Original Article

Becoming Mathematics Teachers in the Age of Artificial Intelligence: A Narrative Inquiry into Pre-Service Teachers' Lived Stories of Preparation and Change

Dianne Grace Rubin [1], Elvie Jane Amion [1], Henry Lemana II [1,*]

Received: 28 May 2026; Revised: 31 July 2026;
Accepted: 07 August 2026; Published: 10 August 2026

DOI: https://doi.org/10.66074/L9W5P3R8J

Abstract

Artificial intelligence (AI) has increasingly influenced educational practices and teacher preparation, particularly in mathematics education where AI-assisted tools are becoming more accessible for lesson planning, concept explanation, and instructional support. Despite the growing integration of AI in education, limited studies have explored how pre-service mathematics teachers experience and interpret their preparation to teach within AI-enabled learning environments. This study explored the lived experiences of pre-service mathematics teachers in becoming future educators in the age of artificial intelligence. Specifically, it examined how AI shaped their professional identity, instructional readiness, pedagogical practices, and understanding of their roles as future mathematics teachers. Guided by a qualitative approach using narrative inquiry, the study involved three pre-service mathematics teachers from Davao del Sur State College selected through purposive sampling. Data were gathered through semi-structured interviews and analyzed using narrative and cross-narrative analysis. The findings revealed that participants experienced AI as both an instructional support and a source of pedagogical tension. Artificial intelligence contributed positively to lesson preparation, conceptual understanding, instructional confidence, and teaching readiness; however, concerns regarding technological dependence, accuracy, critical thinking, and

[1] University of the Immaculate Conception, Davao City, Philippines
* hlemana@uic.edu.ph

Volume 2, Issue 3, September 2026

responsible use were likewise identified. The narratives further showed a transition from technological hesitation toward reflective integration and highlighted shifts in professional identity from content transmission toward facilitation, ethical guidance, and human-centered teaching. The study concludes that becoming a mathematics teacher in AI-enabled environments extends beyond technological competence and involves reflective practice, pedagogical adaptation, ethical awareness, and identity development. The findings contribute to emerging discussions on artificial intelligence in mathematics teacher education by highlighting the reflective and transformative dimensions of teacher preparation in technology-rich learning contexts.

Keywords: artificial intelligence, mathematics teacher education, narrative inquiry, pre-service mathematics teachers, professional identity, teacher preparation

1. Introduction

Artificial intelligence (AI) has increasingly transformed educational practices, particularly in teaching, learning, lesson planning, and instructional delivery. In mathematics education, generative AI technologies such as ChatGPT and AI-assisted mathematics platforms are becoming more visible in supporting classroom instruction, generating activities, explaining mathematical concepts, and assisting teachers in instructional preparation. Recent literature suggests that AI possesses significant potential to improve educational processes by enhancing problem-solving, supporting cognitive learning, and increasing access to instructional resources (Ifenthaler et al., 2024; Yan et al., 2024). Researchers further emphasized that educational systems and teacher education institutions are increasingly expected to prepare future educators who can integrate AI meaningfully, critically, and responsibly within classroom instruction (Luckin et al., 2022).

In mathematics teacher education, the growing integration of AI presents both opportunities and challenges for pre-service mathematics teachers. Lesson planning, instructional preparation, and pedagogical decision-making remain essential competencies that future mathematics educators must develop throughout teacher preparation programs (Backfisch et al., 2024; Karaman & Göksu, 2024; van den Berg & du Plessis, 2023). Existing studies have emphasized that effective mathematics lesson planning requires pre-service teachers to align instructional objectives, mathematical content, pedagogical strategies, learner engagement, assessment, and

classroom activities into coherent and meaningful learning experiences (Karaman & Göksu, 2024; van den Berg & du Plessis, 2023).

However, Alanazi (2019) found that pre-service teachers commonly encounter challenges in lesson planning and instructional preparation. Likewise, Chien (2015) reported that student teachers often struggle to apply pedagogical theories during field experiences. Researchers further noted that challenges in instructional planning are often associated with limited pedagogical knowledge, insufficient reflective practice, and difficulties integrating technological tools into meaningful learning experiences (Artzt, 1999; Celik et al., 2022). In AI-enabled learning environments, these challenges become more complex because pre-service teachers are expected not only to understand mathematical concepts and pedagogy but also to integrate technological, pedagogical, and content knowledge, critically evaluate AI-generated outputs, and use generative AI responsibly in instructional planning and classroom practice (Backfisch et al., 2024; Frieder et al., 2023; Trust et al., 2023).

At the same time, emerging literature suggests that AI may function as a valuable support tool in lesson planning and instructional preparation. Studies have shown that AI technologies can support pre-service teachers in lesson planning by generating instructional ideas, organizing lesson flow, and assisting in the development of lesson plans (Karaman & Göksu, 2024; van den Berg & du Plessis, 2023). Similarly, generative AI tools such as ChatGPT have the potential to support adaptive instruction, contextualized problem creation, and differentiated learning experiences, thereby assisting teachers in designing more engaging and responsive learning activities (Kohnke et al., 2023).

Researchers have argued that AI integration has the potential to strengthen instructional confidence, streamline routine teaching tasks, and support reflective teaching practices by enabling educators to make more informed and contextually appropriate pedagogical decisions (Grassini, 2023; Luckin et al., 2022). Despite these advantages, concerns regarding the reliability, accuracy, and pedagogical appropriateness of AI-generated outputs remain evident in the literature. Frieder et al. (2023) found that although ChatGPT demonstrates promising mathematical capabilities, it can generate incorrect or inconsistent solutions, highlighting the need for careful verification of AI-generated responses. Meanwhile, Trust et al. (2023) highlighted the need for reflective judgment when integrating AI into instructional planning. Other studies also suggest that effective AI integration depends not solely on technological access but also on teachers' ability to exercise critical thinking, pedagogical reasoning, and ethical responsibility (Celik et al., 2022; Ifenthaler et al., 2024; Luckin et al., 2022).

