

The transformative impact of trauma-informed practices and applied educational neuroscience
training on elementary preservice teachers.

by

Melissa Gerleman

B.S., Emporia State University, 2000
M.S., Concordia University, 2020

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

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College of Education

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Manhattan, Kansas

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Abstract

This qualitative multiple case study explored how trauma-informed practices (TIPs) and applied educational neuroscience (AEN) influence the instructional development of three elementary preservice teachers. Guided by Mezirow's Transformative Learning Theory (TLT), the study examined how participants' beliefs and practices evolved as they engaged with TIP and AEN concepts through coursework, professional development, and microteaching experiences. Data was collected through semi-structured interviews, reflective journals, and scenario analyses, then triangulated to identify patterns of transformation. Findings revealed that preservice teachers redefined classroom management from behavior control to co-regulation, reconceptualized learning environments as emotional ecosystems, and reframed engagement as a process rooted in safety, trust, and connection. Transformation is divulged through phases of disorienting dilemmas, critical reflection, and reintegration of new professional identities aligned with TLT. The study contributes to the growing body of research on trauma-informed teacher preparation by demonstrating how TIPs and AEN can catalyze transformative growth in preservice teachers. Implications highlight the importance of embedding trauma-informed and neuroscience-based content throughout teacher preparation programs to cultivate reflective, relationship-centered educators who can support both academic and emotional regulation in their classrooms.

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Approved by:

Major Professor
Dr. Michael Lawson

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Dedication

For my husband, Shawn, you are my biggest cheerleader and my greatest love.

Your unwavering support, steady encouragement, and ability to find the good in everything I do have carried me across the finish line. Even in my moments of doubt, you believed in me completely. I am endlessly grateful for your love and partnership. I feel so blessed and honored to be your wife in this beautiful, messy, joyful life we share. *We did this!*

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You always saw the best in me, even when I strayed from the path or created my own obstacles.

Though you are no longer here on earth, you have left me with perseverance, grit, and grace.

You taught me that when things get dark, light will prevail if I keep moving forward. You were my rock, my grounding force, and you loved me unconditionally. I know you have been with me through every step of this process, guiding me quietly and proudly. You are the reason I became an educator. I love you forever and always.

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Preface

The journey toward this dissertation began long before the first class or research question. As a teacher educator, I have witnessed the impact of trauma and adversity on both students and teachers. I entered this doctoral program with a desire to understand how to better prepare educators to meet the emotional, neurological, and relational needs of every child who walks into their classroom.

What began as curiosity quickly became a calling. Through the lens of trauma-informed practices and applied educational neuroscience, I discovered a renewed sense of purpose, inspired to make an impact on those who have been impacted by trauma. This research reflects my belief that when educators understand the brain, relationships, and regulation, they can transform learning environments into places of safety, belonging, and growth.

This work is also personal. The themes of resilience and perseverance are woven throughout my own life story. The lessons I learned from family, colleagues, mentors, and students shaped this research in ways that extend beyond the academic. My hope is that this study contributes to a growing movement of educators who lead with empathy, teach with heart, and never underestimate the power of connection.

Chapter 1 - The Case for Trauma-Informed Practices and Applied Educational Neuroscience Training in Teacher Preparation

Introduction

I begin this dissertation with two vignettes: one depicting my lived experience as a student in the 1980s and one portraying a witnessed account of a preservice teacher in the present day. The two moments, one personal and one professional, serve as a mirror across time, revealing how educators' understanding of trauma, behavior, and belonging has evolved, yet also how it still matters. With one lived and one witnessed, I use the vignettes as a contrast, united by a single moral: you cannot teach what you do not understand. Framing this study through stories highlights the importance of awareness, empathy, and neuroscience in education, concepts largely absent from the classrooms of my youth but increasingly central to the preparation of teachers today. Since the original Adverse Childhood Experiences (ACEs) study (Felitti et al., 1998) revealed the enduring impact of early adversity on learning, health, and behavior, educators have been called to teach with an understanding of how trauma shapes the brain and body. These vignettes provide the emotional and conceptual foundation for this dissertation, situating my inquiry into how trauma-informed practices (SAMHSA, 2014; TIPs) and applied educational neuroscience (Desautels, 2020; AEN) transform the beliefs and identities of preservice teachers.

Vignette One: Living as a Child in the 1980s

Home. The word should evoke warmth, safety, and a sense of belonging. Yet for many children in the late 1980s, including myself, "Home" often meant uncertainty hidden behind closed doors. During that era, few teachers asked *why* a student struggled. It was simply assumed that most

children came from stable, supportive families. Emotional chaos remained invisible unless it erupted in class.

In my fourth-grade classroom, the smell of chalk dust and pencil shavings hung in the air. I sat at a desk near the back, tapping my pencil against the edge just to feel the rhythm steady my racing thoughts. My leg bounced beneath the table as I watched the clock's second hand crawl forward. I wasn't thinking about the math problems on the board; I was thinking about whether today would be safe when I got home.

The teacher's voice blended into the background, her words distant and muffled, as my eyes darted toward every sudden movement or raised tone. I couldn't sit still. When I blurted out answers or dropped my books, my classmates giggled. My teacher's face tightened with frustration. What looked like defiance was my body on alert, trapped in a constant "fight or flight" response; my brain was rewired to live in a state of chaos and survival.

Dr. Dan Siegel (1999) later described this state as falling outside the "window of tolerance," the emotional range in which a person can think, learn, and connect. I lived almost entirely outside that window. Every reprimand and sigh from an adult felt like a threat. I was often sent to the hallway, told to "get it together," but I didn't know how.

My parents loved me, but we lived in toxic stress. I needed an adult to see beneath the behavior, someone who understood that my acting out was a form of communication, a cry for help, not rebellion. My teachers saw a "problem child." Neuroscience would later show what they could not. My brain was functioning exactly as it needed to in order to survive.

Had my teachers understood the concepts of trauma-informed practices (TIPs) and Applied Educational Neuroscience (AEN), which is simply the science of how the brain responds to adversity, they might have recognized that I wasn't misbehaving; I was in a constant

state of dysregulation. I didn't need more discipline; I needed connection and calm. Without safety and relationships, learning could not begin.

Vignette Two: Witnessing Preservice Teachers Today

Fast forward three decades. A preservice teacher sits across from me in my office, her hands clasped tightly in her lap. Lesson plans are spread across the table, the pages creased from being held too long. Her eyes are red-rimmed, her voice barely above a whisper.

The preservice teacher begins to cry, "He is in second grade," she says. "He has been in four homes this year. Yesterday, he flipped a chair and yelled, 'No one wants me, look what my mom did!'" She pauses, pressing her sleeve against her eyes. "I do not know how to help him. I just keep thinking about what he said."

She describes how she tried clip charts, time-outs, reward systems, the tools her coursework had emphasized, but none of them reached him. "Every time I send him to the calm corner, he cries harder," she admits. "It feels like everything I learned is not enough."

At that moment, her classroom management strategies collided with a child's trauma. The student wasn't defiant; he was dysregulated; his nervous system locked in a state of protection and pain. But to this preservice teacher, earnest, compassionate, and still learning, it felt like failure.

She represents a generation of teachers stepping into classrooms filled with invisible stories: Children navigating pain, grief, instability, and fear that no sticker chart can fix. Yet teacher preparation programs often offer little guidance for moments like this. These problems are not isolated; they reflect a larger system that is unprepared to meet the human side of teaching.

Connecting the Vignettes: From Personal Story to Professional Imperative

Both vignettes, one lived, one witnessed, reveal the same truth across generations: educators cannot teach what they do not understand. In the 1980s, teachers lacked knowledge of trauma’s neurobiological impact. Today, despite decades of research on Adverse Childhood Experiences (ACEs) (Felitti et al., 1998) and the effects of stress on learning (Perry & Winfrey, 2021; Putnam & Trickett, 1997; Siegel, 1999), many preservice teachers still feel ill-equipped to support trauma-impacted students (Puchnell & Markowitz, 2022).

This gap supports the urgent need for TIPs and AEN within teacher preparation programs. As Brown et al. (2022) found, educators trained in trauma-informed methods experience greater efficacy, lower burnout, and improved student relationships; yet, such preparation remains rare.

My early experiences show what happens when a system fails to see the child beneath the behavior. The preservice teacher’s story reveals the continuing gap in preparation. Together, they frame the central problem of this study: how to bridge the divide between what is known about trauma and what is taught to future teachers.

Table 1.1. *Vignettes of Lived and Contemporary Classroom Experience*

Vignette	Description	Purpose in Context
Vignette 1: A Child in the 1980s	The researcher recalls personal experiences of dysregulation and misunderstanding in a traditional 1980s classroom,	The researcher recalls personal experiences of dysregulation and misunderstanding in a traditional 1980s classroom,

Vignette	Description	Purpose in Context
	illustrating the absence of trauma-informed knowledge and the mislabeling of stress behaviors as defiance	illustrating the absence of trauma-informed knowledge and the mislabeling of stress behaviors as defiance.
Vignette 2: A Preservice Teacher Today	A preservice teacher struggles to support a second-grade student in foster care, whose trauma manifests as externalizing behaviors. The teacher's traditional classroom management strategies prove ineffective.	To demonstrate the continued lack of trauma-informed and neuroscience-aligned preparation in teacher education programs today..
Connecting the Vignettes	Both vignettes; one lived, one observed, illustrate the persistent gap between what is known about trauma's impact on learning and what is taught in teacher preparation programs.	To establish the study's central problem: bridging the divide between research and practice in preservice teacher education.

These vignettes contrast two moments in educational history, one personal, one professional, to illustrate the evolution of trauma awareness in schools. Together, they serve as

the moral and conceptual foundation of this study: *you cannot teach what you do not understand*. By juxtaposing these experiences, the vignettes highlight why teacher preparation must integrate trauma-informed and neuroscience-based approaches to better support all learners.

Statement of Problem

An increasing proportion of elementary students experience trauma, which often manifests in behavioral and emotional challenges that extend beyond the scope of traditional classroom management techniques (American Psychological Association, 2022; Frieze, 2019; Emerson, 2022). Behavioral and emotional manifestations of trauma reverberate through classroom ecosystems, affecting peer interactions, instructional flow, and the collective capacity for regulation and engagement (Felitti et al., 1998; Putman & Trickett, 1997). The landmark ACEs study revealed the strong correlation between early adversity and negative health, behavioral, and academic outcomes, emphasizing that unaddressed trauma impairs children's ability to regulate emotions, focus attention, and engage in learning (Felitti et al., 1998; Anda et al., 2006).

Preservice teachers typically enter teacher preparation programs with enthusiasm and a strong desire to make a positive difference in children's lives (Marsh, 2015; Watt & Richardson, 2012). However, as they transition from coursework to the realities of the classroom, many experience a *reality shock* when their preparation does not align with the demands of supporting students impacted by trauma (Eisenman et al., 2015; Flores & Day, 2006). While theoretical coursework often emphasizes lesson design and content mastery, it provides limited guidance on the relational, regulatory, and neurobiological dimensions of teaching that are essential for trauma-impacted students (Brunzell et al., 2016; Craig, 2016; Souers & Hall, 2016). This gap leaves early-career teachers feeling underprepared and overwhelmed, contributing to decreased

efficacy and high attrition rates (Ingersoll, 2001; Schaefer et al., 2012; Skaalvik & Skaalvik, 2018).

Research consistently indicates that many teacher preparation programs devote insufficient attention to classroom management and social-emotional competencies, leaving preservice teachers unprepared for the behavioral realities of diverse classrooms (Begeny & Martens, 2006; Chesley & Jordan, 2012; Freeman et al., 2014; Oliver & Reschly, 2010). These findings are concerning, given that trauma and dysregulation can mimic or exacerbate behaviors often mislabeled as defiance, inattention, or lack of motivation (Perry, 2006; Souers & Hall, 2016; van der Kolk, 2014). Without training in trauma-informed practices, teachers often rely on tradition or compliance-based models that can retraumatize students or escalate behavioral incidents (Cole et al., 2013; Sporleder & Forbes, 2016).

Despite growing recognition of the importance of TIPs and AEN, most teacher education programs continue to prioritize academic content and generalized management models over relational and brain-based approaches (Brown et al., 2022; Desautels, 2020; Thomas et al., 2019). Across Kindergarten through 12th grade, studies show that trauma-informed and neuroscience-aligned concepts help teachers create emotionally safe classrooms that support regulation, connection, and engagement (Brunzell et al., 2016; Craig, 2016; Desautels, 2020). Yet preservice teachers often graduate without experiential knowledge to apply these concepts effectively (Brown et al., 2022; Thomas et al., 2019).

While the literature on trauma-informed education continues to expand, limited studies have examined how preservice teachers specifically develop readiness to implement these concepts or how AEN principles can be systematically embedded in teacher preparation programs (Brown et al., 2022; L'Estrange & Howard, 2022; McIntosh et al., 2020). The absence

of AEN research-based preparation limits the field's understanding of how preservice teachers transition from awareness to classroom implementation for students impacted by trauma (Thomas et al., 2019).

This study addresses that gap by examining how TIPs and AEN influence three preservice elementary teachers' instructional decision-making, relational approaches, and classroom practices. Understanding how preservice teachers integrate these concepts into their developing professional identities provides insight into how teacher preparation programs can evolve to meet the neurobiological and emotional realities of today's classroom.

Significance of the Study

This dissertation addresses a critical gap in teacher education by examining how well-prepared elementary preservice teachers are to support students affected by trauma. As trauma-related challenges in classrooms continue to rise, traditional classroom management strategies are no longer sufficient to meet the social, emotional, and behavioral needs of today's learners (APA, 2023; Frieze, 2019; Perry & Winfrey, 2021). Preservice teachers require TIPs and AEN concepts to create inclusive learning environments grounded in safety, trust, and relational regulation (Brunzell et al., 2016; Desautels, 2020; SAMHSA, 2014). The finding of this study contributes to the development of more comprehensive teacher preparation curricula that integrate TIPs and AEN, equipping preservice teachers with the understanding and tools necessary to effectively meet the needs of trauma-impacted students.

As such, the intersection between AEN and TIPs is highlighted as a means of preparing teachers to view student behavior through a neurodevelopmental lens rather than a deficit-based perspective. By connecting brain-based regulation with social-emotional learning, the study indicates the importance of addressing the root causes of dysregulation rather than relying on

traditional or compliance-based responses (Craig, 2016; Souers & Hall, 2016; Thomas et al., 2019). Findings from this work inform teacher education policy by advocating for a paradigm shift that prioritizes TIPs and AEN coursework as an essential component of teacher preparation, licensure, and professional development standards (Brown et al., 2022; L'Estrange & Howard, 2022).

