Journal of Research in Science, Mathematics and Technology Education

https://jrsmte.com/

Identity in Transition: How Teachers Learn, Adapt, and Evolve with AI

Valerie Bennett

Clark Atlanta University, USA

Christine Anne Royce

Shippensburg University of Pennsylvania, USA

Abstract: With the surge in the use of Artificial Intelligence (AI) in recent years, educators have been introduced to new tools that may influence and change the future of education as it is known. How educators adapt to and evolve with AI depends on how they view AI in relation to who they are and how they teach. This article defines identity in education, from academic identity to specific disciplinary identities like STEM identity for educators, which involves an integrated understanding of science, technology, engineering, and mathematics. It introduces the critical concept of AI Identity, defined as a professional self-concept encompassing comfort, competence, and agency in leveraging AI for teaching. Developing an AI Identity is a four-step iterative process: Understanding, Exploration, Implementation, and Reflection and Criticality. Key competencies for an AI-identified educator include theoretical knowledge (episteme), practical skills (techne), and crucial professional judgment (phronesis). The article emphasizes the urgent need for teacher education programs to integrate AI competencies across curricula, preparing future educators to use AI, ensuring they are AI-ready and can model critical engagement with students responsibly and effectively.

Keywords: Academic Identity, AI Identity, AI Literacy, AI Usage, Identity, Teacher Preparation

DOI: https://doi.org/10.31756/jrsmte.914

Introduction

Defining Identity in Educational Contexts

Identity is fundamentally understood as the embodiment of self-understanding. In educational contexts, identity formation has become a critical focus, particularly in the 21st century, where the complexity of schooling, diversity of student populations, and global demands on education necessitate a deeper understanding of how students and teachers develop a sense of self (Kaplan & Flum, 2012; Kim et al., 2018). Within these contexts, academic identity refers to a person's self-understanding related to feelings of school belonging and commitment to the practices and expectations of an academic community. This identity strongly influences motivation, engagement, and long-term choices (Hachey, 2020).

Theoretical Foundations of Identity. Identity theory and related frameworks suggest that identities gain meaning through personal and social interpretation of one's roles based on one's experiences (Grimalt-Álvaro et al., 2022; Huvard et al., 2020). Educators, for instance, have multiple dynamic identities shaped by their teaching level, subject, and other internal and external factors (Beauchamp & Thomas, 2009). Individuals may simultaneously hold multiple identities, such as those of learners, family members, athletes, or professionals (Weinberg et al., 2021), which interact with institutional, cultural, and interpersonal contexts to shape self-expression. For educators, identity evolves through classroom practice, reflection, purpose, relationships with students, and pedagogy (Beauchamp & Thomas, 2009), and the use of instructional tools and materials.

The process of identity formation is inherently social. Theories, such as Wenger's (1998) communities of practice (CoP), emphasize the role of participation in meaningful activities. Within these communities, identity is not only a product of individual choice but also of social positioning, recognition, and negotiation (Wenger, 1998). Shanahan (2009) also points to CoP as a driving and dominant theory in explaining how a science identity is developed.

Processes of Identity Acquisition and Development. Identity is shaped by lived experience and reflection (Hachey, 2020). For students, this includes family influence, peer interaction, educator feedback, and exposure to role models (Hachey, 2020). Adopting social roles and labels, or self-identification, often starts early in life (Hachey, 2020). Educational spaces provide opportunities for identity exploration (Talafian et al., 2019). According to Talafian et al. (2019), identity exploration involves both internal reflection and external validation. Project-based learning, collaborative inquiry, and performance-based assessments allow students to enact roles aligned with future selves (Talafian et al., 2019). A student-focused definition of their identity in science education describes "who we think we must be to engage in science" (Barton, 1998, p. 379). Although this quote refers to a student's science identity, it can intrinsically connect to a teacher's science identity. Since teachers were once students, their experiences as students play a role in shaping their identity both inside and outside of the classroom. Teachers also engage in identity development through professional experiences, mentorship, and reflective practices (Beauchamp & Thomas, 2009). Pedagogical beliefs, institutional expectations, and collaboration within professional learning communities influence this evolution (Beauchamp & Thomas, 2009).

Different Identities

There can be both academic identity and disciplinary identity, such as a teacher's STEM identity. Disciplinary identities refer to an individual's self-understanding and sense of belonging within a specific academic or professional field, such as science, mathematics, or engineering (Hite & Tauber, 2019). This concept is a sub-category of academic identity, which generally involves a person's self-understanding related to their feelings of school-belonging and commitment to an academic community's ways (Hachey, 2020; Hachey et al., 2022). Examples of disciplinary identities that incorporate perceiving oneself as a certain "kind of person" (Gee, 2000, p. 99) include being a scientist, engineer, or mathematician (Hachey, 2020; Hachey et al., 2022).

Key Components/Constructs within Identity

Regardless of the specific discipline, several overlapping constructs contribute to or characterize disciplinary identity, viewed from a motivational perspective (Grimalt-Álvaro et al., 2022):

Interest and Aspirations. A desire or curiosity to engage with the discipline (Dou & Cian, 2021; Grimalt-Álvaro et al., 2022) and hopes or ambitions regarding future studies or careers in the specific field (Grimalt-Álvaro et al., 2022).

Competence. Demonstrating meaningful knowledge and understanding of the disciplinary content, often linked to academic achievement, and believing in one's ability to perform tasks in that field (Godwin & Potvin, 2017; Grimalt-Álvaro et al., 2022; Huvard et al., 2020).

Self-Efficacy. Beliefs in one's ability to successfully perform tasks within the discipline. This is crucial for self-identification and influences the likelihood of choosing related activities (Grimalt-Álvaro et al., 2022).

Recognition. Being seen or accepted as a legitimate member of the disciplinary area by others (e.g., peers, teachers, family). This acts as a feedback loop, reinforcing the individual's self-perception (Grimalt-Álvaro et al., 2022).

Performance. Actively behaving, thinking, and exploring in ways characteristic of professionals in that discipline (Huvard et al., 2020). Identity is formed and shaped through practice, and individuals set performance expectations to maintain self-efficacy and gain acceptance within a community (Huvard et al., 2020).

Contextual and Social Influences. Disciplinary identities are not static but dynamic, flexible, and hybrid, influenced by social and cultural contexts and experience (Rushton et al., 2023; Verhoeven et al., 2018; Zembylas, 2003b). They develop through participation in various settings, such as home, school, and work (Verhoeven et al., 2018). Educational activities, the social environment, and interactions with peers and faculty significantly impact whether these identities are nurtured or hindered (Hachey et al., 2022; Weinberg et al., 2021).

Understanding identity formation in academic contexts lays a critical foundation for exploring how learners and educators see themselves within specific disciplines. Nowhere is this more evident than in STEM education, where identity development shapes engagement, aspirations, and belonging in science, technology, engineering, and mathematics (Hachey et al., 2022). As STEM fields increasingly intersect with emerging technologies, particularly artificial intelligence (AI), a new layer of identity work is required. Just as educators have developed disciplinary identities over time, the rapid integration of AI into classrooms necessitates the cultivation of a distinct AI Identity, a professional self-concept that reflects comfort, competence, and agency in using AI to support teaching and learning. It is from that perspective that the authors discuss the concept of a STEM identity as a precursor to understanding the development of an AI Identity.

Building on this foundational understanding of how identities are formed and expressed in academic and disciplinary contexts, specifically those within STEM, this section will now probe specifically into what "science identity" and "STEM identity" look like for educators, and introduce the emerging concept of an "AI Identity."