Existing research on AI integration in teacher education has primarily focused on teachers' perceptions, technological readiness, AI literacy, instructional effectiveness, and the practical use of AI tools in classroom settings. Recent studies have commonly explored the benefits and limitations of AI-assisted lesson planning, instructional efficiency, and teachers' attitudes toward technology integration (Baggia et al., 2026; Karataş & Yüce, 2024). Although these studies have significantly

contributed to understanding AI adoption in education, much of the literature emphasized technological competence and instructional utility rather than the deeper personal and professional experiences of future educators. In particular, limited studies have explored how pre-service mathematics teachers construct meaning from their lived experiences with AI and how these experiences influence their professional identity, instructional confidence, pedagogical decision-making, and readiness to teach mathematics in AI-enabled classrooms.

In the Philippine context, research examining the experiences of pre-service mathematics teachers in AI-enabled learning environments remains limited. Existing Philippine studies have primarily focused on lesson planning, instructional preparation, and teaching practices among pre-service teachers, with comparatively little attention given to how they experience and integrate artificial intelligence into their pedagogical preparation (Calamlam, 2026; Villalon, 2016; Yacap, 2022). Although recent research has begun to explore AI-assisted lesson planning among Filipino pre-service mathematics teachers, these investigations have largely emphasized the perceived usefulness and instructional functions of AI rather than the reflective and meaning-making processes that accompany its integration into teaching practice (Calamlam, 2026).

As generative AI becomes increasingly accessible in teacher education, an important gap remains in understanding how Filipino pre-service mathematics teachers negotiate their pedagogical beliefs, professional roles, and emerging identities while preparing to teach in technology-rich environments. Likewise, little is known about how they interpret, reflect upon, and narrate their experiences of learning to teach mathematics alongside AI technologies. Addressing this gap requires an approach that captures the evolving and contextual nature of these experiences. Since teacher identity develops through reflection, lived experience, and the construction of meaning, narrative inquiry offers a valuable framework for examining how pre-service mathematics teachers make sense of their preparation, adaptation, and professional growth in the age of artificial intelligence (Beijaard et al., 2004; Clandinin & Connelly, 2000).

Anchored in Professional Identity Theory by Beijaard et al. (2004), the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006), and Rogers' (2003) Diffusion of Innovations Theory, this study recognizes that becoming a mathematics teacher in the age of artificial intelligence involves more than simply learning how to use technology. Rather, it involves continuous identity formation, reflective practice, pedagogical adaptation, and critical engagement with emerging technologies (Beijaard et al., 2004; Mishra & Koehler, 2006; Rogers, 2003). In this context, pre-service mathematics teachers are expected to develop not only technological competence but also the ability to evaluate information critically, integrate AI responsibly, and create meaningful learning experiences that promote students' understanding and independent thinking (Trust et al., 2023).

Therefore, this study explored how pre-service mathematics teachers narrate and construct their lived experiences of becoming future mathematics educators in AI-

enabled learning environments. Specifically, the study examined how their experiences with artificial intelligence shape their professional identity, instructional readiness, pedagogical practices, and understanding of their evolving roles as future mathematics teachers. Through narrative inquiry, the study sought to contribute deeper insights into the reflective, personal, and transformative dimensions of AI integration in mathematics teacher education.

2. Methodology

2.1 Research Design

This study employed a qualitative research approach using narrative inquiry as its research design. Narrative inquiry is appropriate for studies that aim to understand how individuals construct meaning from their lived experiences through stories, reflection, and personal interpretation (Clandinin & Connelly, 2000). The design was selected because the study sought to explore how pre-service mathematics teachers narrate and interpret their experiences of becoming future mathematics educators in the age of artificial intelligence (AI). Through narrative inquiry, the study examined how participants experienced preparation, adaptation, identity formation, and professional change as they integrated AI into mathematics teaching and learning contexts.

The study was conducted at Davao del Sur State College (DSSC), Philippines, during the academic year 2025–2026. The institution was selected because pre-service mathematics teachers in the college are increasingly exposed to AI-assisted technologies such as ChatGPT, Microsoft Math Solver, Canva, and other digital tools during lesson preparation, teaching demonstrations, and practice teaching activities. The research design allowed the researchers to capture participants' evolving experiences over time and to understand how these experiences shaped their perspectives, instructional readiness, and professional identity as future mathematics teachers. Narrative inquiry was particularly suitable because identity development and meaning-making are often revealed through stories, reflections, and lived experiences (Beijaard et al., 2004; Clandinin & Connelly, 2000).

2.2 Participants and Sampling Procedure

The participants in the study were three (3) pre-service mathematics teachers enrolled in the Bachelor of Secondary Education major in Mathematics program at Davao del Sur State College (DSSC). The study utilized purposive sampling, which involves selecting participants who possess direct experience with the phenomenon being investigated (Creswell, 2013). Purposive sampling was considered appropriate because the study specifically focused on pre-service mathematics teachers who had experience using artificial intelligence tools in educational contexts.

Participants were eligible if they (1) were currently enrolled in the Bachelor of Secondary Education major in Mathematics program; (2) were currently undertaking or have completed field study, teaching demonstrations, or a teaching internship; and (3) had prior exposure to or experience using artificial intelligence tools such as ChatGPT, Microsoft Math Solver, Canva AI features, or similar educational technologies for instructional preparation or learning purposes. Participants who did not have exposure to AI tools or were not enrolled in the mathematics education program were excluded from the study.

The sample size of three participants was deemed appropriate for narrative inquiry because the design prioritizes depth, detailed storytelling, and rich descriptions of lived experiences rather than statistical generalization (Clandinin & Connelly, 2000). Maximum variation in participant experiences was also considered to capture diverse perspectives regarding AI exposure, instructional readiness, and identity development.

2.3 Research Instrument

The primary instrument used in the study was a researcher-made semi-structured interview guide composed of open-ended questions aligned with the objectives and research questions of the study. The interview protocol was designed to elicit detailed narratives regarding participants' experiences with artificial intelligence, lesson planning, instructional preparation, teaching demonstrations, professional identity formation, and readiness to teach mathematics in AI-enabled learning environments. The interview guide underwent expert validation to ensure clarity, relevance, coherence, and alignment with the research objectives. Validation was conducted by research advisers and qualitative research experts with experience in teacher education and narrative inquiry. Revisions were incorporated based on the recommendations provided during the validation process. The semi-structured nature of the interview allowed flexibility for probing questions and encouraged participants to share reflective and detailed accounts of their lived experiences.