At the federal level, recent legislative initiatives reflect a growing national commitment to trauma-informed education and prevention-centered school reform. The *Trauma-Informed Schools Act of 2022* (S.4614), introduced in the 117th Congress, represents a nonpartisan effort to embed TIPs within public elementary and secondary schools (Trauma-Informed Schools Act of 2022, 2022). The bill authorizes states to use federal education funds to provide professional development for teachers, administrators, and school staff focused on understanding the prevalence and effects of ACEs. It defines TIPs as evidence-based concepts that promote shared understanding among educators, foster inclusive and supportive environments, and replace punitive discipline with restorative and relational strategies that build trust and connection across the school community. It also emphasizes school-based collaboration among educators, families, and students to create safe, predictable, and welcoming environments that foster a sense of belonging and engagement. These policy priorities reflect the objectives of trauma-informed and neuroscience-aligned education, which emphasize safety, coregulation, and relational trust as prerequisites for learning (Brown et al., 2022; Overstreet & Chafouleas, 2016; Souers & Hall, 2016; Trauma-informed Schools Act of 2022, 2022). Aligning preservice teacher preparation with such federal and state initiatives ensures that educators are equipped to meet evolving professional expectations and to translate neuroscience and trauma research into classroom practice (Crosby et al., 2018; Desautels, 2020).

This dissertation also contributes to both theory and practice by promoting TIPs and AEN that empower educators to respond to diverse student needs. It advocates for systemic change in teacher preparation and educational policy, ensuring preservice teachers are equipped to navigate the neurobiological and relational complexities of modern classrooms with confidence, compassion, and resilience.

Purpose of Study

Existing research highlights persistent gaps in teacher preparation programs in integrating TIPs and AEN. Many preservice teachers enter classrooms without adequate preparation to address the behavioral, emotional, and cognitive needs of trauma-impacted students (Begeny & Martens, 2006; Chesley & Jordan, 2012; Desautels, 2020). This study addresses those gaps by investigating preservice teachers' experiences, perceptions, and emerging practices as they learn to apply TIPs and AEN within their coursework and microteaching experiences.

Grounded in Transformative Learning Theory (TLT) (Mezirow, 1991), this study also holds a theoretical significance. TLT explains how adults transform their perspectives through critical reflection, dialogue, and experiential learning (Mezirow, 1991, 2009). Preservice teachers' engagement with TIPs and AEN concepts provides opportunities for perspective transformation, from viewing classroom management as behavioral control to understanding it as relational co-regulation (Thomas et al., 2019). This theoretical framing situates trauma-informed education not as an add-on skill set, but as a transformative shift in teachers' identity, values, and professional practice (Cranton, 2016; Dirkx, 2012; Mezirow, 1991, 2009). Through this lens, teacher preparation becomes a vehicle for reflection and personal growth, empowering preservice teachers to teach with empathy and neuroscience, rather than merely complying.

With this framing, the study uses three junior-level elementary preservice teachers enrolled in an elementary education program at a small Midwestern university as cases. Participants were completing Block One teaching methods coursework and microteaching experiences that introduced TIPs and AEN content. Using a multiple-case study with an instrumental purpose design, the study captures each participant's transformative learning process and examines how theoretical understanding translates into application (Stake, 1995; Yin, 2014).

Data were collected from three primary qualitative sources: semi-structured interviews, reflective journals, and case study analysis assignments. Semi-structured interviews elicited participants' reflections on their learning and implementation of TIPs and AEN (Creswell & Poth, 2018; Stake, 1995). Reflective journals provided insight into participants' internal processing, self-awareness, and professional growth over time (Schon, 1983). Scenario analyses contextualized how preservice teachers applied TIPs and AEN concepts to specific teaching scenarios within their coursework (Bowen, 2009). Collectively, these data sources enabled triangulation, ensuring that participants' evolving understanding of TIPs and AEN was captured comprehensively and authentically.

Research Questions

To address the gaps identified in the Statement of the Problem and Significance of the Study, this research is guided by Mezirow's (1991) Transformative Learning Theory, to address the following research questions:

RQ1: How do trauma-informed practices (TIPs) and applied educational neuroscience (AEN) influence preservice teachers' instructional approaches in elementary education? This

question explores how TIP and AEN shape preservice teachers' pedagogical choices and practices related to instruction and behavior support.

RQ2: In what ways do TIPs and AEN inform preservice teachers' strategies for creating positive, structured, and supportive classroom environments? This question examines how preservice teachers translate theoretical knowledge into classroom management and environmental design that promote safety and belonging.

RQ3: How do TIPs and AEN shape preservice teachers' approaches to engaging and motivating students who have experienced trauma? This question investigates how preservice teachers apply relational and brain-based strategies to build trust, foster resilience, and promote meaningful engagement.

Table 1.2. *Alignment of Research Questions, Purpose, and Theoretical Framework*

Research Question	Purpose and Connection	Theoretical Lens (TLT Focus)
RQ1	Examines how TIP and AEN shape preservice teachers' instructional approaches.	Perspective transformation through critical reflection.
RQ2	Explores how TIP and AEN inform classroom environment design.	Integrating new frames of reference into practice.
RQ3	Investigates how TIP and AEN shape engagement and motivation strategies	Reintegration of transformed perspectives into professional identity.

This alignment, shown in Table 1.2, clarifies how the research questions, study purpose, and theoretical lens are intentionally connected. Guided by Mezirow's (1991) TLT, each question represents a progressive phase of preservice teacher transformation, from critical reflection on instructional beliefs to the integration of TIPs and AEN concepts within classroom design, and finally to the reintegration of those perspectives through engagement and motivation

strategies. This framework ensures that the study maintains coherence and a developmental trajectory consistent with TLT.

The findings of this study aimed to provide actionable insights to improve teacher preparation programs and inform education policy. By examining how preservice teachers experience transformative learning through TIPs and AEN, this research seeks to advance the field's understanding of how trauma-informed and neuroscience-based frameworks can prepare educators to meet the social, emotional, and academic needs of all learners. Figure 1 presents the theoretical framework that guides this study. It illustrates how TLT provides the foundation for preservice teachers' reflective growth, while TIPs and AEN serve as the applied concepts through which the transformation occurs.

Figure 1.1. *Theoretical Framework of the Study*

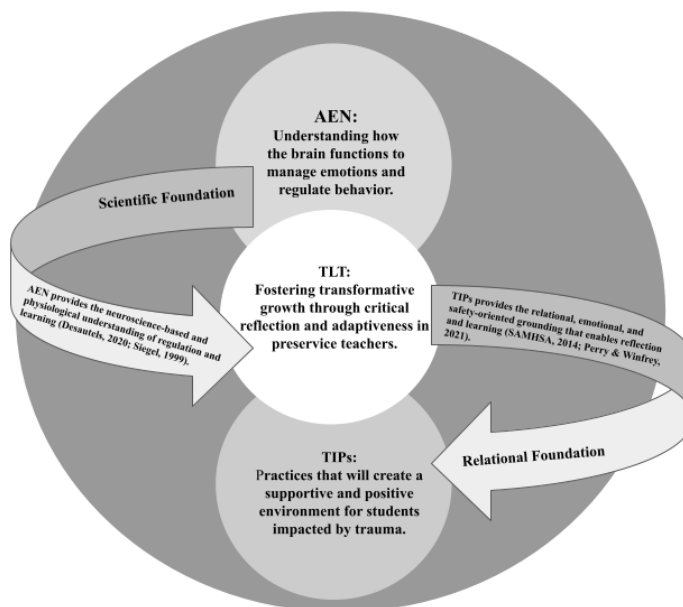


Figure 1.1 illustrates the cyclical theoretical framework guiding this study. AEN provides the scientific foundation, grounding the work in a brain-based understanding of regulation and learning (Desautels, 2020). TIPs establish the relational foundation, emphasizing safety, trust, and connection as prerequisites for teaching and learning. At the center, Mezirow's (1991) TLT

represents the process through which the three elementary preservice teachers integrate these scientific and relational foundations to reshape their instructional beliefs, classroom practices, and professional identities. The circular design reflects the continuous and reciprocal nature of transformation, where knowledge, reflection, and relationship inform one another over time.

TLT serves as the overarching lens for understanding how preservice teachers experience reflection, meaning making, and perspective transformation. Within this framework, TIPs and AEN function as the applied concepts that inform the process of professional growth. TIP provides the foundation for safety, empathy, and co-regulation (SAMHSA, 2014), while AEN offers the scientific foundation for understanding the neurobiological processes of emotion and regulation (Desautels, 2020; Siegel, 1999). Together, these elements illustrate how preservice teachers integrate relational and scientific knowledge to transform their beliefs and instructional practices through reflective learning.

Study Overview

This study employs a qualitative multiple-case study with an instrumental purpose to explore how preservice teachers integrate TIPs and AEN into their instructional practices. A qualitative approach was employed to examine participants' lived experiences and reflections, enabling an in-depth understanding of how these concepts shape teachers' development (Creswell & Poth, 2018; Stake, 1995). By focusing on the experiences of three preservice elementary teachers, this study seeks to show the complexities of applying TIPs and AEN within authentic educational contexts.

The multiple case with instrumental purpose design provides a framework for analyzing participants' experiences across cases to identify both shared patterns and unique variations (Stake, 1995; Yin, 2014). This design aligns with the study's instrumental purpose, to provide an

understanding of how learning experiences related to TIPs and AEN transform preservice teachers' perspectives and practices. Through this approach, the study contributes to understanding how theoretical knowledge about trauma, regulation, and relational teaching translates into classroom practice and professional identity development.

Four qualitative data sources were used to triangulate findings and capture participants' evolving understandings of TIPs and AEN: (1) Semi-structured interviews provided space for participants to communicate their reflections, challenges, and professional growth, offering rich, descriptive data (Creswell & Poth, 2018; Stake, 1995). (2) Reflective Journals documented participants' processing and self-awareness, offering an understanding of their developing pedagogical beliefs (Schon, 1983). (3) Scenario analyses used realistic teaching scenarios to evaluate how participants applied TIPs and AEN within their coursework (Bowen, 2009). (4) Document analyses indicated and evaluated how well the students applied and understood the TIPs and AEN.

To ensure methodological rigor, the study employed triangulation and member checking. Triangulation compared data across interviews, journals, and case studies to establish consistency and depth (Patton, 2015). Member checking allied participants to review and confirm their interview transcripts, ensuring that interpretations accurately reflected their experiences and perspectives (Lincoln & Guba, 1985).

The design aligns with the broader purpose of the research, which is to generate an understanding of how preservice teachers experience transformative learning through the application of TIPs and AEN concepts. The study's findings contribute to the growing body of knowledge on preparing preservice teachers to meet the neurobiological, emotional, and social needs of students impacted by trauma through reflective, relationship-centered teaching.

Boundaries of the Study

As is common in qualitative research, every study includes boundaries that define what can and cannot be known within the design (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Stake, 1995). Recognizing these boundaries is essential for maintaining transparency, credibility, and trustworthiness (Lincoln & Guba, 1985). The following outlines both the *limitations* and the *delimitations*, or intentional parameters set to narrow the scope of inquiry. Within this transformative learning framework, these boundaries are not viewed as constraints but as markers that clarify the study's focus and situate its findings within their appropriate context.

Limitations

Like most qualitative studies, this research was designed to emphasize depth rather than breadth (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Stake, 1995). The goal was not to generalize findings to all teacher preparation programs but to gain an in-depth understanding of how trauma-informed practices (TIPs) and applied educational neuroscience (AEN) shaped the evolving beliefs and instructional choices of three preservice elementary teachers. The small, purposeful sample allowed for rich, context-specific insights but naturally limits the transferability of the findings beyond similar settings (Lincoln & Guba, 1985).

A second limitation involves the composition of the participant group. All three participants entered the course with relatively low Adverse Childhood Experiences (ACEs) scores and stable personal backgrounds. Their perspectives may differ from preservice teachers with higher ACEs or more complex personal histories. Consequently, the study represents one pathway of professional growth rather than the full range of possible experiences.

Another limitation relates to my dual role as both instructor and researcher. Although Institutional Review Board (IRB) approval, separate grading procedures, and triangulated data

sources were used to reduce bias, the established rapport could still influence participant responses. This relationship may have encouraged openness while also introducing the possibility of social desirability bias. Reflexivity is inherent to qualitative research, where the researcher serves as the primary instrument of data collection and interpretation (Finlay, 2002; Merriam & Tisdell, 2016).

Finally, the study was guided solely by Mezirow's (1991) Transformative Learning Theory (TLT). While TLT provides a powerful framework for understanding reflection and perspective transformation, it naturally centers adult meaning-making and may not identify other analytical or systemic dimensions (Cranton, 2016) that a critical or quantitative lens might reveal. Thus, interpretations are situated within a constructivist and transformative paradigm that values participants' voices and evolving identities.

Delimitations

Delimitations refer to the intentional boundaries established by the researcher to define the scope of inquiry (Baron, 2013). This study was limited to three junior-level preservice elementary teachers enrolled in Block One teaching-methods courses at a small Midwestern university. It examined how participants engaged with TIPs and AEN within that coursework and semester. The study did not include preservice teachers from other licensure areas, grade levels, or institutions, nor did it extend into student teaching or early-career practice. Data collection was confined to qualitative sources: semi-structured interviews, reflective journals, and case-study analyses, to align with the study's interpretive, meaning-making design (Creswell & Poth, 2018; Stake, 1985). These delimitations were deliberately set to explore transformation as conceptualized within Mezirow's (1991) framework.

Together, these limitations and delimitations clarify the scope of the study and position its findings within their appropriate context, one that validates reflection, identity development, and transformative learning as the foundation for preservice teacher growth. The following section defines key terms used throughout the dissertation to ensure clarity and alignment with the TIPs and AEN foundations that guide the framework.

Definitions of Key Terms

To ensure clarity and consistency throughout this qualitative research study, the following key terms are defined as used in this study. Because trauma-informed education and applied educational neuroscience, including psychology, neuroscience, and teacher education, require clear operational definitions, they are essential. These terms establish a language for understanding how preservice teachers experience transformation through Mezirow's (1991) Transformative Learning Theory as they integrate TIPs and AEN concepts into their transforming professional identities.

