling, such as visualizing themselves implementing successful strategies, they demonstrated greater composure and effectiveness in classroom simulations. Moreover, De Los Santos and Gaerlan (2023) found that Filipino preservice teachers who regularly engaged in reflective teaching and future-focused mental preparation were more likely to report increased resilience and problem-solving capacity during practicum teaching. Similarly, Watson and Leung (2024) emphasized the importance of “mental rehearsal” as a scaffold for lesson delivery, noting that teachers who imagined various instructional scenarios felt more capable and agile in managing real classroom challenges. Overall, the findings in Table 5 reinforce that cognitive self-modelling, through reflection, mental

rehearsal, and positive visualization, enhances preservice teachers' preparedness, instructional decision-making, and confidence in teaching mathematics. As such, embedding cognitive modelling strategies in teacher education programs may be instrumental in fostering future educators' instructional self-efficacy.

3.1.6. *Reflective Practice*—Table 6 illustrates the responses of preservice teachers re-

garding their engagement in reflective practice during mathematics instruction in professional practice. All five indicators received high ratings, with a mean average of 4.00, indicating extensive coverage. This result highlights the significant role of reflective thinking in enhancing instructional effectiveness and building self-efficacy in teaching mathematics.

Table 6. Extent of Teaching Mathematics During Professional Practice in Terms of Reflective Practice

No	Reflective Practice	Mean
Descriptive Interpretation		
1. Regular reflection on mathematics lessons helps identify areas for improvement and increases teaching confidence.	4.07	Extensive
2. Reflecting on student responses and learning outcomes after mathematics lessons enhances the ability to adjust teaching strategies effectively.	3.98	Extensive
3. Reviewing the effectiveness of different teaching methods used in mathematics instruction strengthens the belief in one's teaching abilities.	4.01	Extensive
4. Reflective practice helps recognize personal growth in teaching mathematics, leading to higher self-efficacy.	4.07	Extensive
5. The process of evaluating and adjusting mathematics teaching based on reflection leads to greater confidence in handling future lessons.	3.88	Extensive
Mean Average	4.00	Extensive

The highest-rated items were “Regular reflection on mathematics lessons helps identify areas for improvement and increases teaching confidence” and “Reflective practice helps recognize personal growth in teaching mathematics, leading to higher self-efficacy” (both $M = 4.07$). These suggest that structured and habitual reflection enables preservice teachers to gain insights into their teaching behaviors and identify areas for personal and professional development. Additionally, “Reviewing the effectiveness of different teaching methods used in mathematics instruction” ($M = 4.01$) and “Reflecting on student responses and learning outcomes” ($M = 3.98$) emphasize the iterative

process of evaluating and adapting pedagogical strategies based on classroom experiences. Recent literature confirms the integral value of reflective practice in teacher development. Carrillo and Flores (2021) found that reflective journaling and lesson analysis fostered increased awareness of instructional strengths and challenges among preservice mathematics teachers, thereby enhancing their self-efficacy. Similarly, Arslan and Yıldız (2022) observed that reflection on teaching performance during practicum led to improvements in instructional decision-making and classroom management. Furthermore, Fayda-Kinik (2024) emphasized that reflective teaching contributes to cognitive restruc-

turing, enabling preservice teachers to internalize their growth and reinforce their belief in teaching capability. In addition, Lawrence and Drew (2023) found that preservice teachers who engaged in reflective dialogue, both independently and collaboratively, demonstrated greater adaptability in lesson planning and responsiveness to student learning needs. These reflective habits not only contributed to improved instructional practice but also strengthened preservice teachers' resilience and confidence when faced with classroom uncertainties. In summary, the findings in Table 6 underscore that reflective practice is a foundational component of effective mathematics teaching during professional practice. Through continuous reflection on lesson outcomes, teaching methods, and personal

growth, preservice teachers enhance their self-awareness, refine their pedagogy, and cultivate stronger self-efficacy in mathematics education.

3.2. Summary of the Extent of Teaching Mathematics During Professional Practice —

Table 7 provides a consolidated view of the extent to which primary preservice teachers engaged in six dimensions of teaching mathematics during professional practice: mastery experience, vicarious experiences, verbal and social persuasion, emotional and physiological states, cognitive self-modelling, and reflective practice. All domains were rated as extensive, with a mean average of 3.92, reflecting a consistently high level of engagement and perceived influence across all components.

Table 7. Summary of the Extent of Teaching Mathematics During Professional Practice

No	Emotional and Physiological States	Mean
Descriptive Interpretation		
1. Mastery experience	3.81	Extensive
2. Vicarious experiences	3.86	Extensive
3. Verbal and social persuasion	3.99	Extensive
4. Emotional and physiological states	3.92	Extensive
5. Cognitive self-modelling	4.00	Extensive
Mean Average	3.92	Extensive

Among the domains, cognitive self-modelling received the highest mean score ($M = 4.00$), indicating that preservice teachers found great value in mentally rehearsing teaching strategies, visualizing success, and drawing upon past positive experiences to prepare for instruction. This supports the findings of Rashid and Singh (2022) and Watson and Leung (2024), who emphasized that cognitive modeling improves instructional readiness and fosters resilience among early-career teachers. Closely following were verbal and social

persuasion ($M = 3.99$) and emotional and physiological states ($M = 3.92$). These dimensions suggest that affirming feedback from mentors, peers, and students, as well as the regulation of emotional responses such as anxiety and excitement, significantly impact teachers' perceived competence. This aligns with studies by Fayda-Kinik (2024) and Pereira and Costa (2023), which highlighted how supportive communication and emotional awareness enhance teacher self-efficacy and adaptive capacity in mathematics instruction. Vicarious experiences ($M =$

3.86) and mastery experience ($M = 3.81$) were also interpreted as extensive, indicating that observing skilled practitioners and experiencing personal success in teaching both contributed to preservice teachers' growing confidence. These findings are consistent with the works of Fu and Kartal (2023) and Sahin and Cevikbas (2022), who emphasized that observational learning and successful lesson execution shape positive beliefs about teaching ability. In synthesis, the data from Table 7 reveal that preservice teachers' development of self-efficacy in teaching mathematics is multi-faceted and strongly influenced by cognitive, emotional, and social interactions within the practicum environment. The extensive ratings across all dimensions reinforce the need for comprehensive support structures, such as reflective tools, mentoring systems, and peer collaboration, within teacher education programs to strengthen confidence and capability in mathematics instruction.