Science and STEM Identities for Educators

For educators, a science identity refers to a teacher's sense of self as a "science person" or science educator and how they view themselves and how others perceive them in this role (Zhai et al., 2024). This identity is a complex, multifaceted construct, encompassing a teacher's knowledge, beliefs, values, and commitment to science teaching (Zhai et al., 2024). For example, the Dynamic Systems Model of Role Identity (Kaplan & Garner, 2017) suggests that a teacher's role identity includes their beliefs about science, their purpose and goals as a science teacher, their self-perceptions (confidence, competence) and self-definitions, and their perceived action possibilities (what they feel capable of doing in the classroom) (Kaplan & Garner, 2017). A strong science teacher identity means the educator not only possesses content knowledge and pedagogical skills but also deeply identifies as a science educator, seeing science as an integral part of their professional self (Carlone & Johnson, 2007).

Carlone and Johnson's (2007) framework similarly emphasizes that a science identity involves demonstrating competence in science, performing scientific practices (e.g., inquiry, experimentation) in one's teaching, and gaining self- and external recognition as a "science person." In essence, science teacher identity is the combination of a teacher's self-concept, attitudes, and meanings associated with being a science teacher (Kaplan & Garner, 2017; Zhai et al., 2024). This identity is not static; it develops over time, continuously shaped by personal history, social interactions, and the culture of science education (Zhai et al., 2024). El Nagdi et al. (2018) further note that teacher identity, including a science identity, is a teacher's sense of self in the teaching role, spanning personal, professional, cultural, and political dimensions.

Consistent with this view is the work of Zembylas (2003a, 2003b), who extends this sense of self in the teaching role by discussing the significance of emotion in the formulation of identity. Teachers' emotions are central to shaping and continually reshaping their identities. Zembylas (2003a) explains that emotions are socially constructed through institutional expectations, cultural norms, and power relations, meaning that feelings such as care, pride, or vulnerability become key drivers teachers use to interpret who they are and who they are becoming as professionals. Because teaching involves deep personal investment, these emotions shift as school discourses shift, making teacher identity a dynamic and ongoing process (Zembylas, 2003a). Building on this idea, Zembylas (2003b) shows that emotions also function as mechanisms of both regulation and resistance within school settings. While emotional expressions are shaped and constrained by institutional "emotional rules," teachers can use their emotional experiences, such as frustration or shame, to question and challenge dominant expectations of what a teacher should be and how they should act. In this way, emotions actively produce and transform teacher identity, highlighting how emotional life is intertwined with broader power dynamics in schools (Zembylas, 2003b).

A STEM identity for teachers is a broader construct extending beyond a single discipline to encompass science, technology, engineering, and mathematics as an integrated whole (El Nagdi et al., 2018). A STEM teacher identity describes who an individual is as an educator in relation to the STEM fields, including their views, understandings, and commitments toward teaching in an interdisciplinary STEM manner (El Nagdi et al., 2018). This identity is about being an integrated STEM educator, rather than a science or math teacher in isolation (El Nagdi et al., 2018). Teachers with a STEM identity see themselves as facilitators of learning across multiple STEM disciplines, emphasizing the connections among these fields (El Nagdi et al., 2018).

Crucially, a STEM teacher identity involves embracing a transdisciplinary mindset, seeing STEM as more than the sum of its parts, and adopting the roles of collaborator, designer, and innovator in the classroom (El Nagdi et al., 2018). Galanti and Holincheck (2022) define integrated STEM teacher identity as requiring “a strong sense of who [teachers] are and whom they want to become as STEM teachers” (p. 1), involving the intertwining of their professional teacher identity with their identity as STEM learners/practitioners. Practically, this means a STEM-identified teacher values real-world problem-solving, interdisciplinary projects, and collaborative learning as core to their role (Galanti & Holincheck, 2022). They view STEM teaching as facilitating students’ use of multiple disciplines to address authentic problems, rather than teaching science or math in silos (El Nagdi et al., 2018).

Teachers in a case study by Holincheck and Galanti (2025) developed their STEM identities through authentic practice, inquiry-based professional learning, and leadership roles that enabled them to enact and refine their beliefs about STEM and equity. Their identity growth emerged from designing and teaching meaningful STEM problem-solving experiences, engaging in graduate coursework that deepened their content knowledge and equity-oriented perspectives, and reflecting on how their instructional choices affected students (Holincheck & Galanti, 2025). They also strengthened their STEM identities by collaborating with peers, coaching other teachers, facilitating professional development, and positioning themselves as advocates for expanding access to STEM, especially for multilingual learners, students with disabilities, and students from underrepresented backgrounds. These practices activated multiple dimensions of STEM teacher identity, such as self-efficacy, task perception, recognition, and teaching interest, ultimately allowing teachers to see themselves not only as STEM instructors but as equity-oriented STEM leaders within their schools and communities (Holincheck & Galanti, 2025).

Ultimately, an educator’s professional persona, whether as a content expert, lab expert, or tech guru, is a reflection of how they see themselves, significantly influencing how students receive or perceive the science and knowledge shared during interactions (Norman-McKay, 2023). This persona includes a belief in one’s competence and performance in STEM disciplines, as well as the recognition of these abilities by oneself and others (Norman-McKay, 2023). Advocate and change agent are also professional personas that provide educators with ways to express their identities, as described in the work by Holincheck & Galanti (2025).

Examining the Use of AI by Educators

As we consider the development of a separate identity related to AI use, it is important to examine who is using AI and the rapidly changing statistics. With the surge in AI-related discussions and the ongoing debate about where and how AI should be used in educational settings, two important questions emerge: Who is using AI, and for what purposes? This precedes the deeper inquiry into whether AI use is actually improving instructional methodologies or the learning process.

Generative AI tools such as ChatGPT entered the educational landscape in November 2022. For reference, a RAND Report (Dilberti et al., 2024) was conducted in the fall of 2023—about one year after chatbots began appearing—while the Walton Family Foundation and Gallup Poll (2025) surveyed teachers in the spring of 2025, nearly two and a half years later, or approximately eighteen months after the RAND Report. These two surveys offer baseline data and information regarding the use of AI by educators.

In 2024, RAND, as part of the American School District Panel Report, published findings related to the use of AI tools in K–12 classrooms. The study conducted roughly a year after the release of generative AI tools such as ChatGPT found that "approximately 18% of K–12 teachers reported using AI for teaching and another 15% have tried AI at least once" (Dilberti et al., 2024, p. 1). At that time, 66% of teachers were considered non-AI users. A year and a half later, these numbers reversed, with 60% of educators reporting the use of AI (Walton Family Foundation and Gallup Poll, 2025). Furthermore, educators who used AI reportedly saved 5.9 hours per week (Walton Family Foundation and Gallup Poll, 2025).

When examining who is using AI and at what instructional levels, Dilberti et al. (2024) found that middle and high school humanities teachers (i.e., English language arts and social studies) were more likely to use AI tools. While this group reported a 27% usage rate, it still represented a relatively small portion and was only slightly ahead of those in STEM fields (19%) and elementary education (11%). By 2025, English language arts teachers continued to lead, with 71% indicating AI use. Other subject areas, however, showed significant increases, with science teachers reporting 66% use, mathematics teachers 59%, and elementary educators 55% (Walton Family Foundation and Gallup, 2025).