Adverse Childhood Experiences (ACEs): Potentially traumatic events occurring before age 18, such as abuse, neglect, or household dysfunction, that can disrupt brain development and have long-term effects on learning and health (Centers for Disease Control and Prevention [CDC], 2022).

Applied Educational Neuroscience (AEN): The integration of neuroscience, psychology, and education to strengthen teaching, learning, and regulation through understanding brain-body states, relationships, and co-regulation (Desautels, 2020).

Block One: The first semester of methods coursework in the elementary education program, which includes three microteaching experiences emphasizing instructional design, implementation, and reflection.

Childhood Trauma: Experiences of danger, violence, or threat that overwhelm a child's ability to cope and disrupt emotional, cognitive, and neurological development (Childhood Trauma Assessment Services [CCTAS], n.d.).

Classroom Management: The use of proactive strategies, relationships, and structures to establish safe, predictable, and engaging learning environments (Wong & Wong, 2005).

Co-Regulation: The process through which an educator helps students manage emotional or behavioral states by modeling calmness, consistency, and relational safety—laying the foundation for self-regulation (Desautels, 2020).

Dysregulation: A state of emotional or physiological imbalance in which an individual struggles to manage stress responses or strong emotions (Cunic, 2022).

Executive Functioning: A set of higher-order cognitive processes, including working memory, cognitive flexibility, and inhibitory control, that enable planning, attention, and emotional regulation (Center on the Developing Child, n.d.).

Fight, Flight, Freeze: The body's automatic survival response to perceived danger, activating the sympathetic nervous system to prepare for defense, escape, or immobility (Porges, 2011).

Instrumental Multiple Case Study: A qualitative research approach used to explore a bounded system through multiple cases to understand a central phenomenon (Stake, 1995).

Microteaching: A teacher preparation method in which candidates plan and deliver brief, focused lessons to small groups, followed by feedback and reflection to improve instructional practice (Amobi, 2005).

Preservice Teacher: A teacher candidate enrolled in an accredited teacher preparation program who has not yet completed student teaching or state certification requirements.

Professional Development: Structured, ongoing opportunities for educators to expand knowledge, skills, and reflective capacity to improve classroom practice and student outcomes.

Reflective Practice: The process of examining and learning from one's experiences through critical reflection to improve decision-making and professional growth (Schön, 1983).

Resilience: The ability to adapt, recover, and grow stronger following adversity, supported by protective relationships and safe, predictable environments (Masten, 2001).

Secondary Trauma: Emotional distress or compassion fatigue experienced by professionals indirectly exposed to others' trauma through empathetic engagement (Figley, 1995).

Self-Regulation: The ability to monitor and manage emotions, thoughts, and behaviors in ways that promote well-being, learning, and positive relationships (McClelland et al., 2015).

Social and Emotional Learning (SEL): The process of developing self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2022).

Toxic Stress: Prolonged activation of the stress response system due to chronic adversity without adequate protective supports, impairing brain development and long-term health (Centers for Disease Control and Prevention [CDC], 2022).

Trauma-Informed Practices (TIPs): Educational approaches that recognize the widespread impact of trauma and respond through safety, predictability, relationships, and empowerment to foster learning and resilience (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014).

Transformative Learning Theory (TLT): A framework describing how adults experience perspective transformation through critical reflection, dialogue, and new experiences that lead to deeper awareness and changed practice (Mezirow, 1991, 2009; Cranton, 2016).

Trustworthiness: The criteria used to establish rigor in qualitative research through credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

Toxic Stress: Intense, prolonged adversity without adequate support that disrupts brain architecture and impairs emotional and physical health (CDC, 2022).

Trauma-Informed Practices (TIPs): Educational approaches that recognize and respond to the effects of trauma by creating safe, supportive, and predictable environments where students can learn and heal (SAMHSA, 2014).

Transformative Learning Theory (TLT): A framework explaining how adults experience deep shifts in beliefs and practices through critical reflection, dialogue, and new experiences (Mezirow, 1991, 2009).

Summary

This chapter introduced the purpose and rationale of the study, emphasizing the growing need for preservice teachers to be equipped to support trauma-affected students through trauma-informed practices (TIPs) and applied educational neuroscience (AEN). It outlined the problem of limited preparation in teacher education programs and established the significance of addressing this gap through intentional coursework, reflective practice, and research-based frameworks. Grounded in Mezirow's (1991) Transformative Learning Theory (TLT), the study investigates how three preservice elementary teachers integrate TIPs and AEN into their developing instructional identities to create supportive, inclusive classroom environments.

The chapter also described the study's theoretical foundation, research purpose, and key terms to establish conceptual clarity and alignment. Together, these elements frame the study within a constructivist paradigm that values meaning-making, reflection, and transformation.

Chapter Two provides a review of the literature that situates this study within current research on trauma-informed education, neuroscience, and teacher transformation. The chapter begins with an overview of TIPs and AEN, followed by a discussion of relevant empirical research and gaps that support the need for this investigation. It concludes by connecting these frameworks to the transformative processes that shape preservice teacher identity, thereby setting the stage for the methodology described in Chapter Three.

Chapter 2 - A Review of the Literature

Healing and learning are parallel processes. Both require safety, connection, and the courage to confront what has been fragmented. In classrooms across the nation, teachers face growing numbers of students whose nervous systems carry the imprint of adversity, loss, and chronic stress (Brown et al., 2020; Thomas et al., 2019). These experiences alter the brain's architecture and disrupt the very capacities of attention, memory, and emotional regulation that make learning possible (Craig, 2016; Perry & Winfrey, 2021). For decades, educational systems have responded to these behaviors through compliance and control rather than compassion and co-regulation (Desautels, 2020).

A growing body of neuroscience and trauma research calls for an intentional pedagogical shift: one that redefines learning as a relational and neurobiological process (Brown et al., 2020; Desautels, 2020; Immordino-Yang & Damasio, 2007; Perry & Winfrey, 2021; Thomas et al., 2019). The prevalence of trauma among children and adolescents emphasizes the urgency of this shift (CDC, 2023; SAMHSA, 2014). National surveys indicate that nearly two-thirds of adults report at least one adverse childhood experience (ACE), and one in six report four or more, with these experiences linked to long-term physical, emotional, and academic challenges (CDC, 2023; Felitti et al., 1998; Foreman, 2020; SAMHSA, 2014; Thomas et al., 2019). In the school context, trauma manifests as behavior challenges, absenteeism, or withdrawal, symptoms frequently misinterpreted as defiance or passivity (Thomas et al., 2019). These misunderstandings reinforce inequities for students who face higher levels of poverty, discrimination, and systematic violence (Brunzell et al., 2015; Thomas et al., 2019).

Research continues to affirm that teachers, equipped with trauma-informed practices (TIPs), can become safeguards against these effects, fostering environments that support

regulation, resilience, and a sense of belonging (Brown et al., 2020; Foreman, 2020; L'Estrange & Howard, 2022). Despite growing awareness, translating trauma-informed principles into consistent classroom practice remains complex and uneven (Foreman, 2020; Thomas et al., 2019). Although foundational professional development has expanded teachers' knowledge, it rarely leads to lasting changes in practice or mindset (McIntyre et al., 2019). These initiatives often overlook a crucial component of teacher transformation: the internal reflection and reorientation required for educators to view students and themselves through a trauma-informed lens (Desautels, 2020; L'Estrange & Howard, 2022). Without this transformation, trauma-informed approaches risk becoming procedural rather than relational (Foreman, 2020; L'Estrange & Howard, 2022). Teacher preparation programs stand at a pivotal intersection: they can either reproduce traditional models of behavior management or cultivate the reflective, neuroscience-aligned practices essential for co-regulation and healing-centered engagement (Desautels, 2020; Dubinsky et al., 2013).

Applied Educational Neuroscience (AEN) offers a scientifically grounded, human-centered approach to understanding this transformation (Desautels, 2020). Rooted in the neurobiology of safety, connection, and plasticity, AEN operationalizes TIPs into strategies that reshape both teaching and learning (Desautels, 2020, 2021). Desautels' (2020) four foundational pillars: adult brain and body State, co-regulation, touchpoints, and teaching brain and body states to adults and students, redefine the classroom as a living nervous system where regulation precedes instruction (Desautels, 2020, 2021; Porges, 1985). These pillars extend beyond behavior management; they represent the pedagogy of presence, inviting educators to attune their own brain-body states as an antecedent to student growth. Neuroscientific research reinforces this foundation, demonstrating that emotion and cognition are interdependent processes

(Immordino-Yang & Damasio, 2007). When teachers embody regulation and relational safety, they create conditions in which neuroplasticity, our brain's ability to reorganize and heal, to thrive (Desautels, 2020; Dubinsky et al., 2013; Porges, 1995).

Transformative Learning Theory (TLT) provides the theoretical foundation for this study, explaining how educators critically examine their assumptions and integrate new theoretical insights and applied educational knowledge into practice (Mezirow, 1991). Research indicates that through critical reflection and dialogue, preservice teachers can reconstruct their professional identities and adopt more responsive approaches to student learning (Mezirow, 1991; Kitchenham, 2008; Taylor, 2008; Hoggan et al., 2017). TLT frames trauma-informed growth not as a checklist of strategies but as a transformative learning journey that reshapes identity, practice, and purpose (Mezirow, 1991).

This chapter synthesizes research across TIPs and AEN, as well as transformative learning, to establish a foundation for this study. Grounded in the expanding body of work connecting trauma, learning, and brain development (Felitti et al., 1998; Perry & Winfrey, 2021; Thomas et al., 2019), the review begins with an exploration of the historical and conceptual roots of trauma in education and its influence on student learning and development. Subsequent sections examine TIPs in schools, emphasizing both the progress and the persistent challenges of implementing trauma-responsive approaches (Brown et al., 2020; L'Estrange & Howard, 2022), and AEN as a conceptual bridge linking brain-based regulation to instructional practice (Desautels, 2020; Dubinsky et al., 2013; Immordino-Yang & Damasio, 2007). The chapter then introduces TLT (Mezirow, 1991; Kitchenham, 2008) as the guiding theoretical framework for understanding how preservice teachers engage in critical reflection and perspective transformation. Together, this literature constructs a conceptual bridge from theory to practice,

positioning this study to investigate how preservice teachers integrate TIPs and AEN understanding into their evolving professional identities, a focus explored through a qualitative multiple-case study with an instrumental purpose design.

To understand how trauma-informed and neuroscience-aligned practices emerged, it is first necessary to examine the nature of trauma itself and how it shapes the conditions for learning. Trauma is not solely an emotional response to adversity; it is a neurobiological and relational experience that alters the brain's capacity for regulation, attention, and connection (Perry & Winfrey, 2021; Siegel, 2012). These disruptions extend beyond individual experiences, influencing classroom dynamics, relationships, and educational systems. Exploring the educational implications of trauma establishes the foundation for this chapter, indicating why trauma-informed practices (TIPs) and applied educational neuroscience (AEN) are essential frameworks for fostering safety, belonging, and engagement in schools. The following section begins by defining trauma through both clinical and educational lenses, highlighting its influence on cognition, emotion, and behavior, and situating these understandings within the broader movement toward trauma-informed education.

Understanding Trauma and Its Educational Implications

Understanding the educational implications of trauma requires first exploring how the concept itself has developed across time and disciplines. Historically, trauma was defined within medical and psychological frameworks that focused narrowly on pathology and individual response (SAMHSA, 2014). Over the past several decades, however, researchers have expanded this view, recognizing trauma as a neurobiological, relational, and systemic experience that greatly influences learning and development (Brown et al., 2022; Desautels, 2020; Perry & Winfrey, 2021; Siegel, 2012). To understand how this shift shapes education today, it is

necessary to examine the historical background that gave rise to the trauma-informed movement and the evolution of trauma as a concept. The following section provides that context, tracing how the study of trauma progressed from medical diagnosis to educational transformation.

Historical Background of the Trauma-Informed Movement

The understanding of trauma has evolved from a narrow medical model to a multifaceted educational and societal framework that recognizes its adverse effects on learning and development (SAMHSA, 2014). This shift redefined trauma as a systemic and relational experience rather than an individual disorder, emphasizing that schools play a vital role in addressing trauma's impact. As research expanded, researchers began to examine how trauma shapes not only mental health but also physical development, cognition, and learning (Burke-Harris, 2018; Immordino-Yang & Damasio, 2007; Perry & Winfrey, 2021; Siegel, 2012). This growing body of evidence reframes trauma as an ecological condition that influences the whole child and the systems surrounding them.

Early definitions of trauma emerged from the medical field and positioned it as a psychological irregularity with the individual (CDC, 2023; SAMHSA, 2014). The inclusion of posttraumatic stress disorder (PTSD) in the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980 formalized trauma as a clinical diagnosis and legitimized research into its psychological and physiological dimensions (APA, 19080; Herman, 1992). However, these early definitions located trauma within the individual psyche, isolating it from the relational and environmental contexts that often contribute to its development (Webb, 2022).

By the late 20th century, interdisciplinary research challenged this simplistic view. The groundbreaking *Adverse Childhood Experiences (ACEs) Study*, conducted by Felitti and Anda (1998), marked a turning point, linking early adversity to a wide range of physical, mental, and

social health outcomes. Analyzing data from more than 17,000 participants, the study indicated that higher ACEs scores correlated with chronic illness, substance abuse, and mental health disorders later in life (Felitti & Anda, 1998). This finding confirmed that trauma's effects are cumulative and systemic, prompting a reexamination of how social systems, including schools, respond to adversity (Burke-Harris, 2018).

Building on this understanding, it is essential to examine how the concept of trauma has evolved. Over the past several decades, definitions of trauma have shifted from being viewed primarily as a clinical disorder to being recognized as a complex biopsychosocial experience that intersects with education, culture, and community (American Psychiatric Association, 1980, 1984, 2000, 2013; SAMHSA, 2014; Whittier, 2009). The following section examines this evolution, illustrating how psychological, social, and neuroscientific perspectives collectively expanded trauma's meaning and paved the way for trauma-informed approaches in schools.

Subsequent neuroscience research expanded the understanding of trauma's impact. Building on advances in neuroscience, Perry (2006), Siegel (2006), and Immordino-Yang (2016) demonstrated that trauma reshapes the neural circuitry of the amygdala, hippocampus, and prefrontal cortex, areas essential for emotional regulation, attention, and higher-order thinking. Collectively, their work established that trauma extends beyond emotional distress, disrupting the neurological systems that make learning and relational engagement possible. Research on neuroplasticity introduced an equally important insight: the brain can reorganize and heal through consistent, supportive relationships and predictable environments (Desautels, 2020; Siegel, 2012). These findings laid the foundation for trauma-informed education, grounding pedagogy in a scientific understanding of the brain-body connection and highlighting educators' roles in fostering regulation and resilience.