3.3. Extent of Primary Preservice Teachers' Self-Efficacy—Fu and Kartal (2023) emphasized that self-efficacy increases significantly through structured teaching experiences, such as lesson delivery and classroom observation. Similarly, Fayda-Kinik (2024) found that preservice teachers who engaged in reflective practice and received consistent feedback demonstrated stronger beliefs in their instructional abilities. In addition, Ng and Cheung (2021) noted that collaborative environments and peer modeling during practicum positively contribute to the development of teacher self-efficacy, particularly in managing classroom dynamics and addressing learner needs. High self-efficacy in preservice teachers has been correlated with several desirable outcomes, including instructional resilience, openness to innovative practices, and improved learner outcomes (Woolfolk Hoy Spero, 2005). Conversely, low self-efficacy may result in avoidance behaviors, anxiety, and poor instructional performance, especially in subjects perceived as challenging, such

as mathematics. In summary, primary preservice teachers' self-efficacy is a pivotal component in teacher development. It evolves through experiential learning, guided reflection, and supportive mentorship, all of which contribute to the formation of competent, confident educators capable of fostering positive learning environments in the early grades.

3.3.1. Confidence In Delivery—Table 8 presents the responses of primary preservice teachers regarding their level of confidence in delivering mathematics instruction during professional practice. With an overall mean average of 4.01, interpreted as extensive, the results reflect a strong perception among participants that confidence significantly enhances their instructional effectiveness and classroom performance in teaching mathematics. The highest-rated item was “Being well-prepared and confident in lesson delivery enhances the ability to engage students in mathematics” ($M = 4.20$), interpreted as very extensive. This finding underscores the vital role of preparation in enhancing teacher confidence and fostering active student participation. As noted by Fu and Kartal (2023), preservice teachers who reported high levels of confidence in mathematics instruction were more likely to adopt student-centered teaching strategies and sustain learner engagement throughout the lesson. Likewise, items such as “A strong belief in the ability to deliver mathematics lessons effectively fosters a positive classroom atmosphere” ($M = 4.07$) and “High levels of confidence in lesson delivery result in smoother classroom management during mathematics instruction” ($M = 4.06$) affirm the role of confidence in establishing a well-managed and emotionally supportive learning environment. These findings align with those of Fayda-Kinik (2024), who demonstrated that confident preservice teachers are more capable of creating emotionally safe classrooms, maintaining discipline, and encouraging participation during mathematics activities. Furthermore,

the statement “Confidence in delivering clear and structured mathematics lessons positively impacts student learning and participation” ($M = 3.88$) resonates with the findings of Lawrence and Drew (2023), who asserted that clarity in lesson delivery, which stems from instructional

confidence, promotes better comprehension and learner engagement. The ability to communicate concepts effectively is fundamental in subjects like mathematics, where procedural understanding and conceptual clarity are both crucial.

Table 8. Extent of Primary Preservice Teachers’ Self-Efficacy in Terms of Confidence in Delivery

No	Confidence in De- livery	Mean
Descriptive Interpretation		
1. Confidence in delivering mathematics lessons leads to more effective communication of concepts to students.	3.83	Extensive
2. Being well-prepared and confident in lesson delivery enhances the ability to engage students in mathematics.	4.20	Very Extensive
3. High levels of confidence in lesson delivery result in smoother classroom management during mathematics instruction.	4.06	Extensive
4. A strong belief in the ability to deliver mathematics lessons effectively fosters a positive classroom atmosphere.	4.07	Extensive
5. Confidence in delivering clear and structured mathematics lessons has a positive impact on student learning and participation.	3.88	Extensive
Mean Average	4.01	Extensive

In a similar vein, Rashid and Singh (2022) emphasized that teacher self-efficacy in lesson delivery, particularly in terms of clarity, pace, and responsiveness, was a predictor of perceived student achievement and classroom success among preservice mathematics teachers. Their study further supports the claim that confident delivery not only influences how teachers teach but also how students learn. In conclusion, the findings in Table 8 demonstrate that confidence in delivery is a key dimension of self-efficacy that enhances instructional clarity, student engagement, and classroom management in mathematics teaching. As such, fostering preservice teachers’ confidence through practical experiences, peer modeling, and guided mentoring should be prioritized in teacher preparation programs.

3.3.2. Perception Of Teacher Success—Table 9 presents the responses of primary preservice teachers on their perception of teacher success during mathematics instruction in professional practice. All indicators were rated either extensive or very extensive, with a high mean average of 4.13, suggesting that preservice teachers perceive a strong sense of teaching success, which in turn reinforces their self-efficacy in mathematics education. The highest-rated item was “Positive feedback from students and mentors boosts the perception of success in teaching mathematics” ($M = 4.26$), followed closely by “The ability to meet learning objectives in mathematics lessons increases the perception of success as a teacher” ($M = 4.24$). These results reflect the centrality of external validation and goal attainment in shaping preservice teachers’ confidence and professional identity. As

noted by Gibbs and Atkinson (2023), feedback from mentors and learners serves as an important form of social persuasion that strengthens perceived instructional competence.