AI tools were most often integrated into the learning process through two categories of digital tools already familiar to educators such as virtual learning platforms (e.g., Google Classroom) and adaptive learning systems (e.g., IXL or Khan Academy), as well as one emergent category: chatbots such as ChatGPT or, at that time, Google Bard (Dilberti et al., 2024). The most frequently cited reasons for using AI included adapting instructional content, generating instructional materials, and personalizing content for students (Dilberti et al., 2024). By 2025, educators who used AI tools also indicated they were "optimistic about the impacts of AI on student outcomes" (Walton Family Foundation and Gallup, 2025, p. 3).

Dilberti et al. (2024) further noted that teachers were more likely to use AI tools when those tools were provided to them or recommended. In the RAND study, nearly three-quarters (73%) of educators anticipated that AI use would increase in the future. This expectation was echoed in the Walton Family Foundation and Gallup Poll (2025), where 40% of teachers somewhat or strongly favored the use of AI tools in K–12 classrooms.

Addressing the question of why some teachers use AI more than others, Dilberti et al. (2024) suggest that those who generate more of their own instructional content may be more inclined to use AI tools. This finding points to an additional avenue for research as conversations around developing an individual AI Identity continue to expand.

The Importance of Identity Construction

Developing into an AI Identity

Just as a strong disciplinary identity in science or STEM is crucial for educators' sense of purpose and pedagogical approach (Kaplan & Garner, 2017; Zhai et al., 2024), the rapid integration of AI into classrooms necessitates a new professional self-concept, an AI Identity, that reflects comfort, competence, and agency in leveraging AI for teaching and learning.

Understanding the process by which Science and STEM identities are developed lays the groundwork for defining AI Identity as "one's level of understanding, exploration (i.e., interaction), implementation, and reflection and criticality of AI tools" (Bennett & Royce, 2025, para 4). This definition extends Norman-McKay's (2023) work where a "STEM identity is a form of social identity and is usually studied and discussed as having two key facets. typicality: Believing that who you are as a person is compatible with being a STEM professional. [and] centrality: Feeling that the members of the STEM disciplines accept you" (para 4). If a science teacher's identity is the combination of a teacher's self-concept and attitudes (Kaplan & Garner, 2017; Zhai et al., 2024), and a STEM teacher's identity takes identity one step further by embracing a transdisciplinary mindset (El Nagdi et al., 2018), then the definition of an AI Identity incorporates these and other facets that have need to be defined.

It is important to state clearly that having a Science and/or STEM Identity is *not* a prerequisite for developing an AI Identity; practitioners across all content areas and walks of life can develop one. What connects all individuals across disciplines is the emergence and increasing pervasiveness of AI tools as well as the fact that AI has become a "transformative force and will increase as the future unfolds" (Royce, 2025, p. 2).

Developmental Steps

The development of an AI Identity involves four key steps, beginning with Understanding. In this process, AI literacy and understanding go hand in hand. This involves grasping fundamental AI concepts such as machine learning and deep learning, and becoming familiar with relevant tools, including educational AI platforms, AI-powered lab platforms, and data analysis tools (Royce, 2025). Developing foundational knowledge requires asking questions such as:

- What is AI and how does it work?
- Do I understand the basic concepts behind AI?
- Why do I want or need to use AI?

- How do I use AI?

From Understanding, the next step is Exploration. During exploration, individuals determine the purpose of AI usage and which AI tools will best meet that purpose. This is supported through investigating the different tools and their own experiences with using these tools which supports Zembylas' (2003b) views that experience and emotion are connected. These tools can be categorized into buckets such as the following:

- Lesson Preparation
- Data Analysis and Visualization
- Differentiated Instruction
- Scientific Inquiry and Experimentation

Exploring various AI tools designed or marketed for different tasks is necessary. As with other digital tools, it's essential to explore them and use them in ways that foster a deep understanding and appreciation of what each can accomplish (Royce & German, 2019).

The subsequent step is the Implementation/Application component of developing an AI Identity. Beyond merely exploring, this step signifies the adoption and utilization of an AI tool. Working directly with the AI tool in this stage further molds the AI Identity, as the experience gained solidifies or changes initial perceptions of AI.

Finally, Reflection and Criticality require a necessary 'stepping back' to objectively view the impact and effectiveness of the AI tool, while being mindful of any inherent biases. Just as being a teacher is a reflective process, so too is the process of creating or even reinventing an AI Identity, given that tools are constantly changing and AI is a dynamic area. The key stages for interacting with and developing the basic skills for an AI Identity are illustrated in Figure 1 which represents this iterative cycle for considering the different stages.

While iterative in nature and in practice, the identification and progress through the key stages is not simply a cyclical process. It has metacognitive components that help develop a deeper understanding of this iterative cycle. For example, when exploring different tools, there is a need to stop and ask questions regarding 'how does this tool work' or 'where was the data sourced from for this tool' which returns the user to a need to build their own understanding. Another example of the need to consider what is being learned is the implementation or application of the tools explored. At some point, it is likely that additional tools that do similar tasks may be developed which returns the user to the stage of exploration. This interactive and retrograde movement to earlier stages is illustrated in Figure 2.

Figure 1

Key Stages for Interacting with and Developing Basic AI Skills

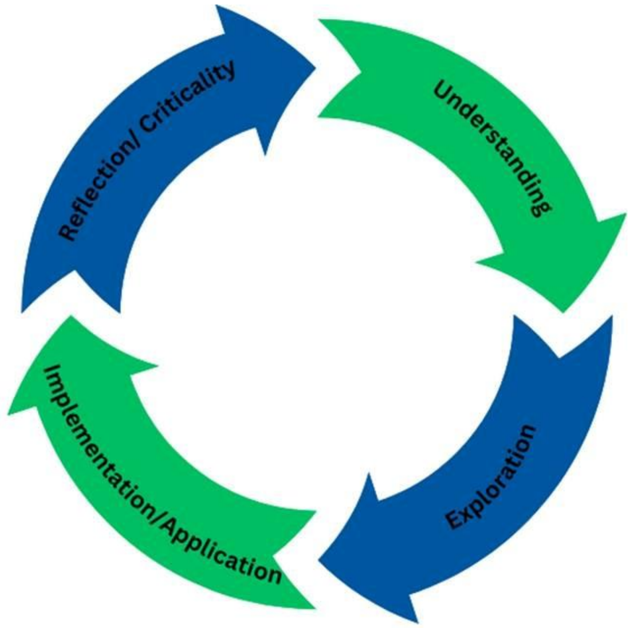
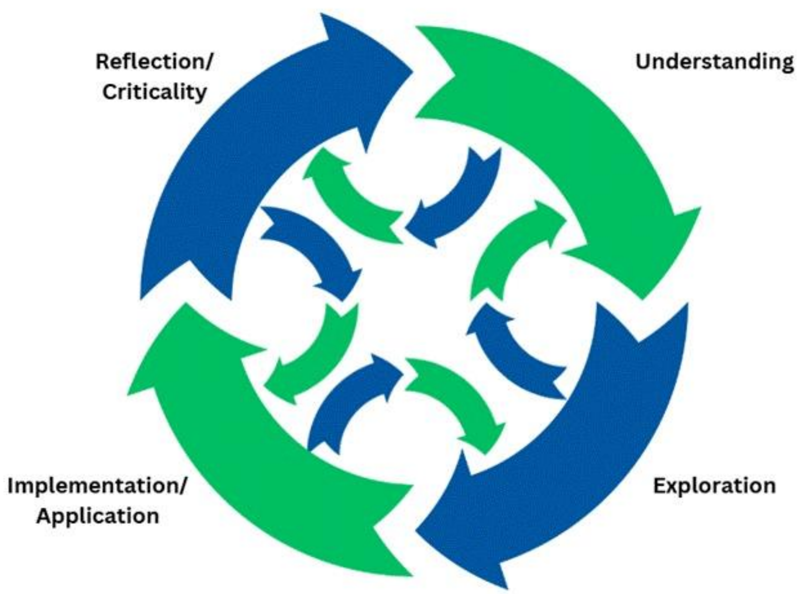