2.4 Data-Gathering Procedure

Prior to the conduct of the study, the researchers formally requested permission from the appropriate institutional authorities through a letter addressed to the Dean of the University of the Immaculate Conception (UIC). Upon approval, coordination with department chairpersons and faculty members was conducted to identify qualified participants who met the inclusion criteria of the study.

After participant identification, the researchers explained the objectives, nature, and purpose of the study to the participants. Ethical considerations were discussed thoroughly, including voluntary participation, confidentiality, anonymity, and the right to withdraw from the study at any stage without penalty. Written informed consent was secured from all participants prior to data collection.

Individual interviews were then scheduled at a time and setting convenient for the participants. Depending on participants' availability and preferences, interviews were conducted either face-to-face or through online platforms. During the interviews, participants were encouraged to narrate their lived experiences as pre-service mathematics teachers preparing to teach in the age of artificial intelligence. The interviews focused on their experiences with AI integration, instructional preparation, lesson planning, challenges encountered, identity formation, and professional growth. With participants' consent, all interviews were audio-recorded to ensure accurate documentation of responses. Field notes were likewise taken to capture non-verbal cues, contextual observations, and reflective insights during the interview sessions. Each interview lasted approximately 45 to 60 minutes.

2.5 Data Analysis

The recorded interviews were transcribed verbatim and carefully reviewed to ensure accuracy and completeness of the data. The researchers repeatedly read the transcripts to familiarize themselves with the participants' narratives and lived experiences. Data were then organized, coded, and analyzed using thematic narrative analysis. Thematic narrative analysis was employed to identify recurring patterns, meanings, turning points, tensions, and experiences reflected in participants' stories regarding AI integration and professional identity formation. The analysis involved coding significant statements, grouping related ideas into categories, and generating broader themes that reflected participants' experiences over time. Narrative sequencing and contextual interpretation were also considered to preserve the coherence and individuality of participants' stories.

The researchers utilized manual coding procedures to ensure close engagement with the narratives and to maintain sensitivity to participants' meanings and interpretations. The themes generated from the analysis were interpreted in relation to the study's theoretical foundations, namely Professional Identity Theory by Beijaard et al. (2004), the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006), and Rogers' (2003) Diffusion of Innovations Theory, to further explain participants' experiences of identity formation, pedagogical adaptation, and AI integration in mathematics teaching.

2.6 Ethical Considerations

The study strictly adhered to ethical standards in qualitative research. This research was conducted as a course output in Qualitative Research under the PhD Mathematics program of the University of the Immaculate Conception (UIC). Prior to data collection, permission to conduct the study was formally secured from the Program Coordinator of the PhD Mathematics Program of the University of the Immaculate Conception. Participants were informed about the objectives, nature, procedures, benefits, and potential risks of the study prior to participation. Written

informed consent was obtained to ensure voluntary participation, and participants were informed that they could withdraw from the study at any stage without any negative consequences.

Confidentiality and anonymity were strictly observed throughout the conduct of the study. Pseudonyms and coded identifiers were used instead of participants' real names to protect their identities. All interview recordings, transcripts, field notes, and collected data were securely stored and accessed only by the researchers. The researchers likewise ensured that participants' narratives and lived experiences were represented accurately, respectfully, and responsibly during data analysis, interpretation, and presentation of findings.

3. Results

The narratives of the participants revealed that becoming a mathematics teacher in the age of artificial intelligence is characterized by an ongoing process of pedagogical negotiation, reflective adaptation, and professional identity reconstruction. Across the narratives, participants described experiences that moved beyond the mere technical use of artificial intelligence (AI) tools and instead reflected deeper struggles related to instructional competence, confidence formation, ethical responsibility, and the evolving meaning of teaching in technology-mediated environments. Their stories illustrated how AI became simultaneously a source of instructional support, pedagogical tension, and professional transformation.

The findings further demonstrated that participants' encounters with AI were neither immediate nor uniformly positive. Initial experiences were commonly marked by hesitation, uncertainty, skepticism, and concerns regarding overreliance on technology. However, through repeated exposure, classroom practice, mentorship, collaborative learning, and reflective engagement, participants gradually reconstructed their understanding of AI from a mere source of convenience into a pedagogically supportive and critically mediated instructional resource. These experiences consequently shaped how participants perceived themselves as future mathematics teachers within increasingly technology-rich educational environments.

The findings are presented through narrative accounts that preserve the temporal and experiential flow of participants' stories, followed by cross-narrative resonances that illuminate shared tensions, transitions, and meanings across the narratives.

3.1 Narrative Account of Participant 1: Reconstructing Confidence Through AI-Mediated Learning

Participant 1's narrative reflected a gradual transition from dependence on traditional learning approaches toward a more reflective and technologically supported mode of instructional preparation. At the beginning of her journey as a pre-service mathematics teacher, she described learning mathematics as a frustrating and isolating process characterized by repeated rereading of notes, independent searching for

examples, and persistent difficulty understanding abstract mathematical concepts such as calculus. Her narrative revealed experiences of uncertainty and intellectual exhaustion, particularly during moments when instructional support was not immediately accessible.

The introduction of artificial intelligence represented a significant turning point within her narrative trajectory. Initially, she approached AI with hesitation and uncertainty, questioning whether it could meaningfully contribute to her learning. However, her encounters with ChatGPT and mathematics-solving platforms gradually altered her perception of instructional support and mathematical understanding. She described AI as an accessible explanatory resource capable of presenting step-by-step processes, alternative problem-solving methods, and immediate instructional feedback. Reflecting on this experience, Participant 1 shared:

> *"It was like having someone who could explain the lesson anytime. It helped me break down complex problems step by step and showed me different ways of solving problems."*

This experience marked the beginning of a pedagogical shift in which mathematical understanding became more interactive, immediate, and dialogic rather than purely dependent on static instructional materials. More importantly, Participant 1 emphasized that AI not only supported her comprehension of mathematical concepts but also influenced how she imagined herself teaching these concepts to future learners. Her narrative suggested that instructional confidence emerged not merely from obtaining correct answers but from developing clearer ways of explaining and representing mathematical ideas.