Table 9. Extent of Primary Preservice Teachers' Self-Efficacy in Terms of Perception of Teacher Success

No	Perception of Teacher Success	Mean
Descriptive Interpretation		
1. The perception of successfully teaching mathematics lessons enhances belief in one's ability to teach the subject effectively.	4.01	Extensive
2. Seeing students demonstrate understanding and improvement in mathematics reinforces the perception of teaching success.	4.13	Extensive
3. Positive feedback from students and mentors boosts the perception of success in teaching mathematics.	4.26	Very Extensive
4. The ability to meet learning objectives in mathematics lessons enhances the teacher's perception of success.	4.24	Very Extensive
5. Observing student engagement and participation during mathematics lessons strengthens the belief in teaching effectiveness.	4.02	Extensive
Mean Average	4.13	Extensive

Additionally, the item "Seeing students demonstrate understanding and improvement in mathematics reinforces the perception of teaching success" ($M = 4.13$) confirms that student learning outcomes act as strong indicators of effective teaching. This finding aligns with the work of Carrillo and Flores (2021), who emphasized that observing tangible learning gains among pupils leads preservice teachers to evaluate their teaching efforts more positively, thereby increasing their self-efficacy. Other indicators, such as "The perception of successfully teaching mathematics lessons enhances belief in one's ability to teach the subject effectively" ($M = 4.01$) and "Observing student engagement and participation during mathematics lessons strengthens the belief in teaching effectiveness" ($M = 4.02$), reinforce Bandura's (1997) theory that mastery experience—direct teaching success—has a powerful impact on efficacy beliefs. Fu and Kartal (2023) also highlighted that classroom successes, including student attentiveness and achievement of planned objectives, significantly influence preservice teachers' developing

perceptions of themselves as effective educators. These findings suggest that the perception of success is not merely self-referential but is also reinforced through student outcomes, behavioral engagement, and supportive feedback mechanisms. As such, teacher education programs should emphasize strategies that help preservice teachers reflect on success criteria, celebrate instructional achievements, and interpret student responses constructively to build a sustained sense of teaching efficacy.

3.3.3. Satisfaction With Mathematics Teaching Practices—Table 10 presents the extent to which primary preservice teachers experience satisfaction with their mathematics teaching practices during professional practice. With an overall mean average of 4.01, interpreted as extensive, the data suggest that participants generally feel confident and fulfilled in their instructional strategies and classroom outcomes, reinforcing their overall teaching self-efficacy. The highest-rated items were "Positive outcomes from using specific teaching strategies in mathematics lead to greater satisfaction with

teaching practices” and “The ability to create an engaging and productive learning environment in mathematics lessons contributes to satisfaction with teaching practices” (both $M = 4.09$). These findings suggest that the successful application of strategies and the ability to maintain student engagement are key factors in driving preservice teachers’ professional satisfaction. As supported by Fu and Kartal (2023), when preservice teachers perceive that their instructional efforts lead to observable student growth and engagement, they are more likely to express satisfaction and develop stronger self-beliefs as teachers.

Table 10. Extent of Primary Preservice Teachers’ Self-Efficacy in Terms of Satisfaction with Mathematics Teaching Practices

No	Satisfaction with Mathematics Teaching Practices	Mean
Descriptive Interpretation		
1. Satisfaction with the effectiveness of mathematics teaching practices enhances confidence in teaching the subject.	4.01	Extensive
2. Positive outcomes from using specific teaching strategies in mathematics lead to greater satisfaction with teaching practices.	4.09	Extensive
3. The ability to create an engaging and productive learning environment in mathematics lessons contributes to satisfaction with teaching practices.	4.09	Very Extensive
4. Satisfaction with the progress and success of students in mathematics strengthens belief in the effectiveness of teaching methods.	3.94	Very Extensive
5. The alignment of teaching practices with student needs and learning outcomes increases overall satisfaction with mathematics teaching.	3.91	Extensive
Mean Average	4.01	Extensive

The item “Satisfaction with the effectiveness of mathematics teaching practices enhances confidence in teaching the subject” ($M = 4.01$) further affirms the reciprocal relationship between satisfaction and self-efficacy. According to Ng and Cheung (2021), sustained satisfaction with one’s teaching practices fosters positive psychological reinforcement, which in turn strengthens the motivation to refine and maintain effective instructional behaviors. Additionally, the items “Satisfaction with the progress and success of students in mathematics” ($M = 3.94$) and “The alignment of teaching practices with student needs and learning outcomes” ($M = 3.91$) highlight the importance of student-centered approaches in shaping preservice teachers’ professional satisfaction. Carrillo and Flores (2021) noted that preservice teachers derive greater fulfillment when their instructional decisions are responsive to learners’ needs and result in meaningful learning outcomes. Overall, these results support the premise that satisfaction with teaching practices serves not only as a reflection of instructional effectiveness but also as a reinforcing mechanism for developing teaching confidence. Programs that enable preservice teachers to experiment with diverse strategies, receive timely feedback, and reflect on student progress are essential in fostering high levels of instructional satisfaction and self-efficacy.

3.3.4. *Resilience and Stress Management*—Table 11 presents the perceptions of primary preservice teachers on their ability to manage resilience and stress while teaching mathematics during their professional practice. All five indicators received a descriptive rating of extensive, with a mean average of 4.06, suggesting that participants consistently acknowledged the importance and impact of stress regulation and adaptive behaviors on their teaching self-efficacy. The highest-rated item, “The ability

to manage stress during challenging mathematics lessons enhances confidence in teaching the subject” ($M = 4.14$), indicates that preservice teachers who effectively regulate stress experience greater assurance in delivering instruction. This aligns with the findings of Pereira and Costa (2023), who emphasized that emotional resilience and self-regulatory strategies significantly predict the teaching confidence of preservice mathematics teachers, especially when navigating instructional difficulties or unfamiliar classroom contexts.