The educational implications of this research became increasingly evident in the early 2000s. Policymakers and researchers have recognized that schools —primarily teachers — are well positioned to buffer the effects of trauma (Craig, 2016; Thomas et al., 2019). The establishment of the National Child Traumatic Stress Network (NCTSN) in 2000 formalized this perspective, promoting training and resources to support trauma-impacted students in educational settings (SAMHSA, n.d.).

Legal and policy movements reinforced this shift. The 2015 class-action lawsuit *Peter P. et al. v. Compton Unified School District* argues that schools have a legal and moral obligation to address trauma as a barrier under the Americans with Disabilities Act (ADA) (Adams, 2018). This case positioned trauma-informed education as an equity issue rather than an optional practice. Recently, the *Trauma-Informed Schools Act of 2022* (S. 4614) and other federal initiatives have sought to incorporate trauma sensitivity into school policy. Implementation remains uneven: as of 2019, only 16 states required trauma-focused professional development for teachers, and only Virginia mandated trauma training for preservice teachers (National Association of School Boards [NASB], 2022). These gaps indicate the need to integrate TIPs into teacher preparation programs to ensure equitable educational access for all students (Atwood et al., 2022).

The historical development of trauma research established the foundation for trauma-informed education, demonstrating that learning cannot be separated from the brain's response to safety, connection, and regulation (Alisic, 2011; Bell et al., 2013; Sporleder & Forbes, 2016). As researchers extended their understanding of how adversity affects both the mind and nervous system, the concept of trauma evolved (Perry, 2025; Porges, 2022). What started as a clinical diagnosis evolved into an interdisciplinary construct that links neuroscience, psychology, and

education (Sousa, 2010; van der Kolk, 2003, 2015). The following section examines this evolution, highlighting how shifting definitions of trauma have influenced contemporary understandings of learning, relationships, and healing within educational contexts.

The Evolution of the Concept of Trauma

The evolving conception of trauma reflects an interdisciplinary shift that integrates neuroscience, psychology, and education to explain how adversity shapes both individual functioning and learning environments (Craig, 2016; Sousa, 2010; Thomas et al., 2019). Researchers across various fields have demonstrated that trauma is not solely a psychological condition, but a neurobiological and relational experience that influences development and learning (Burke-Harris, 2018; Perry & Winfrey, 2021; Siegel, 2012). Immordino-Yang (2016) called for integrating affective neuroscience with educational practice, emphasizing that learning depends on the interaction of emotion, cognition, and context. Similarly, Siegel's (2012) framework of interpersonal neurobiology suggests that relationships and neural integration are inextricably linked processes in shaping identity and well-being.

Perry and Winfrey (2021) extended this understanding, demonstrating how trauma disrupts the brain's capacity for regulation and connection, while safe and predictable relationships foster repair and restoration. Later research expanded this perspective, showing that emotional safety and attuned relationships can reconstruct disrupted neural pathways (Desautels, 2020; Dubinsky et al., 2013; Porges, 2018; Siegel, 2012, 2020). Collectively, these interdisciplinary insights reformed trauma from an isolated medical diagnosis to a systemic and relational phenomenon with implications for educational practice and teacher preparation (Brown et al., 2020; SAMHSA, 2014).

Early definitions positioned trauma as an intrapersonal disorder, emphasizing the individual's maladaptive response to distress rather than the relational and systematic conditions that shape those experiences (APA, 1980, 2013). However, researchers such as Herman (1992) and van der Kolk (2015) have challenged this simplistic view, emphasizing that trauma disrupts connection, trust, and the capacity for relationship, core conditions for learning and development. Herman (1992) argues that trauma erodes an individual's sense of connection and control, making recovery a relational process. Similarly, van der Kolk (2015) demonstrated that healing depends on environments that restore safety, trust, and connection, conditions that extend beyond therapy, into classrooms, families, and communities.

This shift from seeing trauma as an individual problem to understanding it as a relational one marked a significant change in perspective (Craig 2016). It revealed that trauma influences not only emotional well-being but also relationships and the ability to engage in learning (Burke-Harris, 2018; Desautels, 2020; Hamre & Pianta, 2001). Perry and Winfrey (2021) furthered this understanding by emphasizing that trauma is “biologically embedded in relationships,” suggesting that educators, through consistent and attuned interactions, can become central agents of regulation and repair. Collectively, this research challenged deficit-based views of trauma and positioned connection, co-regulation, and safety as essential ingredients for resilience (van der Kolk, 2015), principles that would later support trauma-informed education.

This reconceptualization of trauma as both a neurobiological and relational phenomenon provided the foundation for trauma-informed education (Brown et al., 2022; NCTSN, 2020; SAMHSA, 2014). As educators and researchers recognized that learning and healing are parallel processes, attention shifted from theory to implementation, specifically how schools and teacher preparation programs translate this research into practice (Brown et al., 2022; Brunzell, 2018;

Puchner & Markowitz, 2023). The following section examines empirical studies of trauma-informed initiatives in K-12 and preservice contexts, highlighting both their successes and persistent challenges.

Current Empirical Studies on Trauma-Informed Education and Teacher Preparation

The growing recognition of trauma's effects on behavior has generated an expanding body of empirical research examining how teachers and schools apply trauma-informed practices (TIPs). Foundational work such as the Adverse Childhood Experiences (ACEs) study established the prevailing relationship between early adversity and academic, behavioral, and health outcomes (Felitti & Anda, 1998; CDC, 2023; SAMHSA, 2014). Building on this foundation, researchers explored how educators translate TIPs into daily practice and how these practices shape teacher effectiveness, classroom environment, and student engagement (Brown et al., 2020; Craig, 2016; Thomas et al., 2019).

Brunzell, Stokes, and Waters (2019) executed one of the earliest empirical research studies of trauma-informed professional development for elementary teachers. Their mixed-methods study revealed that sustained professional learning enhanced teachers' ability to build safe, relational environments and improved student engagement and behavior (Brunzell et al., 2019). Although their study was limited by its small sample size and reliance on self-report, it provided analytical evidence that intentional professional learning can shift teacher practice from behavioral control toward relational regulation (Brunzell et al., 2019; Perry & Szalavitz, 2017). Thomas, Crosby, and Vanderhaar (2019) expanded on this work through a quasi-experimental design involving 20 schools across two states. The researchers found that trauma-informed implementation was associated with reductions in disciplinary incidents and increases in academic achievement, demonstrating TIPs' potential for systemic benefits (Thomas et al.,

2019). However, the researchers noted that such studies seldom examine the reflective processes through which educators internalize and sustain TIPs over time (Brown et al., 2020; Craig, 2016).

Other large-scale analyses, such as the Trauma-Informed Elementary Schools (TIES) pilot by Rishel et al. (2019), further support the value of trauma-informed interventions. Their quasi-experimental findings showed improvements in emotional support, classroom organization, and teacher-student relationships following the implementation of TIPs. However, like many intervention-based studies, the TIES project captured outcomes over a single academic year, leaving questions about long-term changes in teacher mindset and instructional identity. A recent systematic review by Maynard et al. (2019) reached similar conclusions, noting that most school-based trauma-informed studies show promising short-term gains but lack methodological rigor and longitudinal follow-up.

Parallel research in teacher preparation reveals similar patterns. Puchner and Markowitz (2023) examined preservice teachers' experiences across multiple institutions and found inconsistent exposure to TIPs. Participants often described trauma as an isolated incident rather than an integrated instructional lens and expressed a need for explicit connections between theory and classroom application (Puchner & Markowitz, 2022). Brown et al. (2022) echoed these findings, reporting that teacher-preparation programs vary widely in the introduction of trauma-related content and seldom incorporate reflection or practice-based modeling. L'Estrange and Howard (2022) likewise found that, while preservice teachers increasingly saw the importance of TIPs, they lacked opportunities to connect neuroscience, emotional regulation, and pedagogical strategies in a framework.

Emerging studies also indicate a growing interest in neuroscience-informed education, though these remain conceptual rather than empirical (Dubinsky et al., 2013). Dubinsky et al. (2013) emphasized the potential of integrating neuroscience into professional development, demonstrating that basic brain science grows teachers' understanding of learning processes. In a comparative study, Deibl and Zumbach (2023) examined how preservice teachers at different stages of teacher preparation understood the role of neuroscience in education. The study's findings indicated that students early in the teacher-preparation program hold limited or inaccurate conceptions, while those further along show somewhat stronger, though still limited integration of neuroscience principles into pedagogical thinking (Diebl & Zumbach, 2023). These studies together suggest that, while preservice teachers recognize the importance of neuroscience for instruction, few have received training in its application for students (Immordino-Yang & Damasio, 2007; Dubinsky et al., 2013; Deibl & Zumbach, 2023).

Despite growing advocacy, no peer-reviewed empirical research currently examines Applied Educational Neuroscience (AEN) in preservice or in-service teacher-preparation contexts. Current research on AEN is primarily descriptive and practice-based (Desautels, 2020, 2021), with minimal empirical studies examining how educators implement or experience these ideas in current classrooms. This gap is significant because AEN operationalizes the neurobiological and relational concepts supporting trauma-informed education through its four pillars: adult brain and body state, co-regulation, touchpoints, and teaching brain and body states to students and adults (Desautels, 2020, 2021; Porges, 2018; Siegel, 2012). AEN's pillars provide educators with a scientific foundation for understanding behavior, connection, and resilience (Desautels, 2020; Dubinsky et al., 2013; Immordino-Yang & Damasio, 2007),

although their influence on teacher preparation and professional identity development remains unexplored.

Together, these studies show a field in emergence and transition, from short-term, awareness-based professional development toward a more relational, reflective, and systemic approach to trauma-informed education. However, the research remains methodologically disconnected. Quantitative designs tend to measure external outcomes such as discipline rates or test scores (Thomas et al., 2019; Rishel et al., 2019), while qualitative research relies on self-reported experiences, offering a limited understanding of teachers' long-term internal transformation (Brunzell et al., 2019; Puchner & Markowitz, 2023). Few investigations trace how educators' beliefs, emotions, and identities transform as they engage with TIPs and neuroscience-aligned concepts, such as AEN (Brown et al., 2022; L'Estrange & Howard, 2022; Craig, 2016).

The research deficit has left teacher preparation programs with limited empirical guidance on how to effectively prepare elementary preservice teachers to recognize and respond to trauma, contributing to a persistent gap between current practice and pedagogical potential (Brown et al., 2022; L'Estrange & Howard, 2022; SAMHSA, 2014). Despite broad agreement that understanding trauma and regulation is foundational in effective teaching, few studies have examined how preservice teachers internalize and apply these principles within their evolving professional identities.

Addressing these methodological and conceptual gaps is central to the present study. Using a qualitative multiple-case-study design with an instrumental purpose grounded in Transformative Learning Theory (TLT), this research indicates the reflective, emotional, and cognitive dimensions of preservice teachers' growth (Mezirow, 1991; Kitchenham, 2008; Taylor,

2008; Hoggan et al., 2017). Through semi-structured interviews, reflective journals, and case-study analyses, this study expands current literature by exploring how preservice teachers internalize and apply TIPs and AEN concepts as part of their transformative professional identities (Desautels, 2020; Mezirow, 2009).

Across the expanding body of research on trauma-informed education, multiple methodological trends reveal both progress and limitations (Craig, 2016; Thomas et al., 2019). Early studies primarily emphasized program implementation and short-term outcomes, often using quantitative or quasi-experimental designs that measured disciplinary incidents, academic performance, or teacher perceptions (Thomas et al., 2019; Maynard et al., 2019; Rishel et al., 2019). While these designs contributed evidence that TIPs improve classroom environment and student engagement, they did not indicate the reflective and relational dimensions that enable teachers to integrate these practices authentically (Brunzell et al., 2019; Brown et al., 2020). The research provides data on what happens when TIPs are adopted but lacks a comprehensive understanding of how educators internalize and sustain them (L'Estrange & Howard, 2022; Puchner & Markowitz, 2023).

A second finding across the literature is that research has concentrated on professional development for in-service teachers, leaving gaps in understanding how preservice teachers acquire and understand TIPs and AEN. Studies by Brunzell et al. (2019) and Puchner and Markowitz (2023) suggest that teachers conclude the most benefit from extended, relational learning experiences rather than traditional professional development. Most studies relied on self-reported surveys and short-term interviews, limiting understanding of the transformative beliefs, emotions, and instructional identities that arise over time (Brown et al., 2022; L'Estrange & Howard, 2022). Few research designs have employed longitudinal or case-based approaches to

explore teachers' cognitive and affective growth as they navigate TIPs (Craig, 2016; Thomas et al., 2019). These methodological gaps restrict the field's understanding of how teachers evolve from awareness to pedagogy (Mezirow, 1991, 2009; Kitchenham, 2008).

A third notable omission concerns AEN research, which has not been examined in teacher-preparation programs. While Desautels (2020) established the conceptual foundations of AEN through practitioner-based work, no peer-reviewed studies have explored how preservice teachers experience or implement these ideas in classrooms. The field currently relies on descriptive accounts and short-term training models, leaving unanswered questions about how elementary preservice teachers internalize AEN into their professional identities (Desautels, 2021; Dubinsky et al., 2013). Addressing this gap is central to the present study, which examines how preservice teachers engage with and apply AEN and TIPs during their teacher-preparation journey (Mezirow, 1991; Desautels, 2020; Hoggan et al., 2017).

Understanding these research gaps requires revisiting the foundations of trauma, its definition, mechanisms, and implications for learning and development. To position AEN and TIPs within an educational context, the following section examines the impact of trauma on development, behavior, and classroom environment. This research emphasizes the importance of incorporating neuroscience-aligned, relationship-centered pedagogy to prepare future elementary teachers to address trauma effectively (Brown et al., 2020; Desautels, 2020; Perry & Winfrey, 2021).