At the same time, her narrative reflected critical tensions regarding the ethical and pedagogical implications of AI use. Prior to integrating AI into her instructional preparation, she associated AI with academic shortcuts and superficial learning because she had observed students merely copying generated responses without genuine understanding. Consequently, she initially resisted using AI, perceiving it as potentially harmful to authentic learning processes.

However, her experiences during practice teaching and classroom observation gradually complicated this perspective. Witnessing teachers use AI meaningfully and responsibly led her to reconsider the role of technology in education. Describing this experience, Participant 1 explained:

> *"That experience made me realize that AI is not the problem. It depends on how we use it."*

This realization represented a significant identity transition within her narrative. Rather than rejecting AI altogether, she began integrating it cautiously into lesson planning, activity design, and instructional preparation while simultaneously emphasizing the necessity of verification, critical thinking, and pedagogical judgment.

Her narrative ultimately reflected an evolving professional identity grounded not in technological dependence but in reflective technological mediation.

Toward the latter part of her story, Participant 1 increasingly described herself not simply as a transmitter of mathematical knowledge but as a facilitator capable of guiding learners through critical and responsible engagement with AI-assisted learning environments. Her narrative illustrated how confidence, instructional readiness, and professional identity were gradually reconstructed through reflective encounters with emerging technologies.

3.2 Narrative Account of Participant 2: Negotiating Professional Identity Amid Technological Uncertainty

Participant 2's narrative centered strongly on the tension between technological adaptation and professional self-efficacy. Her story revealed how the process of becoming a mathematics teacher involved continuous negotiation between mastering instructional fundamentals and adapting to rapidly changing technological expectations.

At the beginning of her narrative, Participant 2 described significant struggles related to instructional communication and pedagogical clarity. Although she often understood mathematical procedures personally, she found it difficult to explain these concepts effectively to students. This led to recurring feelings of inadequacy and uncertainty about her competence as a future mathematics educator.

The introduction of artificial intelligence further intensified these uncertainties. Initially, she described AI as both intriguing and overwhelming. While curious about its capabilities, she feared that dependence on technology might weaken her ability to develop authentic teaching competence. When asked about this, Participant 2 stated:

> *"At first, I relied on AI mainly for answers and lesson ideas, but I realized that depending on it did not improve my teaching skills."*

Her narrative revealed that early interactions with AI generated internal conflict rather than immediate empowerment. On one hand, AI offered convenience, speed, and instructional assistance. On the other hand, it challenged her understanding of what it meant to genuinely learn how to teach. This tension reflected broader concerns regarding overdependence, reduced critical thinking, and the possibility of technological substitution replacing pedagogical depth.

A critical turning point within her narrative emerged through mentorship and collaborative guidance. Participant 2 repeatedly emphasized the role of cooperating teachers, instructors, and reflective classroom experiences in reshaping her understanding of AI integration. Through these experiences, she gradually reframed AI from being a shortcut into a pedagogical support mechanism. Participant 2 recalled:

> *"I began to see AI not as a replacement for teaching, but as a support that can strengthen learning when used correctly."*

As her narrative progressed, Participant 2 increasingly portrayed herself as a more reflective and intentional user of AI. Rather than using AI merely to generate answers, she began using it to deepen conceptual understanding, reorganize lesson objectives, and improve instructional flexibility. This shift demonstrated movement from passive technological consumption toward reflective pedagogical engagement.
Despite these developments, Participant 2 acknowledged that balancing technological integration with foundational teaching competencies remained an ongoing challenge. Her narrative suggested that adaptation to AI was not a linear process of mastery but rather a continuing negotiation between innovation, pedagogical competence, and ethical responsibility. Ultimately, her story reflected the gradual reconstruction of a professional identity characterized by adaptability, reflexivity, and critical technological awareness. She increasingly perceived her role not merely as delivering mathematical content but as cultivating independent thinking and responsible technological engagement among learners.

3.3 Narrative Account of Participant 3: Reflective Adaptation and Human-Centered Technological Integration

Participant 3's narrative illustrated how adaptation to artificial intelligence was deeply shaped by social interaction, collaborative learning, and reflective engagement within teacher education environments. His story emphasized that becoming a mathematics teacher in AI-enabled classrooms required not only technological competence but also the preservation of meaningful human-centered pedagogical relationships.

At the beginning of his narrative, Participant 3 described AI primarily as a convenient instructional resource capable of generating answers, examples, lesson plans, and mathematical explanations. During early encounters with tools such as ChatGPT, Microsoft Math Solver, Canva, and Photomath, he often depended heavily on these technologies to simplify instructional preparation and classroom tasks.

However, through repeated classroom experiences, teaching demonstrations, workshops, and interactions with mentors and peers, he gradually recognized the limitations of purely convenience-based AI use. His narrative increasingly reflected awareness that effective teaching extends beyond technological efficiency. Participant 3 elaborated on this point:

> *"I began to understand that AI should support learning rather than replace the role of the teacher."*

This realization became central to his evolving professional identity. As he continued engaging with AI-assisted instructional practices, Participant 3 increasingly

emphasized the importance of evaluating the accuracy, appropriateness, and pedagogical relevance of AI-generated content. He described becoming more intentional in modifying lesson activities, contextualizing explanations, and ensuring that instructional materials remained responsive to students' actual learning needs.

His narrative further demonstrated growing awareness of the interconnectedness of technological knowledge, pedagogical knowledge, and mathematical content knowledge. Through practice teaching and reflective engagement, he gradually developed confidence in integrating these domains more meaningfully.

Importantly, Participant 3 repeatedly highlighted the significance of social support systems in shaping his adaptation to AI. Mentorship, peer collaboration, workshops, and classroom interactions were consistently described as influential factors that strengthened both his technological confidence and pedagogical understanding. Participant 3 recounted:

> *"Over time, AI became less intimidating and more of a helpful partner in my preparation as a future teacher."*

Toward the conclusion of his narrative, Participant 3 increasingly framed teaching as a fundamentally human endeavor that must remain grounded in interaction, reflection, and ethical responsibility despite technological advancement. Although AI contributed significantly to his instructional preparation and adaptability, he consistently emphasized that meaningful learning still depended on teachers' capacity to guide, connect with, and critically support students.