Table 11. Extent of Teaching Mathematics During Resilience and Stress Management

No	Resilience and Stress Management	Mean
Descriptive Interpretation		
1. The ability to manage stress during challenging mathematics lessons enhances confidence in teaching the subject.	4.14	Extensive
2. Resilience in overcoming difficulties faced while teaching mathematics increases belief in one’s ability to handle future teaching challenges.	4.07	Extensive
3. Effective stress management techniques lead to improved focus and performance during mathematics instruction.	4.08	Extensive
4. The ability to remain composed under pressure during mathematics lessons strengthens self-efficacy in teaching.	4.05	Extensive
5. Resilience in adapting to unexpected classroom situations boosts confidence in handling a variety of teaching scenarios in mathematics.	3.97	Extensive
Mean Average	4.06	Extensive

Similarly, “Effective stress management techniques lead to improved focus and performance during mathematics instruction” ($M = 4.08$) and “Resilience in overcoming difficulties faced while teaching mathematics increases belief in one’s ability to handle future teaching challenges” ($M = 4.07$) reflect the belief that both proactive coping and experiential learning through adversity contribute positively to a teacher’s sense of competence. Martínez-Sierra et al. (2022) support this view, noting that preservice teachers who demonstrate emo-

tional adaptability tend to perceive their professional development more positively and are more confident in handling academic pressures. Other items, such as “The ability to remain composed under pressure during mathematics lessons strengthens self-efficacy in teaching” ($M = 4.05$) and “Resilience in adapting to unexpected classroom situations boosts confidence in handling a variety of teaching scenarios” ($M = 3.97$), further emphasize the significance of composure and adaptability. In this context, Yüksel and Karataş (2021) argue that develop-

ing resilience in teacher education helps mitigate the effects of teaching anxiety and supports preservice teachers in becoming more confident classroom practitioners. Overall, the findings from Table 11 affirm that resilience and stress management are not peripheral but central components of primary preservice teachers' self-efficacy in mathematics instruction. These capacities enable them to maintain focus, recover from setbacks, and confidently navigate the complexities of teaching—critical competencies for long-term success in the profession.

Table 12. Summary of the Extent of Teaching Mathematics During Professional Practice

No	Extent of Teaching Mathematics During Professional Practice	Mean
Descriptive Interpretation		
1. Confidence in delivery	4.01	Extensive
2. Perception of teacher success	4.13	Extensive
3. Satisfaction with Mathematics teaching practices	4.01	Extensive
4. Resilience and stress management	4.06	Extensive
Mean Average	4.05	Extensive

Specifically, the highest mean score was recorded under the indicator “perception of teacher success” ($M = 4.13$), suggesting that respondents strongly associate their professional teaching practice in mathematics with a high degree of perceived instructional effectiveness. This indicates a strong internal belief among preservice or in-service teachers that their mathematics instruction leads to meaningful learning outcomes, reinforcing their sense of professional competence. The indicator “resilience and stress management” followed with a mean of 4.06, also interpreted as “Extensive.” This result highlights the ability of teachers to adapt and manage stress while fulfilling their instructional responsibilities in mathematics. The ability to handle classroom challenges, such as

3.4. Summary of the Extent of Teaching Mathematics During Professional Practice —

Table 12 presents the summary of responses on the extent of teaching mathematics during professional practice across four key dimensions: confidence in delivery, perception of teacher success, satisfaction with teaching practices, and resilience and stress management. The results reveal that all indicators were rated within the “Extensive” range, with mean scores exceeding the threshold of 4.00 on a 5-point Likert scale.

learner diversity, performance pressure, and instructional pacing, appears to be moderately well-developed among the respondents. Both “confidence in delivery” and “satisfaction with mathematics teaching practices” obtained identical mean scores of 4.01, falling within the same interpretive bracket. These findings suggest that the respondents feel adequately confident in presenting mathematical concepts and are generally satisfied with their strategies, methodologies, and instructional practices. Confidence and satisfaction are closely linked and may reflect the cumulative effect of teacher preparation, mentoring, and experiential learning during practice teaching. The overall mean average of 4.05 affirms that, as a whole, the extent of teaching mathematics during professional practice is

regarded as Extensive. This implies a strong engagement and positive disposition among the respondents toward mathematics instruction during their practicum or early teaching experiences.

3.5. *Relationship Between Teaching Mathematics During Professional Development Practice And Primary Preservice Teachers' Self-Efficacy*—Table 13 displays the results of the Pearson correlation analysis between teaching mathematics during professional practice and

primary preservice teachers' self-efficacy. The study yielded a correlation coefficient (r) of 0.698 with a p -value less than 0.001, indicating a strong and statistically significant positive relationship between the two variables. Since the p -value is less than the 0.05 level of significance, the null hypothesis (H_0), which posited that there is no significant relationship between teaching mathematics during professional practice and preservice teachers' self-efficacy, is rejected.

Table 13. Relationship Between Teaching Mathematics During Professional Practice and Primary Preservice Teachers' Self-Efficacy

Variables	r-value	p-value	Interpretation
Teaching Mathematics During Professional Practice	0.698	<0.001	Significant, Reject H_0

This finding implies that the more extensive and meaningful the teaching experiences of preservice teachers during professional practice, the higher their level of self-efficacy in delivering mathematics instruction. It affirms the theoretical foundation laid by Bandura (1997), who identified mastery experiences and social modeling as key contributors to the development of self-efficacy. In the context of mathematics education, engaging in real teaching tasks, observing peers and mentors, and reflecting on instructional outcomes are central to forming strong teaching beliefs. Recent empirical studies support this conclusion. Fu and Kartal (2023) found that participation in structured teaching experiences significantly improves mathematics teaching self-efficacy by enhancing preservice teachers' belief in their instructional competence. Similarly, Fayda-Kinik (2024) emphasized that active engagement in instructional planning, delivery, and reflective practice during professional fieldwork predicts stronger confidence and teaching satisfaction. Moreover, Ng and Cheung (2021) demonstrated that

the relationship between teaching experience and self-efficacy is particularly pronounced in mathematics, where content mastery and classroom experience interact to influence both teaching behaviors and perceived success. Their findings showed that preservice teachers who had more robust practicum experiences demonstrated higher confidence in instructional delivery, student engagement, and classroom management. In conclusion, the statistically significant correlation ($r = 0.698$, $p < .001$) supports the hypothesis that teaching mathematics during professional practice has a positive influence on the self-efficacy of primary preservice teachers. This underscores the importance of well-designed practicum experiences in teacher education programs, particularly in preparing future educators to teach mathematics with competence, confidence, and adaptability.