Table 2.1. *Summary of Current Empirical Studies on Trauma-Informed Education and Teacher Preparation*

Author(s) & Year	Population / Context	Methodology	Key Findings	Limitations / Gaps Identified
Brunzell, Stokes, & Waters (2019)	Elementary teachers (Australia)	Mixed-methods PD study	Professional learning improved teacher-student relationships and engagement.	Small sample; self-reported data; short-term focus.
Thomas, Crosby, & Vanderhaar (2019)	Trauma- Informed Elementary Schools (TIES) pilot	Quasi- experimental	TIPs reduced disciplinary incidents and increased academic achievement.	Limited insight into teacher reflection and internalization.
Rishel et al. (2019)	Trauma- Informed Elementary Schools (TIES) pilot	Quasi- experimental	Improved emotional support and classroom organization	One-year study; limited longitudinal evidence.
Maynard et al. (2019)	Systematic review of TIPs in schools	Systematic review	TIPs show promise for improving outcomes.	Limited rigorous, long- term, or mixed- method designs.

Author(s) & Year	Population / Context	Methodology	Key Findings	Limitations / Gaps Identified
Brown et al. (2022)	Preservice teacher preparation programs	Qualitative comparative	Identified inconsistency in trauma-related training and reflection opportunities.	Variation across programs; lacks sustained data.
Puchner & Markowitz (2023)	Preservice teachers (multiple institutions)	Qualitative interviews	Participants viewed trauma as isolated incidents; needed applied connections.	Limited sample diversity; self- report bias

Table 2.1 synthesizes recent empirical research (2019-2023) on trauma-informed education and teacher preparation. Collectively, these studies demonstrate growing evidence that TIPs enhance teacher-student relationships, classroom organization, and student engagement. However, consistent gaps persist across the literature, including longitudinal research, overreliance on self-report data, and minimal integration of AEN within preservice preparation programs. The gaps show the need for qualitative studies, such as the present one, that explore how preservice teachers internalize and apply TIPs and AEN concepts through reflective, transformative processes.

The Impact of Trauma

Trauma represents one of the most pervasive factors influencing children's learning, behavior, and emotional development, with researchers documenting its widespread prevalence and educational impact (Berger, 2019; Overstreet & Chafouleas, 2016; Perry & Daniels, 2016). The Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) defines trauma as an emotional response to distressing or life-threatening events that overwhelm an individual's ability to cope and result in lasting effects on their mental, emotional, and physical well-being. This definition extends beyond emotional distress, indicating trauma's capacity to alter the biological foundations of learning and behavior (Bremner, 2006; Perry & Pollard, 1998; Siegel, 2012; van der Kolk, 2015).

Neurobiological research confirms that chronic stress and adversity disrupt the brain systems that regulate attention, memory, and emotion. Perry and Pollard (1998) demonstrated that prolonged activation of the stress-response system disrupts brain architecture, primarily in the amygdala, hippocampus, and prefrontal cortex, brain regions central to emotion, cognition, and executive functioning. Building on this work, Bremner (2006) used neuroimaging, which showed that trauma shrinks the hippocampal volume and impairs the brain's capacity to integrate new learning. Similarly, Siegel (2012) described how trauma interferes with neural pathways needed for emotional balance and relational attunement. Together, their research findings explain why many trauma-impacted students exhibit hypervigilance, withdrawal, or emotional dysregulation, behaviors often misread as defiance rather than responses to perceived threat (Souers & Hall, 2016; Thomas et al., 2019).

Together, these findings position trauma as both a neurobiological and educational phenomenon, one that shapes how children think, feel, and engage in learning. Understanding

how trauma alters the developing brain, teachers can shift from traditional punitive approaches toward relational, regulation-based strategies that promote healing and connection (Desautels, 2020; Perry & Winfrey, 2021).

Understanding trauma’s neurobiological foundations also clarifies how it manifests in childhood and in the classroom environment. Students exposed to trauma or chronic stress experience disruptions in brain regions that affect emotional regulation, attention, memory, and learning, functions essential for social connection and academic performance (Peverill et al., 2023; Siegel, 2012; van der Kolk, 2015). These disruptions often appear as difficulty focusing, emotional volatility, or impulsive behavior, which are misinterpreted as intentional misbehavior, unintentionally reinforcing shame and disconnection (Souers & Hall, 2016; Thomas et al., 2019).

Table 2.2. *Manifestations of Trauma in Elementary Students*

Category	Examples	Classroom Manifestation
Physical	Stomach aches, headaches, fatigue, sleep disturbances, changes in appetite or energy levels (Bell et al., 2013; Burke-Harris, 2018; Hodas, 2006).	Frequent visits to the nurse, falling asleep in class, and noticeable changes in energy levels or appetite.

Category	Examples	Classroom Manifestation
Emotional	Anxiety, depression, irritability, emotional numbness, mood swings, withdrawal from peers, and conflicts with teachers (Desautels & McKnight, 2019; Souers & Hall, 2016)	Frequent crying, excessive fearfulness, mood swings, withdrawal, conflicts with peers or teachers.
Cognitive	Reduced memory retention, lack of focus, impaired decision-making, lower test scores, incomplete assignments, and increased behavioral referrals (Statman-Weil, 2015; Siegel, 2011; Enlow et al., 2012; Bell et al., 2013)	Incomplete assignments, difficulty focusing, lower test scores, behavioral referrals, or special education placement.

Table 2.2 summarizes the physical, emotional, and cognitive manifestations of trauma commonly observed in children, illustrating how these indicators often appear in classroom contexts. The table integrates findings from Bell et al. (2013), Burke-Harris (2018), Desautels and McKnight (2019), Hodas (2006), Siegel (2011), and related research to indicate the multidimensional impact of trauma on student functioning. Recognizing these manifestations is

essential for educators implementing TIPs and AEN, as early identification of these patterns informs responsive regulation, relational support, and instructional design (Desautels, 2020, 2024).

Teachers, therefore, play a critical role in buffering the effects of trauma on learning and behavior. Viewing behavior through a trauma-informed lens shifts the guiding question from *“What is wrong with this student?”* to *“What happened to this student?”*, a reframing that moves from compliance to compassion (Desautels & McKnight, 2019; Souers & Hall, 2016). Teachers who make this shift are better able to identify unmet needs driving dysregulated behavior to respond with strategies that promote safety, predictability, and connection (Desautels, 2020; Perry & Winfrey, 2021; Souers & Hall, 2016). This relational approach aligns with the neurobiological evidence showing that consistent, attuned relationships and predictable environments calm the stress response system, creating trust, regulation, and cognitive engagement (Perry & Winfrey, 2021; Souers & Hall, 2016).

Trauma-Informed Practices (TIPs)

Trauma-informed practices (TIPs) have emerged as a critical tool for transforming how teachers respond to students affected by adversity (Downey & Greco, 2023; Sweetman, 2022). Rather than focusing on compliance or behavioral control, trauma-informed approaches emphasize safety, connection, and regulation as essential prerequisites to learning (Brown et al., 2020; Desautels, 2020; Overstreet & Chafouleas, 2016; Thomas et al., 2019). Rooted in the understanding that chronic stress and trauma disrupt neural development, emotional regulation, and relational capacity, TIPs equip teachers to create classroom environments that restore safety, rebuild trust, and reengage the brain’s ability to learn (Bremner, 2006; Perry & Pollard, 1998;

Siegel, 2012; Thomas et al., 2019). This shift marks a fundamental reorientation from controlling student behavior to cultivating an environment in which learning and healing can occur.

Despite growing awareness of TIPs' importance, their implementation remains inconsistent across educational settings; currently, only 16 states provide TIP training (NASBE, 2022). This inconsistency is compounded by gaps in research indicating which frameworks are adequate and the limited empirical research on the efficacy of various TIP models (Overstreet & Chafouleas, 2016; Rodger et al., 2020). In-service teachers on the frontline have often been shaped by traditional training methods prioritizing content delivery over trauma sensitivity, which can delay TIPs implementation (Puchner & Markowitz, 2023; Thomas et al., 2019).

Due to the inconsistencies, SAMHSA (2014) identified six core principles that underpin trauma-informed work: safety; trustworthiness and transparency; peer support; collaboration; empowerment; and addressing cultural, historical, and gender issues. These principles extend beyond classroom management to guide the entire ecology of the school environment, serving as a blueprint for creating environments where both students and teachers feel physically, emotionally, and psychologically safe (SAMHSA, 2014). In education, these principles translate into predictable routines, transparent communication, collaborative problem solving, and recognition of student voice and agency (Overstreet & Chafouleas, 2016). By creating emotionally and physically safe spaces, teachers can reduce the activation of the stress response system, thereby increasing students' readiness to learn (Bath, 2008; Perry & Pollard, 1998; Perry & Winfrey, 2021; Porges, 2018). The emphasis on predictability and belonging enables students' nervous systems to shift from a state of survival to one of engagement, trust, and curiosity (Desautels, 2020; Siegel, 2012).

Researchers emphasize that intentional transformation occurs not solely from awareness, but from the application of TIPs to everyday teaching and relational interactions (Downey & Greco, 2023; Sweetman, 2022). TIPs allow teachers to move beyond surface-level strategies toward addressing the root causes of behavioral and learning challenges (Bath, 2008; Brunzell, Stokes, & Waters, 2019; Desautels & McKnight, 2019; Overstreet & Chafouleas, 2016; Souers & Hall, 2016; Thomas et al., 2019). Instead of emphasizing compliance and control, trauma-informed teachers prioritize regulation and relationship as the foundations of engagement (Brunzell et al., 2019; Desautels & McKnight, 2019; Souers & Hall, 2016). When teachers interpret behavior as communication of unmet needs rather than intentional defiance, they can respond with relational repair and co-regulation rather than punishment (Bath, 2008; Perry & Winfrey; Porges, 2018). This shift redefines discipline as a process of restoring safety, helping students regain emotional balance and cognitive readiness for learning.

Within these environments, relationships become the cornerstone of instruction. Neuroscientific and educational research consistently show that learning depends on students' capacity for regulation and connection; the brain cannot access rational reasoning until the nervous system perceives safety (Desautels, 2020, 2021; Immordino-Yang, 2016; Perry & Pollard, 1998; Porges, 1995, 2018; Siegel, 2012). Creating predictable routines, attuned communication, and relational cues, trauma-informed teachers can help students develop the trust and stability necessary for engagement (Brunzell et al., 2019). As Brunzell et al. (2019) found, when teachers intentionally implement TIPs in professional learning, students exhibit increased self-regulation, improved focus, and stronger classroom relationships.

Although the foundational neuroscience of trauma has informed these practices, the field continues to evolve toward integrating neuroscience research in education. AEN extends the

principles of trauma-informed education by grounding them explicitly in the neurobiological processes that support regulation, connection, and relational safety. Building on the work of Desautels (2020, 2021), AEN extends TIPs by understanding how stress and emotional states impact neural functioning and learning (Desautels, 2021). AEN concepts align with Porges' (1995, 2011, 2018) polyvagal theory, which identifies safety and co-regulation as prerequisites for engagement, and with Siegel's (2012) model of interpersonal neurobiology, which emphasizes the brain's social nature and its reliance on relationships for integration and regulation. Similarly, Perry and Winfrey (2021) and Immordino-Yang (2016) illustrate that emotional connection and predictability restore the brain's capacity for learning, supporting AEN's central premise that relational safety is the foundation for cognitive and emotional growth.

Table 2.3. *SAMHSA's Six Trauma-Informed Principles and Their Application to Teacher Preparation*

SAMHSA Principle	Core Description	Application to Trauma-Informed Education
Principle 1: Safety	Ensuring physical, emotional, and psychological safety for classroom community (SAMHSA, 2014).	Teachers create predictable routines, calm tone, and structured environments that reduce threat responses and promote learning readiness (Bath, 2008; Perry & Pollard, 1998)
Principle 2: Trustworthiness & Transparency	Clear expectations and open communication build trust among students and colleagues (SAMHSA, 2014).	Teachers explain procedures and decisions openly, model honesty, and provide consistent feedback (Overstreet & Chafouleas, 2016)
Principle 3: Peer Support	Healing occurs in relationships and shared experiences (SAMHSA, 2014).	Teachers foster peer mentoring and collaborative learning, so students co-regulate and experience belonging (Brunzell et al., 2019)

SAMHSA Principle	Core Description	Application to Trauma-Informed Education
Principle 4: Collaboration & Mutuality	Power differences are leveled through shared decision-making (SAMHSA, 2014).	Teachers engage students in goal setting and classroom norms, reinforcing shared responsibility for safety and learning (Souers & Hall, 2016).
Principle 5: Empowerment, Voice, & Choice	All individual's strengths and experiences are recognized and validated (SAMHSA, 2014).	Teachers give students agency through differentiated instruction, restorative practices, and opportunities for self-advocacy (Brown et al., 2020).
Principle 6: Cultural, Historical, & Gender Awareness	Practices acknowledge and respond to systemic inequities and cultural identities (SAMHSA, 2014).	Teachers integrate responsive pedagogy and reflect on biases that influence their perceptions of behavior (Gay, 2018; Herman, 1992).

Note. Adapted from SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach (Substance Abuse and Mental Health Services Administration, 2014). The integration of educational applications aligns with the literature by Desautels (2020, 2021), Mezirow (1991, 2009), Brunzell et al. (2019), Brown et al. (2020), and Taylor (2008).

The six principles outlined by SAMHSA (2014) provide the ethical and relational foundation for trauma-informed education, yet they do not fully explain *how* these principles manifest within the brain and body. AEN extends TIPs by integrating neurobiological understanding with classroom strategies, translating the principles of safety, trust, and empowerment into processes of regulation and connection (Desautels, 2020). Within the AEN model, co-regulation fosters engagement by synchronizing the nervous systems of teacher and student through relational safety (Desautels, 2020, 2021; Porges, 2018; Siegel, 2012). Reflective teaching, in turn, promotes neural integration and resilience, demonstrating how intentional

awareness and emotional attunement can rewire both the teacher's and the student's brains to support learning and recovery (Desautels, 2023; Immordino-Yang & Damasio, 2007; Mezirow, 2009). The connection between brain-based understanding and relational practice is the foundation of AEN.

Applied Educational Neuroscience (AEN)

Educational neuroscience bridges the fields of neuroscience, psychology, and education, providing an understanding of how brain processes influence learning and development (Sousa, 2010; Varma et al., 2008). Early debates questioned whether neuroscience could intentionally inform classroom instruction, with Bruer (1997) cautioning against direct application of neuroscience findings. However, research demonstrated its educational relevance. Dubinsky et al. (2013) found that neuroscience-informed professional development improved teachers' understanding of learning processes and enhanced their instructional decision-making. Building on these interdisciplinary advances, AEN, developed by Desautels (2018), extends trauma-informed education by explicitly connecting neurobiological principles to teaching practice.