Figure 2

Interaction Between Key Stages for Interacting with and Developing Basic AI Skills



Having established the definition and recognizing that it is an interactive and iterative cyclical four-step process within the model for developing an AI Identity, it is essential to elaborate on what exactly constitutes this AI Identity for educators, focusing on the core characteristics and competencies required. It underscores that the development and transition to an AI Identity require a broader, yet nuanced, understanding of AI beyond a mere tool, acknowledging its profound societal implications in areas such as human rights and employment (Tadimalla & Maher, 2024). The next part expands upon the stages introduced (Bennett & Royce, 2025) by detailing the theoretical knowledge, practical skills, and professional judgment that are incorporated within each stage of AI Identity development (Dilek et al., 2025; Sperling et al., 2024). This part provides a comprehensive picture of the traits and abilities an educator with a strong AI Identity might possess, moving from the conceptual framework to its practical manifestation in the classroom.

Developing an AI Identity: From Theory to Practice

This shift involves continuously adapting, learning, and rebalancing pedagogical practices (Dilek et al., 2025; MacDowell et al., 2024), moving beyond simply restricting AI use to reframing its effective utilization (Bennett & Royce, 2025; Dilek et al., 2025; Royce, 2025). While educators are increasingly aware and generally positive towards generative AI (GenAI) tools (Faverio & Tyson, 2023; Ghimire et al., 2024; Walton Family Foundation and Gallup, 2025) there is a recognized gap where student use often outpaces instructor adoption, highlighting the urgent need for teachers to develop their AI literacy (MacDowell et al., 2024; Ng et al., 2021). AI literacy, the cornerstone of an AI Identity, empowers individuals to understand AI's role, evaluate its pros and cons, and use it productively (Hollands & Breazeal, 2024; Ng et al., 2021; Royce, 2025). Ultimately, developing an AI Identity empowers educators with a sense of agency, allowing them to be innovators and guardians in shaping AI's responsible integration into education (Dilek et al., 2025; Ghimire et al., 2024; MacDowell et al., 2024). This also fosters professional competence and a lifelong learning mindset, essential for navigating an evolving educational landscape (Royce, 2025).

Developing an AI Identity: Core Characteristics and Competencies

An identity for a STEM teacher involves a multi-faceted development process, encompassing theoretical knowledge, practical skills, and professional judgment, as previously discussed. The STEM Identity can readily be framed by Aristotle's concepts of *episteme*, *techne*, and *phronesis* (Sperling et al., 2024). The same processes apply as one considers their AI Identity.

Theoretical-Scientific Knowledge (Episteme). This dimension of AI literacy involves understanding fundamental AI concepts, principles, and capabilities (Sperling et al., 2024). For a teacher, this means grasping what AI is, how it works, distinguishing between general and narrow AI usage and understanding the basics of natural language processing and generative AI models (Sperling et al., 2024). It also extends to understanding how AI perceives the world using sensors and maintains representations for reasoning (Hollands & Breazeal, 2024; Ng et al., 2021). A broader consensus is needed on what constitutes theoretical AI literacy for teachers and teacher educators (Sperling et al., 2024).

Practical-Productive Knowledge (Techne). This aspect focuses on acquiring the practical skills to effectively use and apply AI tools in diverse contexts (Sperling et al., 2024). Teachers who have embraced the use of AI have noted that it frees up nearly six hours a week of time allowing them to reinvest the time elsewhere (Dilberti et al., 2024). This includes leveraging AI to automate mundane administrative tasks such as grading, scheduling, and communication, thus freeing up time for more meaningful student interaction (Al-Zahrani, 2024; Dilek et al., 2025; MacDowell et al., 2024; Royce, 2025). It also involves using AI to personalize learning experiences, adapt instruction, and provide immediate, detailed feedback (Dilek et al., 2025; MacDowell et al., 2024; Royce, 2025). Developing prompt engineering skills is crucial for effectively communicating with and fine-tuning AI chatbots to maximize their potential as teaching aids (Zhang et al., 2025). An AI-literate teacher can also use AI for innovative teaching strategies, such as designing lesson plans, creating engaging activities, generating questions for assessments, and producing multimedia content (Bennett & Royce, 2025; MacDowell et al., 2024). Experiential learning is key to developing this practical knowledge (Dilberti et al., 2024; Dilek et al., 2025; MacDowell et al., 2024) and immersing oneself in the use will help build skills (Royce, 2024).

Professional Judgment (Phronesis). This involves the ethical, critical, and responsible application of AI, guided by sound judgment (Sperling et al., 2024). This is perhaps the most critical aspect for a teacher developing their own AI Identity (Sperling et al., 2024). It requires cultivating a critical mindset to discern authenticity, identify biases (including cultural and gender biases) (Al-Zahrani, 2024), and recognize misinformation or "deepfakes" generated by AI (Bennett & Royce, 2025; Dilek et al., 2025; MacDowell et al., 2024). Teachers must understand the potential for AI to negatively impact essential 21st-century skills like problem-solving, critical thinking, creativity, and communication if over-relied upon (Al-Zahrani, 2024; Zhang et al., 2025). They must also navigate ethical concerns related to data privacy and security, intellectual property rights, and the potential for job displacement (Al-Zahrani, 2024; Dilberti et al., 2024; MacDowell et al., 2024; Sperling et al., 2024; Tadimalla & Maher, 2024). This dimension underscores the need for teachers to be guardians of responsible AI integration, ensuring it aligns with human values and promotes equity and social good (Dilek et al., 2025; MacDowell et al., 2024). However, research often conceptualizes ethics primarily through the technical configurations of data-driven AI technologies, rather than as an adaptable moral way of thinking and acting (Sperling et al., 2024). Dilberti et al. (2024) notes that AI users were more likely than non-users to identify concerns about potential bias as a potential barrier to future use. Teacher skepticism stemming from practical concerns like internet access and computer lab availability, rather than a lack of understanding, can also act as a barrier to AI adoption (Dilek et al., 2025; German et al., 2022).

Zembylas' (2003a, 2003b) insights into the importance of emotion to identity formation of teachers are aligned most closely with phronesis, or practical wisdom. Aristotle viewed phronesis as ethical, situated judgment developed through experience. Teachers' emotional experiences, as Zembylas (2003a, 2003b) shows, are not irrational impediments but essential sources of practical wisdom: they help teachers assess context, recognize tensions between institutional norms and personal values, and make ethically grounded decisions. Emotions, therefore, become indispensable to the phronetic dimension of teaching because they guide wise action by revealing what matters, for whom, and why in the complex moral terrain of classroom life.

What a teacher chooses to do, or their actions, align most closely with phronesis as the actions require grounding in ethical judgment. Phronesis emphasizes knowing *what is the right thing to do* in a specific context and acting on it for the good of others. However, decisions are not merely technical (techne) or theoretical (episteme). Zembylas (2023a, 2023b) points out that phronesis captures how teachers blend expertise, values, and real-time decision-making in their pursuit of more equitable STEM outcomes and by extension AI outcomes. Ultimately, when the three areas of competency are considered, the informed and purposeful use of AI can occur. Figure 3 illustrates the overlap of these competencies and what occurs at the intersection of only two being activated at any given time.