3.6. *Teaching Mathematics During Professional Practice Significantly Influences Primary Preservice Teachers' Self-Efficacy*—The model summary (see Table: Model Summary - PRIMARY PRESERVICE TEACHER SELF-

EFFICACY_AVERAGE) presents the results of the regression analysis that examined the influence of multiple teaching practice dimensions—namely mastery experience, vicarious

experience, verbal and social persuasion, emotional and physiological states, cognitive self-modelling, and reflective practice—on the self-efficacy of primary preservice teachers.

Table 14. Model Summary - PRIMARY PRESERVICE TEACHER SELF-EFFICACY_AVERAGE

Model	R	R ²	Adjusted R ²	RMSE
M	0.000	0.000	0.000	0.291
M	0.708	0.501	0.471	0.212
Note. M includes ave., ave..12, ave..18, ave..24, _ave., _ave.				

The full model (M) yielded an R value of 0.708, indicating a strong positive relationship between the predictors and the dependent variable. The coefficient of determination ($R^2 = 0.501$) suggests that 50.1 percent of the variance in preservice teachers' self-efficacy can be explained by the combination of the six predictor variables. The adjusted R^2 of 0.471, which corrects for model complexity, still reflects a large effect size. The Root Mean Square Error (RMSE) of 0.212 implies a relatively low average deviation of predicted values from actual values, suggesting good model fit. This result

supports the theoretical framework of Bandura's (1997) self-efficacy theory, which posits that efficacy beliefs are formed through the integration of multiple experiential and affective sources. The ANOVA table provides evidence that the model is statistically significant. The regression model produced an $F(6, 97) = 16.263$, $p < .001$, indicating that the combination of the six teaching practice predictors significantly predicts primary preservice teachers' self-efficacy. Thus, the null hypothesis that these variables do not explain a significant proportion of the variance in self-efficacy is rejected.

Table 15. ANOVA

Model	Sum of Squares	df	Mean Square	F	p
M (Regression)	4.368	6	0.728	16.263	< .001
M (Residual)	4.342	97	0.045		
M (Total)	8.710	103			
Note. M includes ave., ave..12, ave..18, ave..24, _ave., _ave.					
Note. The intercept model is omitted, as no meaningful information can be shown.					

This finding confirms the collective impact of experiential and reflective teaching practices on the perceived instructional capabilities of future mathematics educators. As Fu and Kartal (2023) and Fayda-Kinik (2024) have emphasized, integrated teaching experiences serve as powerful mechanisms for professional

confidence-building. Table 14 details the individual contributions of each predictor variable. The regression coefficients are interpreted as follows:

- Mastery Experience (Mas_exp): With a standardized beta of $\beta = 0.246$, $t = 3.203$, and $p = .002$, mastery experience was a signifi-

cant positive predictor of self-efficacy. This result validates Bandura's (1997) claim that successful teaching performance directly enhances efficacy beliefs.

- **Vicarious Experience (Vic_exp):** This variable had $\beta = 0.091$, $p = .273$, and was not statistically significant. This suggests that observing others, while beneficial, may not independently contribute to self-efficacy unless paired with direct teaching practice.
- **Verbal and Social Persuasion (Ver_SP):** Though theoretically influential, it was not significant in this model ($\beta = 0.138$, $p = .099$). This aligns with Ng and Cheung (2021), who suggest that the impact of verbal encouragement is moderated by the teacher's internal belief and teaching context.
- **Emotional and Physiological States (Em_PS):** This predictor significantly influ-

enced self-efficacy ($\beta = 0.198$, $p = .018$), showing that teachers who effectively manage stress and emotional responses feel more competent in their instructional role.

- **Cognitive Self-Modelling (Cog_sm):** Also significant ($\beta = 0.215$, $p = .020$), suggesting that mental rehearsal and visualization of teaching success meaningfully strengthen confidence in instructional ability, as supported by Rashid and Singh (2022).
- **Reflective Practice (RP):** This was one of the strongest predictors ($\beta = 0.244$, $p = .002$), affirming that systematic reflection on teaching contributes meaningfully to pre-service teachers' self-assurance in mathematics instruction. This finding echoes the research of Carrillo and Flores (2021) on the role of reflective thinking in efficacy development.

Table 16. Adaptation Strategies that Significantly Influence Learning Outcomes

Model	Unstandardized	Standard Error	Standardized	t	p	Decision
M	(Intercept)	4.057	0.029		142.264	< 0.001
Reject Null						
M	(Intercept)	0.685	0.348		1.968	0.052
Accept Null						
	Mas_exp	0.202	0.063	0.246	3.203	0.002
Reject Null						
	Vic_exp	0.065	0.059	0.091	1.103	0.273
Accept Null						
	Ver_SP	0.104	0.062	0.138	1.667	0.099
Accept Null						
	Em_PS	0.158	0.066	0.198	2.403	0.018
Reject Null						
	Cog_sm	0.169	0.072	0.215	2.367	0.020
Reject Null						
	RP	0.161	0.052	0.244	3.113	0.002
Reject Null						

Overall, the regression analysis reveals that mastery experience, emotional regulation, cognitive self-modelling, and reflective practice are

significant predictors of self-efficacy among primary preservice teachers. The model accounts for a substantial portion of the variance in self-

efficacy scores, confirming that experiential and self-reflective factors are foundational in shaping confidence in teaching mathematics.