Applied Educational Neuroscience (AEN), developed by Desautels (2018), integrates neuroscience, psychology, and education to help teachers understand how brain states influence learning, relationships, and behavior. AEN rests on four pillars, with its foundation built on the understanding that learning and emotional well-being are interconnected, particularly for students whose nervous systems have been shaped by adversity or chronic stress (Desautels, 2018, 2020, 2021; Persike, 2021). By grounding trauma-informed practice in neuroscience, AEN provides teachers with tools to create safe, relational, and emotionally attuned learning environments.

AEN integrates neuroscience, psychology, and education to address the emotional, cognitive, and relational needs of students who have been impacted by trauma and chronic stress (Desautels, 2020; Persike, 2021). It recognizes that learning is both a neurological and relational process: students cannot access reasoning and creativity until their nervous systems experience safety and connection (Perry & Pollard, 2012; Porges, 2011; Siegel, 2012). When teachers understand how stress alters neural functioning, they can intentionally design environments that regulate the brain and body, restore trust, and reopen access to learning (Desautels, 2018, 2020, 2021; Porges, 2015).

Neuroscience research provides the rationale for AEN concepts. Chronic activation of the stress response system changes the neural networks in the amygdala, hippocampus, and prefrontal cortex, regions central to emotional regulation and executive functioning (Bremner, 2006; Perry & Pollard, 1998). Neuroplasticity enables healing and new learning when students experience TIPs, such as supportive relationships and predictable routines (Darling-Hammond et al., 2002; SAMHSA, 2014; Siegel, 2020). AEN operationalizes these findings by teaching teachers how to create relationally safe classrooms that strengthen neural integration, the coordination between emotional and cognitive systems essential for self-regulation and engagement (Desautels, 2020; Porges, 2011).

Research demonstrates that trauma and chronic stress alter the brain's architecture, particularly in regions such as the amygdala, hippocampus, and prefrontal cortex, which regulate emotion, memory, and executive functioning (Perry & Pollard, 1998; Siegel, 2012; van der Kolk, 2015). These neurobiological disruptions can keep students in a persistent state of hyperarousal, limiting their capacity for attention, problem solving, and social connection (Dubinsky et al., 2013; Perry & Pollard, 1998; Siegel, 2012; van der Kolk, 2015). AEN addresses this challenge

by emphasizing neuroplasticity, the brain's ability to reorganize and heal through consistent, supportive experiences (Desautels, 2020, 2021, 2023). When teachers design classrooms that are structured, predictable, and emotionally responsive, they help students rebuild the neural pathways required for regulation, trust, and engagement in learning (Desautels, 2020; Perry & Winfrey, 2021).

Applied Educational Neuroscience (AEN) operationalizes the neurobiological principles underlying trauma-informed education into tangible, relationship-centered classroom practices. Developed by Desautels (2020), AEN is organized around four interconnected pillars: Educator Brain and Body State, Co-Regulation, Touchpoints, and Teaching Brain and Body States to Students, which collectively support regulation, safety, and connection for both educators and learners. Each pillar represents an implementable translation of neuroscience into pedagogy, representing how educators' awareness of their own physiological states directly influences students' capacity for engagement and regulation (Desautels, 2020, 2023; Siegel, 2012).

While AEN explains what occurs within the brain and body during regulation and connection (Desautels, 2020), Mezirow's (1991) Transformative Learning Theory (TLT) explains how meaning and professional identity evolve through these experiences. Together, these perspectives demonstrate the internal and external dimensions of educator growth: AEN provides the physiological grounding, how safety, co-regulation, and reflection reshape neural pathways (Desautels, 2020) while TLT frames the reflective process that enables preservice teachers to reinterpret these experiences, challenge prior assumptions, and integrate new ways of being and teaching (Desautels, 2020, 2023; Mezirow, 1991, 2009; Siegel, 2012). In this way, TLT serves as the theoretical bridge connecting neuroscience and transformation, positioning reflection, emotion, and cognition as interdependent processes in professional learning.

Table 2.4 summarizes each of the four pillars of AEN, including core descriptions and classroom implications, and establishes how these neuroscience-based principles align with the reflective transformation central to TLT.

Table 2.4. *The Four Pillars of Applied Educational Neuroscience*

Pillar	Core Description	Educational and Classroom Implications	Researchers/Sources
Pillar One: Educator Brain and Body State	Emphasizes that educators must regulate their own nervous systems before supporting students. Adult self-regulation establishes emotional safety.	Teachers who remain calm model stability, reduce student stress responses, and create predictable, emotionally safe environments.	Desautels (2020, 2021); Porges (1995, 2018); Siegel (2012)
Pillar Two: Co-Regulation	Highlights the reciprocal process through which educators and students share calm and emotional steadiness.	Through tone, pacing, and body language, teachers model regulation, helping students move from reactive to reflective brain states.	Desautels (2020, 2023); Siegel (2012); Perry & Winfrey (2021)
Pillar Three: Touchpoints	Refers to brief, intentional moments of relational connection that foster trust and a sense of belonging.	Greeting students by name, validating feelings, and offering consistent positive interactions strengthen attachment and classroom safety.	Desautels (2020, 2023); Hachtem et al. (2022); Brunzell et al. (2019)
Pillar Four: Teaching Brain and Body State to Students and Staff	Involves teaching basic brain and body concepts so learners understand and manage their own regulation.	Students learn to identify when they are dysregulated (“flipped lid”) and use strategies such as breathing or movement to return to a state of learning readiness.	Desautels (2020, 2021); Siegel (2012); Dubinsky et al. (2013)

Note. The table illustrates how AEN’s four pillars translate neuroscience principles into classroom practice that supports emotional regulation and learning.

As shown in Table 2.4, AEN provides educators with a structured yet relational approach to fostering safety and learning through brain-based practices. The framework reframes teaching as an integrated process in which emotional regulation, relational connection, and cognitive engagement occur simultaneously. This neurobiological understanding complements Mezirow’s (1991) Transformative Learning Theory by emphasizing that meaningful educational change begins with awareness and reflection within the adult learner. The following section introduces TLT as the guiding theoretical framework for this study and illustrates how preservice teachers’ engagement with AEN and TIPs reflects the phases of perspective transformation described by Mezirow.

Transformative Learning Theory (TLT)

Transformative Learning Theory (TLT), developed by Jack Mezirow (1978, 1991, 2000), is a widely recognized framework in adult education that explains how individuals critically examine and revise their assumptions through reflection, dialogue, and action. TLT describes learning as a process in which adults confront experiences that challenge their existing beliefs, what Mezirow (1991) termed disorienting dilemmas, and reconstruct their perspectives to form inclusive, self-aware, and adaptive understandings (Hoggan et al., 2017; Mezirow & Taylor, 2009). This theory aligns with the goals of trauma-informed and neuroscience-aligned teacher education, in which preservice teachers often encounter new understandings of student behavior, regulation, and classroom relationships that compel them to rethink traditional approaches to teaching and learning (Desautels, 2020; Mezirow, 1991).

Mezirow's early work, based on a national study of women returning to higher education, identified ten phases of perspective transformation, illustrating how individuals move from disorientation to the integration of new beliefs (Kitchenham, 2008; Mezirow, 1978). In teacher preparation, this process mirrors how preservice teachers evolve as they grapple with the realities of trauma-impacted classrooms. When their prior beliefs about compliance, discipline, or "good teaching" fail to align with the complex needs of their students, they experience disorienting dilemmas that spark critical reflection and change. Through this process, teachers transition from behavior-based frameworks to relational, regulation-focused practices grounded in empathy and neuroscience.

Several philosophical and theoretical influences substantiate TLT. Thomas Kuhn's (1962) concept of paradigm shifts holds that transformation arises when existing frameworks fail to explain lived experience. Paulo Freire's (1970) concept of conscientization has contributed to the social and moral dimensions of learning by emphasizing reflection on power, bias, and equity, which are essential for preservice teachers who must interrogate how systemic inequities influence students' experiences. Jürgen Habermas's (1971, 1981) theory of communicative action shaped Mezirow's focus on dialogue and mutual understanding, positioning transformation as a relational process rather than an isolated event. Together, these influences frame transformative learning as cognitive, emotional, and ethical growth, a view that aligns with TIPs and AEN, both of which emphasize emotional regulation, empathy, and connection as foundations for learning (Desautels, 2020; SAMHSA, 2014).

Although other adult learning theories, such as Kolb's experiential learning model (1984) or Bandura's social learning theory (1977), address aspects of reflection and modeling, they do not capture the identity reconstruction that characterizes transformation. TLT uniquely explains

how preservice teachers integrate new knowledge about TLT, AEN, and pedagogy into their professional identities (Mezirow, 1978, 1991, 2000). This focus on perspective transformation rather than skill acquisition makes TLT the most appropriate theoretical lens for this study.

Aligned with educational neuroscience, Mezirow's framework acknowledges that transformation involves both cognitive and emotional dimensions (Dirkx, 1998; Hoggan et al., 2016). Research in educational neuroscience confirms that emotional safety and connection enable the brain's higher-order reasoning processes to engage in reflective learning (Immordino-Yang & Damasio, 2007; Siegel, 2012). Thus, the pillars of AEN, emphasizing regulation, co-regulation, and touchpoints, serve as neurobiological precursors to the kind of critical reflection and empathy that TLT describes. When preservice teachers regulate their own nervous systems and engage in intentional reflection about their students' needs, they embody Mezirow's transformative process, integrating emotional, cognitive, and relational growth into their professional practice (Mezirow, 1991; Porges, 1995).

As the framework guiding this study, TLT not only explains what transformation entails but also how it develops. Mezirow's ten phases of transformation outline the journey from disorientation to reintegration, a journey mirrored in how preservice teachers begin to question, reflect, and ultimately redefine their approach to teaching students affected by trauma.

The Ten Phases of Transformative Learning Theory

To understand how transformation evolves within learners, Mezirow's (1978, 1991, 2009) TLT outlines ten interrelated phases that trace the cognitive and emotional shifts individuals experience as they reconstruct meaning. These phases offer a developmental lens for understanding how preservice teachers evolve from relying on traditional, behaviorist approaches to embracing trauma-informed and neuroscience-aligned perspectives that prioritize

regulation, reflection, and relationship. TLT positions transformation as both a cognitive and an emotional process, emphasizing how new understandings transform not only what teachers know but also how they interpret and respond to their students lived realities (Dirkx, 2012; Hoggan et al., 2017).

Phase One: Disorienting Dilemma

Transformation begins when learners encounter experiences that disrupt their existing assumptions and require them to reconsider what they believe and how they act (Mezirow, 1991, 2009). In educational contexts, these disorienting dilemmas frequently emerge when preservice teachers encounter classroom situations that challenge traditional notions of control, discipline, or students' motivation (Cranton, 2006; Kitchenham, 2008; Taylor, 2008). Such moments disrupt established perspectives, prompting reflection and opening space for transformative learning (Dirkx, 1998; Hoggan et al., 2017; Mezirow, 1981). For example, encountering a trauma-impacted student who exhibits withdrawal or defiance can unsettle a preservice teacher's prior understanding of behavior as a willful choice rather than emotional survival. Mezirow (1991) described this disruption as the essential first step in transformative learning, as it requires preservice teachers to question their long-held frames of reference. In the context of this study, the disorienting dilemma marks the moment when preservice teachers recognize that conventional management strategies are insufficient to meet the needs of students affected by trauma, prompting a search for more compassionate, neuroscience-aligned approaches (Desautels, 2020; Sporleder & Forbes, 2016).

When preservice teachers encounter a disorienting dilemma that challenges their previous understanding of teaching or behavior, they are compelled to look inward. According to Mezirow (1991, 2009), the process of self-examination occurs when individuals confront the

discomfort, guilt, or uncertainty that arises as they recognize inconsistencies between their established beliefs and their current experiences. In teacher preparation, this phase often manifests as an emotional reckoning, when preservice teachers acknowledge the tension between their desire for classroom control and their emerging awareness of students' needs for safety, regulation, and connection (Dirkx, 1998; Taylore, 2008). Educational neuroscience supports this process by demonstrating that reflection and emotional awareness facilitate neural integration, enabling individuals to balance logic and empathy in their responses (Desautels, 2020; Siegel, 2012). As preservice teachers begin to examine their own triggers and assumptions, they shift from reacting to student behavior toward understanding it as communication of an unmet need (Souers & Hall, 2016; Sporleder & Forbes, 2018). This stage lays the foundation for critical reflection and growth, where emotional honesty becomes the first step toward relational and pedagogical transformation.

Phase Two: Self-Examination

Following the disorienting dilemma, preservice teachers enter a stage of self-examination characterized by emotional reflection and growing self-awareness (Mezirow, 1991, 2009). Mezirow (1991, 2009) described this phase as a critical juncture in which learners begin to question their internal reactions, motives, and biases that influence their understanding of an experience. In teacher education, this process involves confronting one's emotional responses to students' behaviors and recognizing how personal regulation shapes professional practice (Desautels, 2020, 2021). When preservice teachers acknowledge that their frustration, fear, or helplessness reflects students' dysregulation, they begin to see that effective teaching requires not only pedagogical skill but also emotional attunement (Brunzell et al., 2019; Desautels, 2018, 2020, 2023; Jennings & Greenberg, 2009; Porges, 2018; Siegel, 2012). This awareness creates

space for compassion, encouraging teachers to view behavior as a form of communication rather than defiance (Souers & Hall, 2016; Sporleder & Forbes, 2018).

From an AEN perspective, self-examination reflects the first pillar, educator brain and body state, which emphasizes the educator's own nervous system as a foundation for connection and learning (Desautels, 2020). Neuroscientific research shows that when teachers recognize and regulate their stress responses, they model safety and stability for students' nervous systems (Porges, 2018; Siegel, 2012). This alignment between internal state and external response allows educators to "lend their calm" to dysregulated students, fostering co-regulation and relational trust (Desautels, 2020, 2021). Through this reflective process, preservice teachers begin to understand how their physiological and emotional regulation directly impacts classroom environment and student outcomes (Brunzell et al., 2019; Jennings & Greenburg, 2009; Schonert-Reichel, 2017). The self-examination phase becomes both personal and professional awakening (Mezirow, 1991) where understanding of one's triggers and coping mechanisms transforms into a commitment to respond with empathy, presence, and intentional calm.