Figure 3

Overlap of Competency Areas

Characteristics Prevalent in Those with an AI Identity:

In order to develop competency within the use of AI, there are additional areas that one must develop in addition to the previously mentioned competencies within an identity. Based on existing literature, the authors bring together a list of competencies that outline what individuals who have successfully developed an AI Identity would exhibit the following characteristics:

AI-Literate and Informed. Users possess a comprehensive understanding of AI's technical and conceptual underpinnings, extending beyond superficial usage (Hollands & Breazeal, 2024; Ng et al., 2021; Sperling et al., 2024).

Productive and Strategic. Users are adept at effectively integrating AI tools into their professional practice to enhance productivity, augment instructional capabilities, and streamline tasks (Al-Zahrani, 2024; Dilek et al., 2025; MacDowell et al., 2024; Royce, 2025). They can customize AI for personalized learning and design innovative, interactive experiences (Bennett & Royce, 2025).

Critical and Discerning. Users consistently apply a critical mindset to AI-generated content, evaluating its accuracy, identifying biases, and discerning between authentic and manipulated information (Al-Zahrani, 2024; Dilek et al., 2025; MacDowell et al., 2024). They understand AI's limitations and are wary of over-reliance (Al-Zahrani, 2024; Zhang et al., 2025).

Ethically Grounded and Socially Responsible. Users are deeply aware of the ethical implications of AI, including privacy, security, fairness, and algorithmic bias (Al-Zahrani, 2024; Dilek et al., 2025; MacDowell et al., 2024; Sperling et al., 2024; Tadimalla & Maher, 2024). They advocate for AI's responsible development and deployment, prioritizing human-centered design and societal well-being (Dilek et al., 2025; MacDowell et al., 2024).

Adaptable and Lifelong Learner. Users embrace continuous learning and professional development to keep pace with the rapid advancements in AI technology (MacDowell et al., 2024; Sperling et al., 2024). They view the evolving landscape as an opportunity for growth rather than a source of fear (MacDowell et al., 2024).

Agentic and Innovative. Users possess a sense of agency to shape AI's integration into education and actively contribute to its effective and ethical development (Dilek et al., 2025; MacDowell et al., 2024). They are innovators, proactively exploring new ways AI can enhance learning outcomes and foster creativity (MacDowell et al., 2024).

Collaborative. They are skilled at communicating and collaborating effectively with both human colleagues and AI systems, understanding that human-AI collaboration augments capabilities (MacDowell et al., 2024; Ng et al., 2021; Xie et al., 2025) and being referred to as interactionalism (Gamby et al., 2025). Interactionalism is being defined as "a human-centered approach to learning that fosters collaboration, creativity, adaptability, feedback, and well-being." (Gamby et al., 2025, n.p.). Educators recognize that while AI can handle large amounts of information, human flexibility and intelligence remain essential for complex contexts (Seo et al., 2021).

Balanced in Perspective. They maintain a balanced view of AI's potential benefits and inherent risks, understanding that AI can both streamline tasks and pose challenges such as bias, privacy breaches, and reduced critical thinking if not managed carefully (Al-Zahrani, 2024; Dilek et al., 2025; MacDowell et al., 2024).

Each of these can be considered foundational blocks upon which to build their AI Identity while considering the competencies within a reflective and iterative practice.

AI Development Identity Model

Ultimately, an AI Identity for any teacher involves expanding beyond traditional technical proficiency to encompass a comprehensive understanding of AI's broader societal impacts, ethical considerations, and pedagogical implications. This empowers them to be proactive agents in shaping an AI-augmented educational future, rather than passive recipients of technological change (Dilek et al., 2025; MacDowell et al., 2024).

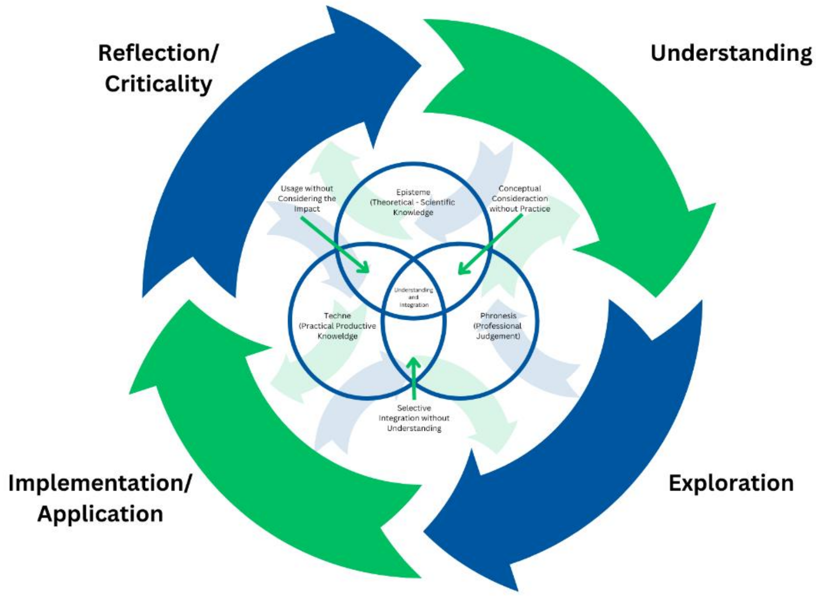
When all of the parts are assembled and utilized, the AI Identity Model incorporates the reflective competencies, knowledge and technical understandings, professional judgement and is guided by the four foundational blocks of Understanding, Exploration, Implementation/Application and Reflection/Criticality. Figure 4 illustrates this iterative and informed process.

Figure 4 connects both the macro-level four key steps (Understanding, Exploration, Implementation/Application, Reflection/Criticality) for developing an AI Identity with the three micro-level underpinnings of the process (Episteme, Techne, and Phronesis). In an ideal scenario, the educator begins with a curiosity and desire to gain an Understanding of AI then goes about learning more regarding AI or a potential tool, increasing their AI literacy. Afterwards, Exploration of a new AI tool or platform occurred. The micro-level components are also activated with the educator learning about the theoretical foundations of AI along with embracing the practical skills needed to develop a certain level of competency. Next, the AI tool is Implemented/Applied and more experience is gained by the educator. At this step, reflecting and having a critical eye on the entire AI process informs and directs *how* and *if* the educator will continue with this particular tool/platform.

As AI literacy and AI Identity processes evolve, it is essential to recognize that each educator begins at a different entry point. Whether it is at the Exploration or the Implementation/Application step first, once the entry point happens, the micro-level process is set in motion. Although an Understanding of AI may not be fully developed at this juncture, this macro-level component of the four key steps remains important in both the AI literacy and AI Identity processes. This scenario, where the first step is Exploration, is most often how the process begins: a teacher is introduced to a new AI tool to explore. Certain elements of Techne, Phronesis, and Episteme are also set into motion. The AI tool may provide the anticipated outcome as the teacher uses it for the first time, but it may not fully yield all of the teacher's expectations. If the process ends here, the teacher has not developed AI literacy nor an AI Identity. They have simply tried a new AI tool and moved on to another digital tool. Further effort, exploration, and reflection are needed to re-engage AI literacy and give AI Identity an opportunity to grow.