3.7. *Standpoints of the Participants Regarding the Extent of Teaching Mathematics During Professional Practice and Primary Preservice Teachers' Self-Efficacy* —

3.7.1. *Qualitative Integration: Standpoints on Teaching Mathematics and Self-Efficacy* —Following the quantitative findings that showed a statistically significant relationship between the extent of teaching mathematics during professional practice and preservice teachers' self-efficacy ($r = .698, p < .001$), the qualitative responses from seven participants were thematically analyzed to illuminate these statistical outcomes. The analysis revealed four major themes:

3.7.2. *Transition from Theoretical Knowledge to Practical Application*—Participants consistently reported a disconnect between coursework and real classroom practice at the beginning of their professional teaching experiences. While they felt moderately prepared in terms of content knowledge, practical teaching, especially in mathematics, presented unforeseen challenges. This supports the findings of Swars et al. (2022), who emphasized that preservice teachers often struggle to transfer mathematical knowledge into effective teaching until they engage in sustained classroom experience.

3.7.3. *Experiential Learning Enhances Self-Efficacy*—The majority of respondents agreed that hands-on teaching experiences significantly improved their confidence, especially through iterative practice, lesson delivery, and real-time problem-solving. This reflects Bandura's (1997) assertion that mastery experience is the most potent source of self-efficacy. Empirically, Fu and Kartal (2023) found similar patterns: preservice teachers' self-efficacy in-

creased as they accumulated practical teaching experience.

3.7.4. *The Role of Feedback and Mentorship*—Respondents highlighted constructive feedback and mentorship as essential components of their development. Feedback helped participants recognize progress and correct deficiencies, while mentorship provided both emotional support and pedagogical modeling. These results support Gibbs and Atkinson (2023), who argue that verbal and social persuasion through mentorship fosters both skill improvement and psychological readiness among preservice teachers.

3.7.5. *Building Resilience Through Classroom Challenges*—Respondents emphasized that initial failures or teaching difficulties—including student disengagement, poor pacing, or unexpected behaviors—initially diminished confidence but ultimately strengthened their resilience and belief in their teaching capacity. This finding aligns with Pereira and Costa (2023), who concluded that emotional regulation and reflective coping are integral to teacher efficacy, particularly in high-stakes content areas like mathematics.

3.7.6. *Integrated Interpretation*—These themes support and elaborate on the significant quantitative finding that teaching mathematics during professional practice is strongly correlated with the self-efficacy of primary preservice teachers. While statistical data captured the strength of this relationship, qualitative insights revealed the underlying mechanisms: experiential learning, feedback, emotional resilience, and continuous reflection. In the explanatory sequential design, this integration reinforces the conclusion that structured, supported, and reflective practicum experiences are crucial for developing confident and effective mathematics educators.

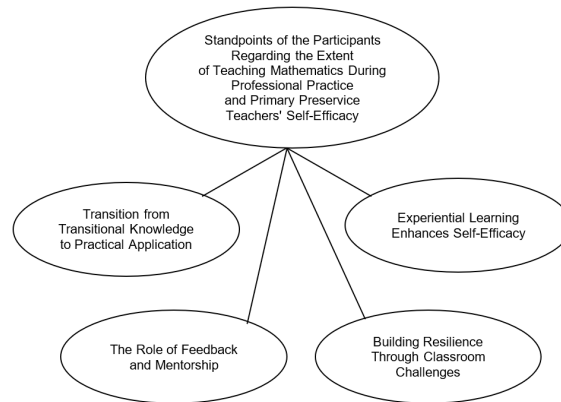


Fig. 2. Standpoints of the Participants Regarding the Extent of Teaching Mathematics During Professional Practice and Primary Preservice Teachers' Self-Efficacy

The standpoints of the participants regarding the extent of teaching mathematics during professional practice and its influence on the self-efficacy of primary preservice teachers revealed four key thematic insights. First, participants emphasized the importance of the transition from transitional knowledge to practical application. This shift signified their movement from theoretical understanding acquired in coursework to actual implementation during field-based experiences. Such a transition enabled preservice teachers to internalize instructional strategies, refine their pedagogical approaches, and gain confidence in delivering mathematical content. Second, participants consistently reported that experiential learning enhances self-efficacy. The process of lesson planning, classroom management, learner engagement, and outcome evaluation enabled them to transform abstract concepts into concrete teaching behaviors. These experiences allowed them to grow in confidence as they observed the positive impact of their instruction on learners' understanding, thereby reinforcing their belief in their teaching capabilities. Third, the role of feedback and mentorship was identified as a critical factor in developing teaching self-efficacy. Participants acknowledged that consistent feedback from cooperating teachers and supervisors helped them reflect constructively on their performance. Mentorship

served not only to model best teaching practices but also to foster reflective habits and professional commitment. Through vicarious learning—observing mentors' approaches and receiving guidance—preservice teachers cultivated a more profound sense of instructional confidence. Ultimately, participants described how they developed resilience through classroom challenges. Facing difficulties such as behavioral management, diverse learner needs, and performance pressures contributed to the development of emotional strength and adaptability. These challenges, rather than diminishing their motivation, helped reinforce their perseverance and emotional regulation—essential elements for sustaining self-efficacy. In summary, the qualitative data indicate that authentic and reflective teaching experiences significantly influence preservice teachers' self-efficacy in teaching mathematics. The interplay between practical application, experiential engagement, mentorship, and emotional resilience plays a decisive role in fostering their professional growth and instructional confidence.

3.8. Standpoints Of the Participants Regarding the Significant Relationship Between Teaching Mathematics During Professional Development Practice And Primary Preservice Teachers' Self-Efficacy —

3.8.1. Qualitative Integration: Standpoints on the Relationship Between Teaching

Mathematics and Self-Efficacy—The quantitative phase of this study found a statistically significant and strong relationship between teaching mathematics during professional practice and primary preservice teachers' self-efficacy ($r = 0.698$, $p < .001$). To enrich this finding, qualitative responses from seven participants were thematically analyzed. Four core themes emerged to describe how participants perceived this relationship:

3.8.2. Practical Teaching Experience as the Foundation of Self-Efficacy—All participants emphasized that actual classroom teaching during their professional practice directly built their confidence in teaching mathematics. Fu and Kartal (2023) found that repeated exposure to real teaching situations significantly enhances preservice teachers' confidence and competence in mathematics instruction.