His narrative ultimately reflected the emergence of a professional identity rooted in reflective adaptation, technological intentionality, and human-centered pedagogy.

3.4 Cross-Narrative Resonances

Table 1 presents the cross-narrative resonances that emerged from the participants' experiences as pre-service mathematics teachers in the age of artificial intelligence. The table summarizes the common patterns found across the narratives, particularly how participants experienced AI as both an opportunity and a challenge, gradually adapted to technology, developed their professional identities, and emphasized the importance of maintaining human connection in teaching despite increasing technological integration.

Table 1. Cross-narrative resonances on becoming mathematics teachers in the age of artificial intelligence.

Cross-Narrative Resonance	Description	Narrative Meaning
AI as Both Pedagogical Support and a Source of Tension	AI-supported lesson preparation, mathematical understanding, and instructional confidence but also raised concerns regarding overreliance, misinformation, and reduced critical thinking.	Participants viewed AI as both beneficial and challenging in teaching preparation.
From Hesitation to Reflective Integration	Participants moved from uncertainty and skepticism toward purposeful and reflective AI use through exposure, mentorship, and practice.	AI adaptation developed gradually through experience and reflection.
Reconstructing Mathematics Teacher Identity	Participants shifted from knowledge transmitters to facilitators, ethical guides, and critical users of technology.	Professional identity evolved alongside AI integration.
Human-Centered Teaching in Technology-Rich Environments	Participants emphasized explanation, guidance, empathy, and interaction despite increasing AI use.	AI was viewed as a support tool rather than a replacement for teachers.

3.4.1 AI as Both Pedagogical Support and Source of Tension

The narratives revealed that participants generally viewed artificial intelligence as a helpful resource in their preparation as future mathematics teachers. Across the stories, AI was frequently associated with improved lesson preparation, deeper understanding of mathematical concepts, better organization of instructional materials, and increased confidence in teaching. Participants particularly appreciated AI's ability to provide step-by-step explanations and multiple strategies for solving mathematical problems, which supported both their learning and their preparation for future classroom instruction. For instance, Participant 1 shared how AI changed her experience of learning mathematics:

> *"It helped me break down complex problems step by step, provided practice exercises, and even showed me different ways of solving problems."*

Likewise, Participant 1 further explained how AI contributed to lesson preparation:

> *"I began using AI to help me create clear learning objectives and design activities that are more engaging and aligned with my lesson."*

These narratives suggest that participants perceived AI not merely as a technological tool but as an instructional support that contributed to both content understanding and teaching preparation.

However, participants also acknowledged that AI integration was accompanied by several concerns. A common issue raised across narratives was the possibility of becoming overly dependent on AI, particularly when users accept generated responses without verification. Participants also expressed concerns regarding incorrect information and the possible reduction of critical thinking. This concern was reflected in Participant 1's statement:

> *"I always check the answers it provides because I know it is not always correct."*

Similarly, Participant 2 noted:

> *"I realized that depending on it did not improve my teaching skills."*

These findings indicate that participants did not fully embrace AI without reservation. Instead, they continuously evaluated its usefulness while remaining aware of its limitations. Thus, AI emerged as both a source of instructional support and a point of pedagogical tension.

3.4.2 From Technological Hesitation to Reflective Integration

Another common pattern that emerged across the narratives was the transition from initial hesitation toward more reflective and purposeful AI integration. Participants described their early encounters with AI as accompanied by uncertainty, skepticism, and questions regarding its role in teaching and learning.
Sharing this experience, Participant 1 remarked:

> *"At first, I was curious but also unsure if it would really help me." Participant 2 conveyed a comparable experience:*

> *"I felt hesitant and unsure about using AI, especially because I was still developing my basic teaching skills."*

This uncertainty was often connected to concerns that AI might become a shortcut rather than a learning tool. Participants worried that excessive dependence on technology could affect their own development as teachers and limit students' independent thinking.

Over time, however, repeated exposure through lesson preparation, teaching demonstrations, practice teaching, workshops, and mentorship gradually changed these perceptions. Participants began to integrate AI more intentionally and viewed it

as a support mechanism rather than a replacement for teaching. Participant 2 reflected this shift by explaining:

> *"I began to see AI not as a replacement for teaching, but as a support that can strengthen learning when used correctly."*

Participant 3 expressed a similar experience:

> *"Over time, AI became less intimidating and more of a helpful partner in my preparation as a future teacher."*

These narratives show that participants' acceptance of AI developed gradually. Their experiences suggest that reflective exposure, guided practice, and support systems played important roles in moving them from technological hesitation toward more responsible integration.

3.4.3 Reconstructing the Identity of the Mathematics Teacher

The findings further revealed that participants' experiences with AI contributed to the development of their professional identity as future mathematics teachers. As participants became more familiar with AI, they gradually moved away from viewing teaching solely as the delivery of content and began to understand teaching as guiding, facilitating, and supporting student learning. As Participant 2 reflected on the changing responsibilities of a mathematics teacher, she shared:

> *"My responsibility is not only to deliver content but also to guide students in thinking deeply and critically."*

This shift in professional identity was likewise evident in Participant 3's account, where he described how AI reshaped his understanding of teaching:

> *"Instead of simply giving information, I now see myself as someone who guides learners, encourages understanding, and uses technology responsibly."*

Participants also emphasized that AI should remain a support tool rather than a replacement for the teacher. Emphasizing the complementary role of AI in classroom practice, Participant 1 explained:

> *"AI is not something that replaces my role as a teacher, but rather a tool that supports my teaching."*

These findings indicate that AI integration influenced participants' understanding of their future roles as mathematics educators. Their narratives reflected an emerging identity centered on facilitation, ethical responsibility, critical thinking, and meaningful use of technology.