Figure 4

AI Identity Development (AI-ID) Model



Preparing Future Educators with an AI Identity

Given the critical importance and complex nature of developing such a comprehensive AI Identity for educators, as detailed above, the next section logically extends the discussion to the implications for teacher education programs. It addresses the pressing need for these programs to integrate AI competencies into their curricula, moving beyond just educational technology courses to embedding AI across methods, assessment, and classroom management courses (Royce, 2025; U.S. Department of Education, 2023). The authors argue that preparing future educators (pre-service teachers) for AI-enhanced learning environments is indispensable (Kopp, 2025; OECD, 2024; UNESCO, 2024), ensuring they view AI as an integrated professional tool rather than an add-on to existing requirements. This approach highlights the current global gaps in AI training for teachers, noting that as of 2022, only 15 countries had included student AI learning objectives in national curricula, and only 7 countries had developed AI training frameworks for teachers (UNESCO, 2025). This model requires deliberate and comprehensive integration, encompassing ethical frameworks and a mindset of continuous learning, to ensure that new teachers are AI-ready and can effectively model critical engagement with AI for their students (UNESCO, 2024; UNESCO, 2025).

Implications for Teacher Education Programs

Teacher education programs, while already managing numerous demands and requirements, must remain agile to incorporate practices and modalities that directly impact student learning. It is essential to ensure that future educators perceive the professional use of AI tools as integral to their professional responsibilities and ongoing learning, rather than as an optional add-on (Royce, 2024). Consequently, education preparation programs must provide resources and guidance for pre-service teachers in developing their AI Identity.

To implement the AI-ID Model in education preparation programs, the following steps are proposed:

1. Faculty within program tracks complete a curriculum map to align the program of study with the three competencies (Theoretical-Scientific Knowledge, Practical-Productive Knowledge, and Professional Judgement) shown in Figure 3.
2. From the curriculum maps, identify modules or sections within each course where there are opportunities for interacting with and developing basic AI skills is a possibility. It is essential that this be a transparent process with both faculty and students alike.
3. Once identified, adapt, modify, or create learning experiences (i.e., Assignments, Projects) that ethically and appropriately integrate AI tools. The *Key Stages for Interacting with and Developing Basic AI Skills (Figure 1)* is the entry point and must be mindfully identified for both the professor and the pre-service teacher (PST). For example, both the professor and PST may start at *Understanding* and may end at *Exploration* by the end of the learning opportunity. Each experience can build on the prior one or be dependent upon prior knowledge and experience, beginning at a particular point and ending before completing the four stages. In other words, while the process itself is iterative, that does not mean the entry and ending points will be the same for each engagement with AI tools.
4. Department Faculty and PST engage in dialogue to reflect on the process and ways to improve the learning experience, especially as AI continues to evolve.

Research by Kopp (2025), OECD (2024), and the Walton Family Foundation and Gallup (2025) indicates that teachers who effectively leverage AI report benefits such as deeper student engagement, more personalized instruction, and reduced workload in lesson planning and assessment. When thoughtfully applied, AI has the potential to address major educational challenges, innovate teaching practices, and accelerate progress toward educational goals (Kopp, 2025; OECD, 2024). As AI is increasingly integrated into educational tools and platforms, today's teachers need a fundamental understanding of AI's capabilities and limitations as part of their professional skill set (UNESCO, 2024). Therefore, developing AI competency is becoming indispensable for teachers both in their classroom teaching and in their professional planning, decision-making, and continuous development activities (UNESCO, 2024).

Given AI's expanding role, there is an urgent need to prepare future educators (pre-service teachers in university and certification programs) for AI-enhanced learning environments (Kopp, 2025; OECD, 2024; UNESCO, 2024). New teachers will enter classrooms where the traditional one-dimensional teacher-student relationship is evolving into a teacher–AI–student dynamic, which requires an understanding of how interactions between these areas occur (Gamby et al., 2025) meaning teachers must learn to collaborate with AI tools in instruction (Gamby et al., 2025; Royce, 2024; Royce, 2025; UNESCO, 2024). This evolution necessitates a reevaluation and update of teacher education curricula to incorporate AI-related knowledge and skills, not exclusively in educational technology courses, but also across methods courses, assessment courses, and classroom management courses (Royce, 2024; U.S. Department of Education, 2023). However, many teacher preparation programs have yet to fully integrate technology, let alone AI into their training (U.S. Department of Education, 2023). In the United States, a federal analysis by the U.S. Department of Education (2023) noted that pre-service teacher education often compartmentalizes or inadequately addresses educational technology, indicating that current programs are not keeping pace with technological advances. As a result, new teachers may graduate without sufficient guidance on effectively and ethically using AI in the classroom (U.S. Department of Education, 2023). This gap is not unique to the U.S. as noted previously, thereby highlighting a global deficit in preparing educators for AI (UNESCO, 2025).

To address these shortcomings, stakeholders must advocate for the deliberate integration of AI competencies into pre-service teacher training (U.S. Department of Education, 2023). This involves equipping future teachers with practical skills to use AI tools for tasks like adaptive learning, data-driven student support, and differentiated instruction, while also fostering awareness of AI's potential pitfalls (e.g., algorithmic bias or privacy issues) so that new teachers can navigate these responsibly (U.S. Department of Education, 2023). The U.S. Department of Education's Office of Educational Technology has specifically urged not only the integration of more technology across all courses in pre-service teacher training programs, but also more investment in research and innovation on how this should be done (U.S. Department of Education, 2023).

Essentially, today's pre-service educators require preparation in utilizing AI as a teaching aid (for example, employing an AI-driven tutoring system in a lesson) and in managing an AI-rich classroom environment such as guiding students on appropriate AI use for research and problem-solving (UNESCO, 2024). They must also develop professional competencies to critically evaluate AI tools and retain control over instructional decisions, rather than passively deferring to automated systems (Royce, 2025; UNESCO, 2024; Walton Family Foundation and Gallup, 2025).

Enactments of agency for equity have direct implications for teacher education programs—particularly as programs begin preparing educators to develop a professional AI Identity alongside their STEM and pedagogical identities. Just as Holincheck & Galanti (2025) illustrate how teachers' STEM identities grew through inquiry-based learning, reflection, leadership opportunities, and authentic problem-solving, AI Identity formation must be similarly supported in teacher preparation programs. Programs must create structures where future teachers learn to interrogate equity issues in AI—such as bias, access, data ethics, and representation—while also seeing themselves as capable of using AI tools responsibly and creatively in instruction. The teachers in Holincheck and Galanti's (2025) research grew into reflective educators, peer collaborators, instructional coaches, and PD facilitators and these same roles can be leveraged in teacher preparation to cultivate AI-ready educators who understand not only *how* to use AI tools but also *why, when,* and *for whom* they should be used to promote fairness and opportunity.

Teacher education programs have a tall order. By embedding ethical inquiry, hands-on AI-rich curriculum design, and opportunities to advocate for justice mirroring the STEM equity practices modeled by participants described in Holincheck and Galanti's (2024) research, teacher preparation programs can help future educators develop a robust AI Identity grounded in phronesis and oriented toward equity. By embedding AI into teacher education, programs can ensure that newly qualified teachers enter the workforce AI-ready, which means knowledgeable, comfortable, and proficient in leveraging AI, alert to its challenges, and adept at maintaining human pedagogy at the forefront in technology-enhanced classrooms (Royce, 2025; UNESCO, 2024). Importantly, preparing educators for AI extends beyond technical skills; it also involves fostering the appropriate mindsets and ethical frameworks (UNESCO, 2025). Pre-service teachers should be educated on the ethics of AI in education, including issues of fairness, transparency, and data privacy, so that they can implement AI in a manner that safeguards student rights and promotes equity (UNESCO, 2025). They should also cultivate a mindset of continuous learning and adaptability (UNESCO, 2025). As one teacher noted in an online 2025 UNESCO article, "the ethos of being a teacher is that we are learners ourselves" (UNESCO, 2025, n.p.). This implies that both experienced and new teachers must be prepared to continuously update their practices as AI technologies evolve. Investing in this comprehensive preparation will help cultivate a generation of educators who are confident in using AI as a partner in instruction, rather than perceiving it as a threat or a black-box tool (UNESCO, 2024). In turn, these educators can model for their K–12 students how to critically and productively engage with AI which is an increasingly vital skill for young people's futures (UNESCO, 2024).