3.8.3. Feedback and Mentorship as Catalysts for Confidence—Participants reported that feedback from mentors and cooperating teachers validated their performance, clarified areas for improvement, and provided models for effective teaching. These responses align with Gibbs and Atkinson (2023), who demonstrated that verbal persuasion and observational learning are significant contributors to teacher self-efficacy, especially during formative teaching experiences.

3.8.4. Repetition and Reflection Reinforce Self-Efficacy—Many participants described how repeated teaching experiences, when combined with structured reflection, led to improved confidence over time. This theme is consistent with findings from Lawrence and Drew (2023), who reported that repeated engagement in classroom practice, paired with reflective dialogue, builds adaptability and instructional confidence in novice mathematics teachers.

3.8.5. Real-World Complexity Builds Resilience and Instructional Identity—Several participants discussed how confronting real class-

room complexities, such as student disengagement or instructional failures, helped them strengthen their instructional identity and belief in their capacity to teach mathematics effectively. According to Pereira and Costa (2023), developing resilience through real-life classroom challenges not only contributes to the formation of professional identity but also reinforces the belief that one can successfully perform teaching tasks under varying conditions. The participants' standpoints highlighted a significant relationship between their experiences of teaching mathematics during professional development practice and their evolving sense of self-efficacy as primary preservice teachers. Central to this relationship is the recognition that practical teaching experience serves as the foundation of self-efficacy. Immersion in real classroom settings allowed preservice teachers to convert theoretical knowledge into actionable strategies, thereby fostering a sense of ownership and control over instructional processes. This hands-on experience provided the basis for developing teaching competence and confidence, as preservice teachers witnessed their impact on student learning outcomes. In addition, feedback and mentorship emerged as critical catalysts of confidence. Participants underscored the importance of receiving consistent and constructive feedback from cooperating teachers, mentors, and field supervisors. These interactions not only validated their instructional decisions but also guided them through pedagogical improvements. Mentorship facilitates vicarious learning and professional modeling, both of which are known to significantly influence self-efficacy development. Another salient theme was the value of repetition and reflection in reinforcing self-efficacy. Through repeated teaching tasks—such as planning, instruction, and assessment—preservice teachers became more fluent and efficient in their pedagogical approaches.

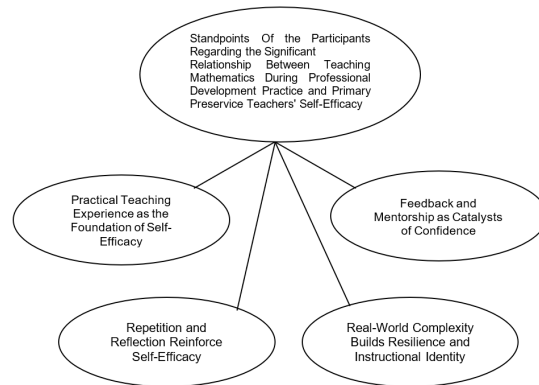


Fig. 3. Standpoints Of the Participants Regarding the Significant Relationship Between Teaching Mathematics During Professional Development Practice and Primary Preservice Teachers' Self-Efficacy

Coupled with reflective practices, these repeated actions facilitated a deeper understanding of effective teaching behaviors, resulting in increased instructional confidence. Reflection served as a critical tool for self-evaluation, adjustment, and growth. Participants also emphasized how real-world complexity builds resilience and instructional identity. Navigating the unpredictable dynamics of classroom environments, such as managing diverse learner needs, responding to spontaneous challenges, and adapting to contextual variables, prompted preservice teachers to develop emotional resilience. These complex experiences not only fortified their capacity to persist but also contributed to the formation of their instructional identity, shaping their beliefs about who they are as future educators. Collectively, these perspectives affirm that meaningful professional development experiences in mathematics instruction do more than enhance technical competence; they shape the psychological and emotional dimensions of teacher identity. The interplay of hands-on teaching, mentorship, reflection, and real-world challenges strongly supports the development of a robust sense of self-efficacy among primary preservice teachers.

3.9. *Integration of Interpretation of Quantitative and Qualitative Findings*—The quantitative results of the study revealed a statis-

tically significant and strong relationship between teaching mathematics during professional practice and primary preservice teachers' self-efficacy ($r = .698, p < .001$). Regression analysis further confirmed that multiple dimensions of teaching experience—particularly mastery experience, cognitive self-modelling, reflective practice, and emotional regulation—significantly predicted self-efficacy ($p < .05$). These findings suggest that the extent and quality of teaching experiences during practicum play a critical role in shaping preservice teachers' confidence and instructional beliefs. To deepen this understanding, qualitative data were examined, and four core themes emerged: (1) Practical teaching as foundational to confidence, (2) Mentorship and feedback as confidence enhancers, (3) Repetition and reflection as reinforcement, and (4) Classroom complexity as a builder of resilience and instructional identity. Participants described how real-world teaching tasks—such as lesson planning, classroom management, and adapting to student needs—enabled them to transform theoretical knowledge into effective teaching behaviors. As one respondent noted, “Each successful lesson built my confidence. Even failures taught me what to improve”. This integration of results illustrates how the statistical relationship is not merely correlational but developmental: practical teaching activates and

strengthens preservice teachers' self-efficacy through lived experience, reflective analysis, and social feedback. The synergy of empirical evidence and narrative testimony confirms Bandura's (1997) theory that mastery and social learning are foundational to the development of efficacy. Thus, the findings collectively underscore the imperative for teacher education

programs to design authentic, mentored, and reflective practicum experiences, particularly in mathematics. Rich, iterative exposure to classroom realities equips preservice teachers not only with competence but with a sustained belief in their capacity to teach effectively, adaptively, and confidently.