3.4.4 Human-Centered Teaching in Technology-Rich Environments

Although participants recognized the value of AI in teaching preparation and instructional support, they consistently emphasized that teaching remains a human-centered process. Across the narratives, meaningful teaching was associated with interaction, guidance, reflection, and responsiveness to students' needs rather than technological efficiency alone. Reflecting on the relationship between innovation and effective teaching, Participant 3 remarked:

> *"I learned that embracing innovation does not mean replacing traditional teaching practices."*

This belief was reinforced as he further reflected on the enduring value of human interaction in the learning process:

> *"Effective teaching is not about replacing human interaction with technology but about using innovation wisely to improve student learning."*

Participants repeatedly returned to the idea that AI should enhance teaching rather than replace teachers. Human interaction remained important in helping students understand concepts, develop critical thinking, and engage meaningfully in learning. Summarizing how this perspective shaped his understanding of the teaching profession, Participant 3 shared:

> *"Being a mathematics teacher is not simply about delivering content, but about guiding students and creating meaningful learning experiences."*

Overall, the findings suggest that participants viewed AI as a valuable instructional support, yet they continued to place strong importance on the relational and human dimensions of teaching. For them, effective mathematics instruction involved balancing technological innovation with empathy, guidance, and purposeful learning experiences.

3.4.5 Overarching Narrative: Becoming Mathematics Teachers in the Age of Artificial Intelligence

The narratives collectively illustrate that becoming a mathematics teacher in the age of artificial intelligence is not simply a process of learning how to use technology. Rather, it is a journey of adjustment, reflection, and professional growth in which pre-

service teachers gradually negotiate their roles, beliefs, and responsibilities within increasingly technology-rich learning environments. Participants' stories showed that their encounters with AI began with uncertainty, hesitation, and even resistance, particularly as they struggled to balance technological use with the development of essential teaching skills. However, through practice teaching, mentorship, classroom experiences, and continued exposure, these uncertainties gradually evolved into more reflective and purposeful forms of engagement.

Across the narratives, AI emerged as more than a technological tool. It became an instructional resource that supported lesson preparation, strengthened conceptual understanding, improved confidence in explaining mathematical concepts, and influenced how participants imagined themselves as future educators. At the same time, participants remained aware of its limitations. Concerns regarding overdependence, reduced critical thinking, inaccurate responses, and excessive reliance on AI repeatedly surfaced across the stories, highlighting that participants did not accept technology uncritically but instead learned to use it with greater awareness and responsibility. The narratives further revealed an important shift in professional identity. Participants increasingly moved away from seeing teaching solely as the delivery of mathematical content and began understanding their role as one that involves facilitation, guidance, and the responsible integration of technology. They positioned themselves not only as future teachers of mathematics but also as mentors who help learners think critically, engage meaningfully, and use AI responsibly.

Taken together, the narratives suggest that preparing mathematics teachers for AI-enabled classrooms extends beyond technological competence. It also requires reflective practice, ethical judgment, pedagogical adaptability, and a continued commitment to human-centered teaching. While AI may reshape instructional practices, the participants' stories consistently affirm that meaningful mathematics education remains grounded in human interaction, thoughtful guidance, and purposeful learning experiences.

4. Discussion

This study explored how pre-service mathematics teachers narrate their experiences of becoming future mathematics educators in AI-enabled learning environments and how these experiences shape their professional identity, instructional readiness, pedagogical practices, and understanding of teaching. The findings revealed that participants viewed artificial intelligence as both an instructional support and a source of pedagogical tension. While AI contributed positively to lesson preparation, conceptual understanding, instructional confidence, and classroom readiness, participants simultaneously recognized concerns regarding technological dependence, reduced critical thinking, and the need for responsible use. These findings suggest that becoming a mathematics teacher in the age of artificial intelligence extends beyond technological competence and instead involves reflective adaptation,

identity reconstruction, and ethical engagement with emerging technologies. The findings therefore support the theoretical assumptions of Professional Identity Theory (Beijaard et al., 2004), the TPACK framework (Mishra & Koehler, 2006), and Diffusion of Innovations Theory (Rogers, 2003), indicating that teacher preparation in AI-enabled environments is shaped through continuous interaction among pedagogy, technology, experience, and professional meaning-making.

The findings support previous literature emphasizing the instructional potential of artificial intelligence in educational settings. Participants described AI as useful in explaining mathematical concepts, generating lesson activities, organizing instruction, and improving confidence during teaching preparation. These findings agree with studies showing that AI technologies may strengthen instructional planning, support adaptive learning, and improve access to educational resources (Karaman & Göksu, 2024; Lo, 2023; Sămărescu et al., 2024; van den Berg & du Plessis, 2023).

Similarly, Luckin et al. (2022) argued that AI has substantial potential to enhance teaching practices and support educators' professional development through AI readiness and responsible technology integration.

However, the present study extends these findings by showing that AI integration among pre-service mathematics teachers was not limited to technical efficiency. Instead, participants' narratives revealed that AI became part of their reflective preparation process, influencing how they understood mathematics, planned instruction, and envisioned their future roles as educators.

At the same time, the study revealed important tensions surrounding AI integration. Participants repeatedly emphasized the need to verify AI-generated responses and expressed concerns regarding overdependence and the possible decline of critical thinking. These findings support the observations of Frieder et al. (2023), who noted that AI-generated mathematical outputs may occasionally contain inaccuracies and therefore require validation. Likewise, Trust et al. (2023) emphasized that meaningful AI integration requires reflective judgment and ethical responsibility rather than passive acceptance. The findings also align with Celik et al. (2022), who argued that technological tools become problematic when convenience overshadows pedagogical reasoning. Nevertheless, the present study slightly extends these concerns by demonstrating that participants themselves recognized these limitations and actively developed strategies such as verification, modification, and contextualization of AI outputs. Rather than becoming passive users, participants increasingly acted as critical evaluators of technological information.

The narratives further demonstrated that AI integration contributed to participants' professional identity formation. Initially, participants described uncertainty regarding their teaching competence and the role of AI in mathematics instruction. However, classroom exposure, practice teaching, mentorship, and reflective experiences gradually reshaped these perceptions. Participants increasingly viewed themselves not only as transmitters of mathematical knowledge but also as facilitators, ethical guides, and mediators of technology-supported learning. This finding strongly supports Professional Identity Theory proposed by Beijaard et al.