In this way, Mezirow's (1991) concept of self-examination extends beyond individual reflection to encompass awareness. As preservice teachers engage in this internal work, they begin to shift from reacting to student behavior toward responding through relational understanding and regulation strategies. This shift reflects what Desautels (2020, 2023) and Souers and Hall (2016) describe as a movement from control to connection, an approach that requires teachers to regulate their own nervous systems before addressing students' needs. Brunzell et al. (2019) similarly found that trauma-informed educators who engage in reflective practice develop more relational and intentional responses to challenging behavior, cultivating classrooms grounded in empathy and predictability. This integration of TLT and AEN provides a

bridge between cognition and emotion, indicating how reflective understanding can rewire both mind and body (Dirkx, 1998; Mezirow, 2009; Siegel, 2012). Through reflection and regulation, educators activate neuroplastic processes that strengthen neural pathways for empathy and self-control (Desautels, 2023; Porges, 2018). By engaging in self-examination, preservice teachers build their self-knowledge and develop the emotional and neurological readiness necessary for trauma-informed teaching, aligning their professional practice with the relational and reflective foundations emphasized across trauma-informed and neuroscience-based concepts (Brunzell et al., 2019; Jennings & Greenberg, 2009; Mezirow, 1991; Schonert-Reichl, 2017).

Phase Three: Critical Assessment of Assumptions

In the third phase, preservice teachers begin to critically evaluate the assumptions and beliefs that shape their understanding of teaching and learning (Mezirow, 1991, 2009). Mezirow (1991) emphasized that transformation occurs when individuals question the cultural and professional norms influencing their perceptions and actions. For preservice teachers, this process involves examining long-held perspectives about control, discipline, and student motivation, beliefs inherited from traditional models of classroom management rather than relational or trauma-informed concepts (Cranton, 2006; Mezirow, 2009). Through guided reflection and dialogue, preservice teachers recognize how punitive discipline practices can perpetuate fear and disconnection instead of fostering growth and safety (Brunzell et al., 2019; Souers & Hall, 2016)

As preservice teachers challenge these underlying assumptions, their cognitive and emotional perspectives begin to reorganize, reflecting what Mezirow (1991) described as perspective transformation and what neuroscience identifies as neural integration, the process by which new knowledge and emotional awareness form lasting changes in brain function and

behavior (Desautels, 2020; Dirkx, 1998; Siegel, 2012). This dual transformation shows how reflective practice not only reshapes beliefs but also rewires the neural pathways that govern empathy, regulation, and relational understanding (Desautels, 2023; Mezirow, 2009).

As this internal transformation occurs, preservice teachers begin to envision new possibilities for action, a movement from reflection to experimentation that defines the next stage of transformative learning (Mezirow, 1991, 1998). Having reexamined and reframed their assumptions about teaching and behavior, preservice teachers start to explore alternative ways to engage with students, implementing strategies grounded in connection rather than control (Cranton, 2006; Mezirow, 2009).

As preservice teachers challenge the assumptions that once guided their beliefs about teaching, they begin to realize that transformation is not an isolated or an academic experience. The internal work of critical reflection often brings both dissonance and relief, a recognition that their evolving understanding of trauma, connection, and learning aligns with a shift occurring among their peers (Cranton, 2006; Dirkx, 2012; Mezirow, 1991). What begins as individual self-questioning in Phase Three becomes a collective understanding in Phase Four, where preservice teachers recognize that their discomfort and growth are shared, validating their learning with TIPs and AEN (Desautels, 2020, Kitchenham, 2008; Mezirow, 1991; SAMHSA, 2014; Taylor, 2008).

Phase Four: Recognition That One's Discontent and the Process of Transformation are Shared

In the fourth phase, preservice teachers recognize that their discomfort and questioning are not isolated experiences but part of a shared process of transformation (Mezirow, 1978, 1991, 2009). As preservice teachers engage in collaborative reflection, they realize that their struggles

with managing behavior, maintaining emotional balance, and redefining control are common among peers who are also learning to teach using TIPs and AEN (Cranton, 2006; Kitchenham, 2008). This recognition reduces feelings of inadequacy and fosters a sense of belonging and mutual understanding (Kitchenham, 2008; Mezirow, 1991). Mezirow (1991) emphasized that this shared awareness strengthens the learning process by enabling preservice teachers to construct meaning through dialogue and relational exchange.

Research in interpersonal neurobiology demonstrates that relational dialogue activates neural pathways associated with empathy and trust, fostering emotional safety and cognitive openness (Porges, 2018; Siegel, 2012, 2020). Within teacher preparation, these neural and relational dynamics reveal the process by which preservice teachers learn to co-regulate with peers and students using conversation and reflection to calm the nervous system and build shared understanding (Desautels, 2020; Mezirow, 2020; Porges, 1998, 2018). When preservice teachers engage in intentional dialogue grounded in safety and curiosity, they strengthen both their relational attunement and their neurobiological capacity for empathy, skills foundational to TIPs and AEN instruction (Desautels, 2020; SAMHSA, 2014; Siegel, 2020).

Through a sense of collective transformation, preservice teachers begin to view vulnerability not as a weakness but as a condition for authentic learning and connection (Dirkx, 2012; Taylor, 2008). This phase marks a shift from individual reflection toward relational interdependence, where preservice teachers experience belonging as a catalyst for personal and professional growth (Dirkx, 1998, 2012; Taylor, 2008). The empathy and trust developed in this phase prepare preservice teachers to move into the next phase, Exploration of Options for New Roles, Relationships, and Actions (Mezirow, 1991), to inquire about new practices and non-traditional teaching behaviors.

Phase Five: Exploration of Options for New Roles, Relationships, and Actions

As preservice teachers begin to experience the support and shared understanding established in the previous phase, they enter a stage marked by curiosity, experimentation, and exploration of alternative ways to think and act (Mezirow, 1991, 2009). In this phase, transformation moves from reflection toward motion as preservice teachers begin to imagine new possibilities for teaching, relating, and responding in the classroom (Mezirow, 1991, 2009). Preservice teachers start to question how their emerging understanding about trauma, regulation, and relational safety shape their instructional approaches and professional identities (Cranton, 2006; Kitchenham, 2008; Mezirow, 1998, 2009).

Exploration often occurs through collaboration, scenario analyses, and peer dialogue that invite preservice teachers to test new perspectives in supportive contexts (Taylor, 2008). These learning environments reflect trauma-informed classrooms, where safety and predictability encourage risk-taking and creativity (Brunzell et al., 2019; Desautels, 2020; Souers & Hall, 2016). As they engage in discussion and experiences, preservice teachers begin to envision what a relationship-centered, regulation-based classroom looks and feels like.

From a neuroscience perspective, this exploratory phase corresponds with the process of neural integration, where reflective understanding combined with experiential learning to create new cognitive and emotional pathways (Desautels, 2020; Siegel, 2012). Each time preservice teachers try a new response, such as using co-regulation or mindfulness instead of traditional discipline, they strengthen the brain's network for empathy, problem-solving, and self-control (Porges, 2018; Siegel, 2020). This alignment between mind and action reinforces the transformative shift from control to connection, from reaction toward reflection (Desautels, 2021; Sporleder & Forbes, 2016).

By the end of this phase, preservice teachers view change as both possible and necessary. Their willingness to explore new professional identities reflects a possible sense of agency and confidence in their abilities to teach through TIPs and AEN (Cranton, 2006; Mezirow, 2009). This exploration sets the stage for Phase Six: Planning a Course of Action, where reflection and experimentation evolve into intentional, strategic implementation of new practices (Mezirow, 1991; 2009).

Phase Six: Planning a Course of Action

In the sixth phase of transformative learning, preservice teachers begin to translate reflection into intentional action by developing strategies to implement their transforming perspectives (Mezirow, 1991, 2009). Having explored new roles and possibilities in the previous phase, preservice teachers now focus on creating steps to apply TIPs and AEN in the classroom. This stage represents a movement from understanding toward intentional planning, an essential bridge between theory and practice (Cranton, 2006; Kitchenham, 2008). As preservice teachers create plans, envisioning begins with relational, brain-based strategies replacing traditional responses, aligning with empathy, regulation, and safety (Desautels, 2020; Souers & Hall, 2016).

Research on transformative pedagogy emphasizes that action planning is a critical step in supporting transformation because it requires preservice teachers to communicate what change will look like in practice (Dirkx, 2012; Taylore, 2008). For preservice teachers, this involves setting intentions for how to integrate TIPs and AEN into daily routines (Desautels, 2021; Jennings & Greenberg, 2009). Through reflection, discussion, and goal setting, they begin to connect theory to instructional design, determining how to respond to student behavior through

connection, predictability, and support rather than compliance or punishment (Brunzell et al., 2019; SAMHSA, 2014).

From an AEN perspective, this phase represents intentional focus on new patterns of thought and behavior strengthening emerging neural pathways (Desautels, 2023; Siegel, 2012). As preservice teachers rehearse and visualize these TIPs, they prepare their nervous systems to respond with regulation and relational presence, creating alignment between cognition, emotion, and practice (Porges, 2018; Siegel, 2020). This preparation supports the pillars of AEN: that educators must first experience regulation and safety internally to model it externally to students (Desautels, 2020, 2021, 2023).

This phase emphasizes the reciprocal relationship between reflection and action that defines TLT (Mezirow, 2009). Creating intentional plans for TIPs and AEN, preservice teachers move beyond theoretical understanding to implementation of their new professional identities (Mezirow, 1991, 2009). The process of planning a course of action serves as a turning point in the transformative journey, where reflective awareness becomes practice-driven by purpose, setting the foundation for the next phase: the acquisition of knowledge and skills necessary to implement changes in the classroom (Mezirow, 1991, 2009).

Phase Seven: Acquisition of Knowledge and Skills

In this phase, preservice teachers move from reflection and planning toward deliberate learning and skill development (Mezirow, 1991, 2009). Transformation extends as acquisition of TIPs and AEN competencies are built. This process represents what Mezirow (1991) described as the instrumental aspect of transformation, the pursuit of new knowledge and abilities that align with revised meaning perspectives. For preservice teachers, this often includes strategies for regulation, connection, and resilience, such as co-regulation strategies, relationship-based

classroom management, and instructional routines that create predictability and safety (Brunzell et al., 2019; Desautels, 2020; Souers & Hall, 2016).

Educational neuroscience shows that learning involves both thinking and feeling; it engages the brain, body, and emotions together (Immordino-Yang, 2016; Siegel, 2012, Sousa, 2011). When preservice teachers recognize this integration, they begin to see professional growth as a whole-body process, one that combines understanding with the practice of relational awareness (Desautels, 2023; Immordino-Yang, 2016; Siegel, 2012; Tokhuma-Espinosa, 2011). The understanding allows preservice teachers to see self-regulation, empathy, and connection not as abstract but as actionable skills essential to effective teaching (Brown et al., 2022; Brunzell et al., 2019). This new understanding will allow the preservice teachers to internalize the science and humanity of teaching (Desautels, 2020, 2023; Perry & Winfrey, 2021).

Through this phase, preservice teachers connect their identity to a developing sense of self-efficacy and relational awareness (Mezirow, 1991, 2009). As they gain confidence in TIPs and AEN, they see that planning, presence, cognition, and emotions are essential tools for teaching students impacted by trauma (Brunzell et al., 2019). These insights lay the groundwork for Phase Eight: Provisional Trying of New Roles, in which preservice teachers begin to test their emerging skills authentically into transformative action (Mezirow, 1991, 2009).

Phase Eight: Provisional Trying of New Roles

In the eighth phase, preservice teachers begin to test their transformed perspective through new roles, relationships, and behaviors (Mezirow, 1991, 2009). For preservice teachers, this phase marks a critical movement from theory to practice. Having developed new understanding through reflection, preservice teachers begin to translate their learning into classroom practice by implementing TIPs and AEN to emphasize safety, connection, and

regulation (Brunzell et al., 2019; Desautels, 2020; Mezirow, 2009). These experiences allow preservice teachers to explore alternative ways of engaging students impacted with trauma.

This provisional experimentation reflects Mezirow's (1991) view that meaning is constructed through action. As preservice teachers implement TIPs and AEN, they begin to understand that transformation is not only conceptual but also implemented through relational presence (Brunzell et al., 2019; Cranton, 2006; Dirkx, 2012). Educational Neuroscience research reinforces that active application strengthens neural pathways associated with regulation, empathy, and problem solving (Immordino-Yang, 2016; Siegel, 2012; Sousa, 2011). These findings suggest that as teachers apply new relational and regulatory strategies, they engage both cognitive and emotional systems, expanding learning through experience (Desautels, 2023; Sousa, 2011).

In this phase, professional identity begins to take shape through authentic engagement with students and colleagues. Preservice teachers start to see their work as relational and dynamic through flexibility, reflection, and ongoing growth (Cranton, 2006; Kitchenham, 2008). This experiential learning sets the stage for Phase Nine: Building Competence and Confidence in New Roles, where preservice teachers refine their skills, strengthen their professional efficacy, and internalize the core concepts of TIPs and AEN (Mezirow, 1991, 2009).

Phase Nine: Building Competence and Confidence in New Roles

In this phase, preservice teachers begin to solidify their developing perspectives through consistent practice and growing self-efficacy (Mezirow, 1991, 2009). As they act upon their transformed understandings, confidence emerges from the alignment between their beliefs and behaviors (Mezirow, 1991, 2009). For preservice teachers, this phase represents the consolidation of skills and dispositions needed to sustain TIPs and AEN strategies that are

introduced in earlier phases, moving from tentative experimentation toward competence in their professional identity (Cranton, 2006; Kitchenham, 2008; Mezirow, 1991, 2009).

This process aligns with Bandura's (1997) theory of self-efficacy, which suggests that experiences, small successful applications of new learning, strengthen confidence and persistence. When preservice teachers implement strategies to facilitate conversations or maintain calm during trauma-affected student dysregulation, they experience reinforcement in competence and confidence related to their transformation (Brunzell et al., 2019; Jennings & Greenberg, 2009). Over time, repeated experiences of success reshape educators' neural and emotional patterns, making compassionate and regulated responses more automatic (Desautels, 2020; Immordino-Yang, 2016; Siegel, 2012).

As teachers engage in reflective practice and receive intentional feedback, they strengthen the brain regions responsible for self-awareness, empathy, and executive functioning (Porges, 2018; Siegel, 2012). These neuroscience adaptations parallel Mezirow's (2009) theory of internalizing transformation, where learning becomes personified in one's sense of self and action. In teacher preparation, this phase supports the importance of lasting mentorship and relational feedback that reinforce growth and prevent regression to old habits (Brunzell et al., 2019; Cranton, 2016; Taylor, 2008).