4. Conclusion and Recommendation

This chapter presents the conclusions drawn from the study's significant findings and provides relevant recommendations based on the results. Grounded in both quantitative and qualitative data, the conclusions highlight key insights into the relationship between teaching mathematics during professional practice and the self-efficacy of primary preservice teachers. The recommendations presented herein aim to inform policy, enhance teacher education practices, and guide future research directions to strengthen the preparation of preservice mathematics educators.

4.1. Findings—On the extent of teaching mathematics during professional practice. The participants rated their teaching experiences as extensive across all six dimensions. Mastery experience ($M = 3.81$) indicated that practical success in delivering lessons significantly contributed to confidence-building. Vicarious experiences ($M = 3.86$) revealed that observing mentors and peers provided meaningful instructional models. Verbal and social persuasion ($M = 3.99$) showed that feedback and encouragement from mentors, peers, and students positively reinforced teaching efforts. Emotional and physiological states ($M = 3.92$) confirmed that managing anxiety and embracing enthusiasm played a role in maintaining instructional performance. Cognitive self-modelling ($M = 4.00$) demonstrated that reflective thinking and visualization of success enhanced readiness. Reflective practice ($M = 4.00$) emerged as a critical factor in refining strategies and identifying areas for improvement. On the Extent of Primary Preservice Teachers' Self-Efficacy. Self-efficacy was rated as extensive in all four dimensions. Confidence in delivery ($M = 4.01$) reflected a strong belief in the ability to present mathemati-

cal content effectively. Perception of teacher success ($M = 4.13$) indicated that achieving learning goals and receiving positive feedback strengthened professional identity. Satisfaction with teaching practices ($M = 4.01$) suggested that preservice teachers felt fulfilled with their instructional approaches. Resilience and stress management ($M = 4.05$) highlighted their capacity to adapt to challenges and maintain composure under pressure. On the significant relationship between teaching mathematics during professional practice and self-efficacy. A statistically significant and strong positive relationship was found between the extent of teaching mathematics during professional practice and self-efficacy among primary preservice teachers ($r = 0.698$, $p < .001$). This confirms that increased and quality teaching experiences are closely linked to the development of instructional confidence. On which teaching practice dimensions significantly influence self-efficacy. Regression analysis revealed that four out of six dimensions were significant predictors of self-efficacy. These include: mastery experience ($p = .002$), emotional and physiological states ($p = .018$), cognitive self-modelling ($p = .020$), and

reflective practice ($p = .002$). Vicarious experience and verbal/social persuasion did not yield statistically significant results independently, suggesting their effects are supportive but not direct determinants. On the participants' standpoints regarding the extent of teaching mathematics and self-efficacy. Qualitative findings confirmed that participants experienced progressive growth in self-efficacy as they navigated real classroom environments. They described early feelings of partial preparedness and anxiety, which evolved into competence through repeated teaching, adaptation to challenges, and sustained reflection. The interplay of experi-

ential learning, mentorship, and student interaction formed a foundation for teaching confidence. On the participants' standpoints regarding the significant relationship. The interviews revealed that preservice teachers perceived a strong and direct connection between hands-on teaching and self-efficacy. Participants emphasized that real-world experience enabled them to apply theory, develop strategies, and manage diverse classroom situations. Feedback and mentorship were identified as vital elements that accelerated professional growth and validated their instructional decisions.

4.2. Conclusion—Based on the quantitative and qualitative results of the study, the following conclusions were drawn: Teaching mathematics during professional practice is a multi-dimensional process that primary preservice teachers experience extensively. Key components—such as mastery experience, reflective practice, and cognitive self-modelling—are instrumental in shaping instructional readiness and confidence. Primary preservice teachers exhibit high levels of self-efficacy in mathematics teaching, particularly in delivering lessons, perceiving instructional success, managing stress, and deriving satisfaction from their teaching practices. A statistically significant relationship exists between teaching mathematics during professional practice and preservice teachers' self-efficacy. This implies that as teaching exposure and experiential quality increase, so

too does the confidence of preservice teachers in handling classroom instruction. Among the six experiential factors studied, mastery experience, emotional and physiological regulation, cognitive self-modelling, and reflective practice have a significant influence on self-efficacy. Vicarious learning and verbal persuasion, while still beneficial, are not strong predictors on their own. Qualitative insights suggest that practical experience is foundational to the development of efficacy. Participants' self-efficacy increased as they gained teaching experience, received mentorship, reflected on their growth, and adapted to classroom challenges. The study confirms that self-efficacy is not merely acquired through theory but developed through active teaching, mentorship, and personal reflection. Therefore, practical experience must be viewed not as a supplementary requirement, but as the core driver of professional confidence.

4.3. Recommendations—In light of the above conclusions, the following recommendations are offered: 1. Teacher education institutions should strengthen the structure and depth of professional practice programs by ensuring sustained exposure to real classroom environ-

ments, particularly in the area of mathematics instruction. 2. Mentorship systems must be institutionalized, wherein mentor teachers are trained to provide specific, constructive, and reflective feedback to preservice teachers, thereby enhancing their self-efficacy. 3. Curriculum

planners and practicum supervisors should integrate structured reflective activities (e.g., teaching journals, video lesson reviews, peer discussions) into field experiences to develop preservice teachers' cognitive self-modelling and reflective practice skills. 4. Workshops and seminars on emotional resilience and stress management should be embedded in teacher training programs to help preservice teachers effectively navigate the psychological challenges of teaching. 5. Future research may explore the longitudinal impacts of teaching experience on self-efficacy post-certification and how the early development of teaching confidence influences long-term instructional effectiveness. 6. Policy-makers and accrediting bodies should recognize and reinforce the role of field-based experiences as a determinant of teacher quality, especially in mathematics education, by setting clear national standards on practicum intensity, mentorship quality, and self-efficacy development.

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