(2004), which explains that teacher identity develops through experience, reflection, and negotiation of professional roles. Previous research has consistently shown that instructional experiences and reflective practice play a significant role in shaping teacher identity by fostering professional knowledge, self-awareness, and pedagogical decision-making (Beauchamp & Thomas, 2009; Izadinia, 2013; Rushton et al., 2023).

Participants also consistently emphasized the importance of maintaining human-centered teaching despite increasing technological integration. Although AI was perceived positively, participants repeatedly argued that meaningful mathematics teaching remains dependent on interaction, explanation, guidance, empathy, and responsiveness to learners' needs. These findings strongly reflect the assumptions of the TPACK framework of Mishra and Koehler (2006), which emphasizes that technology gains value only when integrated with pedagogical and content knowledge. The findings further agree with Lo (2023) and Luckin et al. (2022), who argued that AI should augment rather than replace teachers. In contrast to overly technology-centered narratives found in some AI literature, the present study highlights that participants continued to prioritize relational and human dimensions of teaching. Thus, the findings challenge deterministic perspectives suggesting that technological advancement diminishes the teacher's role. Instead, AI appeared to increase the importance of pedagogical judgment and human mediation.

The gradual acceptance of AI observed across the participants' narratives further supports Rogers' (2003) Diffusion of Innovations Theory. Rather than embracing AI immediately, participants initially experienced hesitation, resistance, and uncertainty. Acceptance developed gradually through repeated exposure, collaboration, mentorship, and practical engagement. Similarly, Baggia et al. (2026) reported that greater familiarity with generative AI, together with continued opportunities for use and professional learning, is associated with more positive attitudes and greater AI integration in teaching. Extending this perspective, the present study demonstrates that adaptation among pre-service mathematics teachers was not merely technological but also deeply reflective and socially constructed. Beyond developing technical competence, participants continually negotiated their beliefs, instructional decisions, and professional identities, suggesting that meaningful AI integration involves both increasing familiarity and the ongoing reconstruction of pedagogical practice.

The findings have important implications for mathematics teacher education. The study suggests that teacher preparation programs should move beyond technical training in AI tools and instead emphasize reflective AI integration, ethical awareness, critical evaluation of generated outputs, and pedagogically meaningful applications. Since participants developed readiness through mentorship, practice teaching, peer interaction, and reflective experiences, institutions may need to strengthen opportunities for guided experimentation and AI-supported instructional practice. Furthermore, the findings indicate the need to integrate AI literacy within mathematics teacher education curricula while ensuring that technological competence develops alongside pedagogical sensitivity and professional identity formation.

Despite these contributions, the study has several limitations. First, the research involved only three pre-service mathematics teachers, which aligns with narrative inquiry but limits broader transferability of findings. Second, the study was conducted within a single institutional context, potentially restricting the diversity of experiences represented. Third, the findings relied on self-reported narratives and reflective accounts, which may be influenced by participants' interpretations and experiences at a particular stage of teacher preparation.

Future studies may expand the investigation by including participants from multiple institutions, educational levels, and geographical contexts. Comparative studies involving practicing mathematics teachers and pre-service teachers may also provide a deeper understanding of AI integration across professional stages. Further research may additionally examine how professional identity evolves longitudinally as mathematics teachers continue engaging with AI technologies in actual classroom settings.

The findings suggest that AI integration in mathematics teacher education should be approached not only as technological preparation but also as a process involving reflection, ethical awareness, pedagogical adaptation, and professional development. The experiences of the participants indicate that readiness for AI-enabled classrooms develops through guided practice, mentorship, reflective engagement, and meaningful exposure to technology. These findings provide implications for teacher education institutions in designing programs that support both technological competence and human-centered teaching.

5. Conclusion

This study explored how pre-service mathematics teachers experienced becoming future mathematics educators in AI-enabled learning environments. The findings showed that artificial intelligence influenced their instructional readiness, professional identity, pedagogical practices, and understanding of teaching. The objectives of the study were achieved as participants' narratives demonstrated that AI integration extended beyond technical use and involved processes of reflection, adaptation, and professional transformation.

The findings revealed that AI functioned both as an instructional support and a pedagogical challenge. While participants valued AI for lesson preparation, conceptual understanding, and instructional confidence, they also recognized issues related to overdependence, accuracy, and responsible use. These experiences highlighted the importance of critical evaluation and ethical engagement when integrating AI into mathematics teaching.

The study further showed that participants gradually reconstructed their understanding of teaching by moving from content delivery toward facilitation, guidance, and responsible technology use. Despite increasing technological integration, they continued to emphasize the importance of human interaction and meaningful learning experiences.

The study contributes to mathematics teacher education by highlighting the need to strengthen reflective AI integration, AI literacy, ethical awareness, and human-centered pedagogy within teacher preparation programs. Future studies may involve broader contexts and longitudinal investigations to further understand identity development and AI integration among mathematics teachers.

Overall, becoming a mathematics teacher in the age of artificial intelligence is not merely about learning new technologies; it is about preparing reflective educators who can integrate innovation while preserving the human dimensions of teaching and learning.

Acknowledgment

The researchers express their sincere gratitude to the pre-service mathematics teachers for sharing their insights on AI-enabled learning. Special thanks to Dr. Porferia Poralan for her guidance on this study, to the instrument validators for their expert review, and to all who supported this study.

Conflict of Interest Statement

The authors declare that there are no financial or non-financial conflicts of interest related to the conduct, analysis, interpretation, and publication of this study.