UNESCO has developed an AI Competency Framework for Teachers (2024) to define the specific knowledge, skills, and values educators need to master in the age of AI. This global framework outlines 15 teacher competencies across five dimensions, including cultivating a human-centered mindset, understanding the ethics of AI, foundational knowledge of AI, AI-enhanced pedagogical strategies, and utilizing AI for their own professional learning (UNESCO, 2024). The framework aims to guide nations and teacher training institutions in updating their standards and curricula, ensuring that teachers worldwide are prepared for AI-rich education environments UNESCO, 2024). Since AI-related skills are increasingly becoming global competencies. By doing so, each educator is equipped with the understanding and skill set that enables them to view themselves as an AI educator, thus developing an AI Identity.

Conclusion

The accelerated presence of AI in education demands that educators undergo a significant professional transition, cultivating a new self-concept defined as AI Identity. This critical identity reflects an educator's comfort, competence, and agency in responsibly leveraging AI tools for teaching and learning. The authors propose that the development of this professional self-concept occurs through a structured and iterative, four-step cycle: Understanding, Exploration, Implementation/Application, and Reflection and Criticality. An educator with a strong AI Identity is thus not only technically adept but is also critical, discerning, ethically grounded, and socially responsible in assessing AI-generated content and addressing concerns like bias and data privacy.

Ultimately, the goal of developing an AI Identity is to empower educators as proactive agents and innovators who can shape an AI-augmented educational future, moving beyond simply restricting AI use. Given the shift toward a teacher–AI–student dynamic in classrooms, there is an urgent need for teacher education programs to integrate AI competencies deliberately and comprehensively across all curricula, rather than treating AI as an optional add-on or a confined subject within technology courses. Teacher preparation must provide hands-on experiences, reflective practices, and ethical frameworks that prepare future educators to interrogate equity issues in AI and advocate for its fair use.

Acknowledgements

The authors would like to thank the reviewers for their feedback and recommendations, which improved the focus of this article, and the journal editors for their support. Additionally, the authors thank the National Science Teaching Association for supporting the initial blog on this topic and specifically Dr. G. Michael Bowen, for his encouragement to expand the topic.

References

Al-Zahrani, A. M. (2024). Unveiling the shadows: Beyond the hype of AI in education. *Heliyon, 10*(9), 1-15. https://doi.org/10.1016/j.heliyon.2024.e30696

Barton, A. C. (1998). Teaching science with homeless children: Pedagogy, representation, and identity. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, *35*(4), 379-394.

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

Bennett, V., & Royce, C. A. (2025, February 10). *Finding your AI Identity as a science teacher*. National Science Teaching Association. https://www.nsta.org/blog/finding-your-ai-identity-science-teacher

Carlone, H. B., & Johnson, A. (2007). Understanding the science experiences of successful women of color: Science identity as an analytic lens. *Journal of Research in Science Teaching*, *44*(8), 1187-1218. https://doi.org/10.1002/tea.20237

Dilberti, M. K., Schwartz, H. L., Doan, S., Shapiro, A., Rainey, L. R., & Lake, R. J. (2024). *Using artificial intelligence tools in K-12 classrooms.* RAND. https://www.rand.org/pubs/research_reports/RRA956-21.html

Dilek, M., Baran, E., & Aleman, E. (2025). AI literacy in teacher education: Empowering educators through critical co-discovery. *Journal of Teacher Education*, *76*(3), 294-311. https://doi.org/10.1177/00224871251325083

Dou, R., & Cian, H. (2021). Constructing STEM identity: An expanded structural model for STEM identity research. *Journal of Research in Science Teaching*, 1–33. https://doi.org/10.1002/tea.21734

El Nagdi, M., Leammukda, F., & Roehrig, G. (2018). Developing identities of STEM teachers at emerging STEM schools. *International Journal of STEM Education, 5*(36) 1-13. https://doi.org/10.1186/s40594-018-0136-1

Faverio, K., & Tyson, A. (2023). What the data says about Americans' views of artificial intelligence. Pew Research Center. https://www.pewresearch.org/short-reads/2023/11/21/what-the-data-says-about-americans-views-of-artificial-intelligence/

Galanti, T. M., & Holincheck, L. K. (2022). Beyond content and curriculum in elementary classrooms: Conceptualizing the cultivation of integrated STEM teacher identity. *International Journal of STEM Education 9*(43), 1-10. https://doi.org/10.1186/s40594-022-00358-8

Gamby, T., Kil, D., Koblic, R., LeBlanc, P., Moldoveneau, M., & Siemens, G. (2025, September 18). *The AI tsunami is here: Reinventing education for the age of AI.* EDUCAUSE Review. https://er.educause.edu/articles/2025/9/the-ai-tsunami-is-here-reinventing-education-for-the-age-of-ai

Gee, J. P. (2000). Identity as an analytic lens for research in education. *Review of Research in Education*, *25*, 99–125. https://www.jstor.org/stable/1167322

German, S., Royce, C. A., & DeVore-Wedding, B. R. (2022). Transforming technology purpose and integration: Crossing the technological chasm without falling in. In P. Bawa (Ed.), *Preparing faculty for technology dependency in the post-COVID-19 era* (pp. 153-173). IGI Global. https://doi.org/10.4018/978-1-7998-9235-9.ch009

Ghimire, A., Prather, J., & Edwards, J. (2024). Generative AI in education: A study of educators' awareness, sentiments, and influencing factors. *Arxiv*. https://doi.org/10.48550/arXiv.2403.15586

Godwin, A. & Potvin, G. (2017). Pushing and pulling Sara: A case study of the contrasting influences of high school and university experiences on engineering agency, identity, and participation. *Journal of Research in Science Teaching 54*, 439-462. https://doi.org/10.1002/tea.21372

Grimalt-Álvaro, C., Couso, D., Boixadera-Planas, E., & Godec, S. (2022). "I see myself as a STEM person": Exploring high school students' self-identification with STEM. *Journal of Research in Science Teaching*, *59*(5), 720–745. https://doi.org/10.1002/tea.21742

Hachey, A. C. (2020). Success for all: fostering early childhood STEM identity. *Journal of Research in Innovative Teaching & Learning*, *13*(1), 135–139. https://doi.org/10.1108/JRIT-01-2020-0001

Hachey, A. C., An, S. A., & Golding, D. E. (2022). Nurturing kindergarteners' early STEM academic identity through makerspace pedagogy. *Early Childhood Education Journal*, *50*(4), 469–479. https://doi.org/10.1007/s10643-021-01154-9

Hite, R., & Tauber, M. (2019). Translating research to practice on individual and collective mathematics and science identity formation: Pedagogical recommendations for teachers. *Journal of Interdisciplinary Teacher Leadership 5*(1). https://doi.org/10.46767/kfp.2016-0028

Holincheck, N. M., & Galanti, T. M. (2025). STEM teacher identity and agency: A cross-case analysis of four teachers' actions for equity in STEM. *Journal for STEM Education Research.* Advance online publication. https://doi.org/10.1007/s41979-025-00163-2