References

Alanazi, M. H. (2019). A study of the pre-service trainee teachers' problems in designing lesson plans. *Arab World English Journal, 10*(1), 166–182. https://doi.org/10.24093/awej/vol10no1.15

Artzt, A. F. (1999). A structure to enable preservice teachers of mathematics to reflect on their teaching. *Journal of Mathematics Teacher Education, 2*(2), 143–166. https://doi.org/10.1023/A:1009999004407

Backfisch, I., Sibley, L., Lachner, A., Kirchner, K. T., Hische, C., & Scheiter, K. (2024). Enhancing pre-service teachers' technological pedagogical content knowledge (TPACK): Utility-value interventions support knowledge integration. *Teaching and Teacher Education, 142*, Article 104532. https://doi.org/10.1016/j.tate.2024.104532

Baggia, A., Tratnik, A., & Brezavšček, A. (2026). University teachers' perceptions, attitudes, and practices with generative AI: A systematic literature review with a meta-analytic component. *Quality & Quantity*. Advance online publication. https://doi.org/10.1007/s11135-026-02717-x

Beauchamp, C., & Thomas, L. (2009). Understanding teacher identity: An overview of issues in the literature and implications for teacher education. *Cambridge Journal of Education, 39*(2), 175–189. https://doi.org/10.1080/03057640902902252

Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education, 20*(2), 107–128. https://doi.org/10.1016/j.tate.2003.07.001

Calamlam, J. M. M. (2026). Artificial intelligence functions in mathematics lesson planning: Perceived usefulness and limitations among Filipino preservice teachers. *Asian Journal for Mathematics Education, 5*(2), 229–248. https://doi.org/10.1177/27527263261454602

Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The promises and challenges of artificial intelligence for teachers: A systematic review. *Computers and Education: Artificial Intelligence, 3*, 100171. https://link.springer.com/content/pdf/10.1007/s11528-022-00715-y.pdf

Chien, C.-W. (2015). Pre-service English teachers' perceptions and practice of field experience and professional learning from expert teachers' mentoring. *Teachers and Teaching: Theory and Practice, 21*(3), 328–345. https://doi.org/10.1080/13540602.2014.953817

Clandinin, D. J., & Connelly, F. M. (2000). *Narrative inquiry: Experience and story in qualitative research*. Jossey-Bass. https://www.jstor.org/stable/20716027

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE Publications. https://docs.edtechhub.org/lib/XAH8M47G

Frieder, S., Pinchetti, L., Chevalier, A., Griffiths, R.-R., Salvatori, T., Lukasiewicz, T., Petersen, P., & Berner, J. (2023). *Mathematical capabilities of ChatGPT* (arXiv:2301.13867). https://doi.org/10.48550/arXiv.2301.13867

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Sciences, 13*(7), 692. https://doi.org/10.3390/educsci13070692

Ifenthaler, D., Majumdar, R., Gorissen, P., Judge, M., Mishra, S., Raffaghelli, J., & Shimada, A. (2024). Artificial intelligence in education: Implications for policymakers, researchers, and practitioners. *Technology, Knowledge and Learning, 29*(4), 1693–1710. https://doi.org/10.1007/s10758-024-09747-0

Izadinia, M. (2013). A review of research on student teachers' professional identity. *British Educational Research Journal, 39*(4), 694–713. https://doi.org/10.1080/01411926.2012.679614

Karaman, M. R., & Göksu, İ. (2024). Are lesson plans created by ChatGPT more effective? An experimental study. *International Journal of Technology in Education, 7*(1), 107–127. https://doi.org/10.46328/ijte.607

Karataş, F., & Yüce, E. (2024). AI and the future of teaching: Preservice teachers' reflections on the use of artificial intelligence in open and distributed learning. *The International Review of Research in Open and Distributed Learning, 25*(3), 304–325. https://doi.org/10.19173/irrodl.v25i3.7785

Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). Exploring generative artificial intelligence preparedness among university language instructors: A case study. *Computers and Education: Artificial Intelligence, 5*, Article 100156. https://doi.org/10.1016/j.caeai.2023.100156

Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences, 13*(4), Article 410. https://doi.org/10.3390/educsci13040410

Luckin, R., Cukurova, M., Kent, C., & du Boulay, B. (2022). Empowering educators to be AI-ready. *Computers and Education: Artificial Intelligence, 3*, 100076. https://doi.org/10.1016/j.caeai.2022.100076

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press. https://www.researchgate.net/publication/257624104_Diffusion_of_Innovations_5th_edition_Everett_M_Rogers_Free_Press_New_York_NY_2003_551_pages

Rushton, E. A. C., Rawlings Smith, E., Steadman, S., & Towers, E. (2023). Understanding teacher identity in teachers' professional lives: A systematic review of the literature. *Review of Education, 11*(2), Article e3417. https://doi.org/10.1002/rev3.3417

Sămărescu, N., Bumbac, R., Zamfiroiu, A., & Iorgulescu, M.-C. (2024). Artificial intelligence in education: Next-generation teacher perspectives. *Amfiteatru Economic, 26*(65), 145–161. https://doi.org/10.24818/EA/2024/65/145

Trust, T., Whalen, J., & Mouza, C. (2023). Editorial: ChatGPT: Challenges, opportunities, and implications for teacher education. *Contemporary Issues in Technology and Teacher Education, 23*(1), 1–23. https://www.learntechlib.org/primary/p/222408/paper_222408.pdf

van den Berg, G., & du Plessis, E. (2023). ChatGPT and generative AI: Possibilities for its contribution to lesson planning, critical thinking and openness in teacher education. *Education Sciences, 13*(10), Article 998. https://doi.org/10.3390/educsci13100998

Villalon, J. J. (2016). Lesson study: Its influence on planning, instruction, and self-confidence of pre-service mathematics teachers. *US-China Education Review A, 6*(7), 405–414. https://doi.org/10.17265/2161-6248/2016.07.003

Yacap, M. J. (2022). Lesson preparation practices of pre-service high school science teachers: Implications to science education. *International Journal of Multidisciplinary: Applied Business and Education Research, 3*(8), 1548–1555. https://doi.org/10.11594/ijmaber.03.08.16

Yan, L., Greiff, S., Teuber, Z., & Gašević, D. (2024). Promises and challenges of generative artificial intelligence for human learning. *Nature Human Behaviour, 8*, 1839–1850. https://doi.org/10.1038/s41562-024-02004-5

Author Contributions: Rubin, D.G.; Methodology, validation, investigation, formal analysis, and manuscript review and editing. Amion, E.J.; Conceptualization, methodology, investigation, data curation, formal analysis, and manuscript drafting. Lemana, H., II; Supervision, conceptualization, methodology, formal analysis,

manuscript review and editing, academic mentorship, and project administration. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.