Hollands, F., & Breazeal, C. (2024). Establishing AI literacy before adopting AI. *The Science Teacher*, *91*(2), 35–42. https://doi.org/10.1080/00368555.2024.2308316

Huvard, H., Talbot, R. M., Mason, H., Thompson, A. N., Ferrara, M., & Wee, B. (2020). Science identity and metacognitive development in undergraduate mentor-teachers. *International Journal of STEM Education*, *7*(1), 31. https://doi.org/10.1186/s40594-020-00231-6

Kaplan, A., & Flum, H. (2012). Identity formation in educational settings: A critical focus for education in the 21st century. *Contemporary Educational Psychology, 37*, 171-175. https://doi.org/10.1016/j.cedpsych.2012.01.005

Kaplan, A., & Garner, J. K. (2017). A complex dynamic systems perspective on identity and its development: The dynamic systems model of role identity. *Developmental Psychology, 53*(11), 2036. https://doi.org/10.1037/dev0000339

Kim, A. Y., Sinatra, G. M., & Seyranian, V. (2018). Developing a STEM identity among young women: A social identity perspective. *Review of Educational Research, 88*(4), 589-625. https://doi.org/10.3102/0034654318779957

Kopp, W. (2025, January 13). Nurturing a thriving teaching profession in an AI-enhanced world. OECD Education and Skills Today (Blog). https://oecdedutoday.com/nurturing-a-thriving-teaching-profession-in-an-ai-enhanced-world/

MacDowell, P., Moskalyk, K., Korchinski, K., & Morrison, D. (2024). Preparing educators to teach and create with generative artificial intelligence. *Canadian Journal of Learning and Technology, 50*(4), 1-23. https://cjlt.ca/index.php/cjlt/article/view/28606/21131

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, *2*, 100041. https://doi.org/10.1016/j.caeai.2021.100041

Norman-McKay, L. (2023). Shaping positive STEM identity for student success. *American Society for Microbiology*. https://asm.org/articles/2023/september/shaping-positive-stem-identity-for-student-success

OECD (2024), *Education policy outlook 2024: Reshaping teaching into a thriving profession from ABCs to AI*, OECD Publishing, Paris. https://doi.org/10.1787/dd5140e4-en.

Royce, C. A. (2025). Becoming AI literate: Preparing future educators for the use of AI. In K. L. Keeley (Ed.), *AI applications, and strategies in teacher education* (pp. 1-20). IGI Global. https://doi.org/10.4018/979-8-3693-5443-8

Royce, C. A. (2024). Shaping future educators: Embracing change for the future of teaching. In N. A. Bakhsh (Ed.), *Futuristic insights on education* (pp. 11–36). Regional Center for Educational Planning, United Arab Emirates. https://rcepunesco.ae/cms/Studies/02_Edited_Volume_2024_EN_Online.pdf

Royce, C. A. & German, S. (2019). Constructing meaning and engaging learners: Digital tools and practices in middle level science. In *Handbook of research on innovative digital practices to engage learners.* pp. 68-99. DOI: 0.4018/978-1-5225-9438-3

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

Seo, K., Tang, J., Roll, I. *et al.* (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. *International Journal of Educational Technology in Higher Education, 18*(54). 1-23. https://doi.org/10.1186/s41239-021-00292-9

Shanahan, M.-C. (2009). Identity in science learning: Exploring the attention given to agency and structure in studies of identity. *Studies in Science Education, 45*(1), 43–64. https://doi.org/10.1080/03057260802681847

Sperling, K., Sternberg, C-J., McGrath, C., Akerfeldt, A., Heintz, F., & Stenliden, L. (2024). In search of artificial intelligence (AI) literacy in teacher education: A scoping review. *Computers and Education Open, 6*, 1-13. https://doi.org/10.1016/j.caeo.2024.100169

Tadimalla, S. Y., & Maher, M. L., (2024) AI literacy for all: Adjustable interdisciplinary socio-technical curriculum, in 2024 IEEE Frontiers in Education Conference (FIE), Washington, DC, USA, 1-9, doi: 10.1109/FIE61694.2024.10893159.

Talafian, H., Moy, M. K., Woodard, M. A., & Foster, A. N. (2019). STEM identity exploration through an immersive learning environment. *Journal for STEM Education Research*, *2*(2), 105–127. https://doi.org/10.1007/s41979-019-00018-7

UNESCO. (2024). *AI competency framework for teachers*. UNESCO Publishing. https://doi.org/10.54675/ZJTE2084

UNESCO. (2025, January 20). *Artificial intelligence in education: UNESCO advances key competencies for teachers and learners.* UNESCO News/Story. https://www.unesco.org/en/articles/artificial-intelligence-education-unesco-advances-key-competencies-teachers-and-learners

U.S. Department of Education, Office of Educational Technology. (2023). *Artificial intelligence and the future of teaching and learning: Insights and recommendations*. U.S. Department of Education. https://www.ed.gov/sites/ed/files/documents/ai-report/ai-report.pdf

Verhoeven, M., Poorthuis, A.M.G. & Volman, M. (2019). The role of school in adolescents' identity development. A literature review. *Educational Psychology Review, 31*, 35–63. https://doi.org/10.1007/s10648-018-9457-3

Walton Family Foundation and Gallup. (2025). *Teaching for tomorrow: Unlocking six weeks a year with AI.* https://www.gallup.com/analytics/691922/walton-family-foundation-gallup-teachers-report.aspx

Weinberg, A.E., Balgopal, M.M. & Sample McMeeking, L.B. (2021). Professional growth and identity development of STEM teacher educators in a community of practice. *International Journal of Science and Mathematics Education,* 19, 99–120. https://doi.org/10.1007/s10763-020-10148-9

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

Xie, S., Zimmerman, J., & Eslami, M. (2025). *Exploring what people need to know to be AI literate: Tailoring for a diversity of AI roles and responsibilities*. In *CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems* (Article 1018, pp. 1–16). ACM. https://doi.org/10.1145/3706598.3713841

Zembylas, M. (2003a). Emotions and teacher identity: A poststructural perspective. *Teachers and Teaching: Theory and Practice, 9*(3), 213–238. https://doi.org/10.1080/13540600309378

Zembylas, M. (2003b). Interrogating "teacher identity": Emotion, resistance, and self-formation. *Educational Theory, 53*(1), 107–127. https://doi.org/10.1111/j.1741-5446.2003.00107.x

Zhai, Y., Tripp, J., & Liu, X. (2024). Science teacher identity research: A scoping literature review. *International Journal of STEM Education*, *11*(1), 20. https://doi.org/10.1186/s40594-024-00481-8

Zhang, D., Wijaya, T. T., Wang, Y., Su, M., Li, X., & Damayanti, N. W. (2025). Exploring the relationship between AI literacy, AI trust, AI dependency, and 21st century skills in preservice mathematics teachers. *Scientific Reports, 15*(14281). https://doi.org/10.1038/s41598-025-99127-0

Corresponding Author Contact Information:

Author name: Christine Anne Royce, Ed.D.

Department: Teacher Education

University, Country: Shippensburg University of Pennsylvania, USA

Email: caroyc@ship.edu

020Please Cite: Bennett, V., & Royce, C. A. (2026). Identity in transition: How teachers learn, adapt, and evolve with AI. *Journal of Research in Science, Mathematics, and Technology Education., 9*(1), 73-96. DOI: https://doi.org/10.31756/jrsmte.914

Conflict of Interest: None

Data Availability Statement: NA

Ethics Statement: NA

Author Contributions: Both authors contributed equally to this manuscript.

Received: June 24, 2025 ▪ Accepted: December 14, 2025