In this stage, preservice teachers not only understand TIPs and AEN concepts but also materialize them in daily interactions, classroom environment, and professional decision-making. The preservice teacher's identity again becomes grounded in empathy, reflection, and relational trust (Desautels, 2020). This integration prepares preservice teachers for Phase Ten: Reintegration, in which their transformed perspectives are assimilated into their practice (Mezirow, 1991, 2009).

Phase Ten: Reintegration

The tenth phase represents the culmination of the TLT process, in which preservice teachers internalize new perspectives and integrate them into their professional identities (Mezirow, 1991, 2009). Reintegration signifies more than the acquisition of new strategies; it reflects a fundamental reorganization of meaning systems through which preservice teachers perceive and respond to their world (Cranton, 2006; Diryx, 2012). For preservice teachers, this phase begins with using TIPs and AEN concepts automatically, showing empathy, calm, and reflection in their teaching (Desautels, 2020, 2023; Mezirow, 2009).

At this stage, preservice teachers experience unity between their values, beliefs, and actions. The alignment between internal regulation and external response reinforces professional authenticity, enabling teachers to navigate classroom dynamics with calm and confidence (Brunzell et al., 2019; Jennings & Greenberg, 2009). Mezirow (1991) described this phase as the integration of perspective transformation into daily life, where learning rebuilds both thought and behavior. Neuroscience research supports this integration, demonstrating that repeated experiences of reflection, regulation, and relational connection strengthen neural networks that substantiate emotional balance and cognitive flexibility (Immordino-Yang, 2016; Porges, 2018; Siegel, 2012).

In preservice teacher development, reintegration is observable when teachers consistently design classroom environments, manage behavior, and build relationships through a trauma-informed lens (Brown et al., 2020; Desautels, 2023). They no longer view practices as interventions but as essential elements of their teaching identity. This synthesis of knowledge and practice marks true transformative learning (Mezirow, 1991): preservice teachers become teachers who teach from a place of presence, connection, and self-awareness. Their classrooms

become extensions of this transformation, spaces where safety, belonging, and emotional attunement are foundational to learning (SAMHSA, 2014; Souers & Hall, 2016; Sporleder & Forbes, 2016). As the final phase of TLT, reintegration signifies both completion and continuity (Mezirow, 1991). While the perspective transformation has been internalized, the reflective stance cultivates the process that ensures that growth remains ongoing (Cranton, 2016; Taylor, 2008). The following table (Table 2.3) summarizes Mezirow's (1991) ten phases of TLT framework, outlining how adults move from disorientation to reintegration, a process applied in this study to examine preservice teachers' transformation through TIPs and AEN.

Table 2.5. *Mezirow's (1991) Ten Phases of Transformative Learning Theory*

Phase	Description	Application to this Study
1. Disorienting Dilemma	Experiences that challenge existing assumptions and beliefs.	Participants encounter dilemmas through learning about ACEs, trauma, and neuroscience
2. Self-Examination	Emotional questioning of prior assumptions and values	Participants reflect on their own beliefs about behavior, fairness, and student motivation related to trauma.
3. Critical Assessment of Assumptions	Evaluating whether prior beliefs still hold true.	Participants analyze how their educational experiences shape their current perspectives.
4. Recognition of Shared Transformation	Realizing that others share similar struggles or shifts.	Course discussions and peer reflections provides mutual; understanding and support.
5. Exploration of New Roles	Considering alternative beliefs and professional roles	Participants imagine themselves as co-regulators and trauma-informed educators.
6. Planning a Course of Action	Developing strategies to implement new understandings.	Participants design trauma-informed classroom environments.

Phase	Description	Application to this Study
7. Acquiring Knowledge and Skills	Gaining the competencies to act on new perspectives.	Coursework in AEN provides tools for co-regulation and emotional attunement.
8. Trying New Roles	Applying new beliefs and skills in authentic contexts	Participants practice relational and neuroscience-aligned teaching in fieldwork.
9. Building Competence and Confidence	Growing in self-efficacy and reflective capacity.	Preservice teachers demonstrate confidence in using trauma-informed practices.
10. Reintegration	Internalizing new perspectives into personal and professional identity.	Participants align their teacher identities with relational, reflective, and trauma-informed values

Note. Adapted from Mezirow (1991, 2009).

The ten phases of Mezirow's (1991, 2009) TLT provide a framework for understanding how preservice teachers transform through reflective and experiential learning. In this study, these phases serve as the scaffolding through which elementary preservice teachers make meaning of TIPs and AEN concepts. Each stage, from disorienting dilemmas to reintegration, mirrors the process of learning to teach from a place of regulation, empathy, and relational understanding (Mezirow, 1991).

However, while the TLT framework explains *how* transformation occurs through reflection and perspective change, TIPs and AEN concepts clarify *what* is being transformed. To fully understand how preservice teachers integrate the TIPs and AEN concepts into their developing identities, it is necessary to connect the TLT framework with the foundational TIPs

(SAMHSA, 2014) and AEN (Desautels, 2020). The following Table 2.6 below shows how this framework intersects with TIPs and AEN to provide a foundation for this study.

Table 2.6. *Integration of SAMHSA’s TIPs, AEN, and TLT*

Trauma-Informed Principles (SAMHSA)	Applied Educational Neuroscience (AEN)	Transformative Learning Theory (TLT)
Safety: Physical and psychological safety are fundamental in TIP classrooms, ensuring that students and teachers feel secure.	By managing stress and emotions, preservice teachers can model and cultivate a safe learning environment. Self-awareness, co-regulation, and predictable interactions foster a classroom where students feel supported and valued.	Providing a safe environment is crucial as preservice teachers face disorienting dilemmas that challenge their assumptions, allowing them to engage without fear and fully process new insights.
Trustworthiness and Transparency: Building trust through transparent decision-making enhances student-teacher relationships and reinforces a supportive environment.	Trust is fostered through emotional regulation and consistent, open interactions with mentors and peers, creating an atmosphere where preservice teachers can reflect and grow.	Transparent communication is vital during self-examination and critical assessment, allowing preservice teachers to reflect honestly and grow.
Peer Support: A supportive peer network fosters trust, empowerment, and a sense of belonging, which are essential for both students and teachers in trauma-informed settings	Peer support among preservice teachers helps manage stress and facilitates mutual support during professional development.	During phases of exploring and trying new roles, peer support offers diverse perspectives and emotional reinforcement, enhancing the learning experience.
Collaboration and Mutuality: This principle emphasizes the shared responsibility of creating a trauma-informed classroom and promotes a collaborative atmosphere.	Collaborative experiences enable preservice teachers to share the responsibility of student support, deepening their understanding of mutual classroom management.	Collaboration is essential in planning and building competence, where collective input strengthens teaching practices and fosters self-confidence.

Trauma-Informed Principles (SAMHSA)	Applied Educational Neuroscience (AEN)	Transformative Learning Theory (TLT)
Empowerment, Voice, and Choice: Empowering students to make choices and have a voice in their learning respects their individuality and fosters a sense of control.	Teaching preservice teachers to empower students builds classroom resilience and encourages positive interactions, contributing to student and teacher confidence.	Empowerment and choice promote effective professional development and classroom management during knowledge acquisition and role exploration.
Cultural, Historical, and Gender Issues: Recognizing and addressing biases ensures that interactions with students and staff are inclusive and responsive to all individuals.	Preservice teachers must be aware of cultural and personal biases to foster inclusive classrooms. Training sessions focusing on cultural sensitivity cultivate a respectful learning environment	Addressing these issues aligns with phases of self-examination and recognition, where preservice teachers critically assess their perspectives in a supportive context.

This table illustrates how SAMHSA’s (2014) TIPs conceptually align with Desautels’ (2020) AEN pillars and Mezirow’s (1991) TLT. Each column shows how they intersect to promote reflection, regulation, empowerment, and transformation in elementary preservice teacher development. Collectively, these conceptual foundations, guided by TLT as the theoretical framework, establish the basis for this study.

Summary

Chapter Two established the theoretical and conceptual foundations for this study, showing how TIPs, AEN, and TLT intersect to support preservice teachers’ development of trauma-informed pedagogy. The literature demonstrates that encounters with trauma-affected students influence preservice teachers’ cognitive, emotional, and behavioral functioning, often showing as challenges in attention, regulation, and engagement (Perry & Winfrey, 2021; Siegel, 2012; Sporleder & Forbes, 2016). Yet research also reveals inconsistent implementation across

teacher preparation programs and a lack of systematic training that equips preservice teachers to apply these concepts effectively (Puchner & Markowitz, 2023; Thomas et al., 2019).

AEN extends the work of TIPs by translating neurobiological research into classroom application (Desautels, 2020, 2023). Grounded in the four pillars, AEN emphasizes the reciprocal relationship between teacher and student nervous systems and the importance of regulated, relational learning environments (Desautels, 2020, 2023; Porges, 2018; SAMHSA, 2014; Siegel, 2012). This framework supports that when preservice teachers create their own regulation and model emotional balance, they strengthen trauma-impacted students' capacity for self-regulation and cognitive engagement (Desautels, 2020; Mezirow, 1991). However, despite promising theoretical foundations, empirical research on the implementation and long-term outcomes of AEN within teacher preparation remains limited (Brunzell et al., 2019; Puchner & Markowitz, 2023). Despite advances in TIPs and AEN, gaps remain in how preservice teachers internalize and apply these practices, a gap this study addresses through a qualitative multiple-case design.

TLT provides the conceptual bridge linking TIPs and AEN by explaining how preservice teachers experience reflective change in their perspectives and practice (Dirkx, 2012; Kitchenham, 2008; Mezirow, 1991, 2009; Taylor, 2008). Through Mezirow's (1991, 2009) ten phases of transformation, beginning with disorienting dilemmas and culminating in reintegration, preservice teachers move from surface-level awareness of trauma to relational practice (Cranton, 2006; Hoggan et al., 2017; Mezirow, 1991, 2009).

Together, the research establishes the need for TIPs and AEN-based teacher preparation grounded in reflective transformation. While TIPs and AEN identify what preservice teachers must know and do to support trauma-impacted students, TLT explains how these shifts occur

internally and developmentally. While gaps persist in how preservice teachers integrate these concepts during coursework and field experiences, this study addresses them by examining how TIPs and AEN influence preservice teachers' practices and classroom environments. The next chapter outlines the methodological design used to explore these questions, describing the qualitative multiple-case study design, data collection procedures, and strategies to ensure credibility and trustworthiness.

Chapter 3 - Methodology

Introduction

Preservice teachers are entering classrooms at a time when student trauma, challenging behaviors, and mental health needs are on the rise (Brown et al., 2022; Perry & Szalavitz, 2017). As a result, educators must be equipped not only with instructional strategies but also with a relational lens grounded in trauma-informed practices (TIPs) and applied educational neuroscience (AEN). Research shows that trauma can significantly impact students' behavior, emotional regulation, and academic success (McIntyre et al., 2019; Phifer & Hull, 2016). These challenges can contribute to stress, burnout, and overreliance on compliance-based discipline systems among novice teachers (Brown et al., 2022; The Graide Network, 2018).

Supporting students affected by trauma requires more than classroom management; it demands a shift in mindset (Brown et al., 2022; Brunzell et al., 2018; Perry & Szalavitz, 2017). Preservice teachers need tools to understand how trauma influences behavior and learning (Perry & Szalavitz, 2017). Brown et al. (2022) emphasize that TIPs and neuroscience-aligned professional development equip teachers to connect, co-regulate, and respond with compassion. However, preparing future educators for this work proves complex, especially within the limited time and scope of teacher preparation programs (Perry & Szalavitz, 2017).

This study examined how TIPs and AEN influence the development of preservice teachers. By integrating coursework, semi-structured interviews, reflective journals, case studies, and experiential learning, the study examined how elementary preservice teachers internalize new concepts related to behavior, learning, and engagement. This study is guided by Mezirow's Transformative Learning Theoretical Framework (1991, 1995, 1996), which centers on how adults undergo shifts in beliefs and practices through disorienting dilemmas, critical reflection,

and meaning making. This lens helped explain how three elementary preservice teachers reframed their teaching identities and pedagogical decisions after being exposed to TIPs and AEN.

The following research questions guided this inquiry:

RQ1: How do applied educational neuroscience and trauma-informed coursework influence preservice teachers' practices in elementary education?

RQ2: In what ways do applied educational neuroscience and trauma-informed coursework affect preservice teachers' strategies for creating a positive and structured classroom environment?

RQ3: How do applied educational neuroscience and trauma-informed training enhance preservice teachers' ability to engage and motivate students, particularly those who have experienced trauma?

This methodology chapter builds on the conceptual and empirical foundations established in Chapters One and Two. It explains the research design, paradigm, context, participants, and analytic strategies that shaped this multiple-case study with an instrumental purpose. The structure of this chapter reflects the study's logic, moving from philosophical stance to application, and concludes with measures to ensure trustworthiness and ethical rigor.

Research Paradigm and Theoretical Lens

Constructivist-Interpretivist Paradigm

This study is grounded in a constructivist-interpretivist paradigm, which assumes that individuals co-construct meaning from experience within their social, cultural, and emotional contexts (Lincoln & Guba, 1985; Stake, 1995). Knowledge, from this stance, is not fixed but continually constructed and reconstructed as learners interact with their environments and one

another (Denzin & Lincoln, 2011). I became a participant in meaning-making rather than an objective observer (Denzin & Lincoln, 2011). This view aligns with the relational nature of TIPs and AEN, where understanding emerges through reflection, dialogue, and authentic human connection.

Transformative Learning Theory as Theoretical Framework

Mezirow's (1991, 2009) TLT framework provides the lens that frames this inquiry. TLT explains how adults experience a transformation of perspective through disorienting dilemmas, critical reflection, dialogue, and reintegration. Within this study, the three participants encountered TIPs and AEN coursework that challenged their prior assumptions about student learning and behavior. Through reflective engagement, they re-examined personal belief systems, experimented with new relational strategies, and reconstructed their professional identities. This theoretical framing guides both the design of data collection and the interpretation of participants' shift described in Chapters Four and Five.

Research Design and Methodological Approach

Qualitative Research

Qualitative research focuses on understanding phenomena through participants' perspectives and experiences in natural settings (Denzin & Lincoln, 2011). This study adopted a qualitative approach to prioritize the voices of three elementary preservice teachers as they made sense of TIPs and AEN in their coursework and microteach placements. According to Stake (1995), qualitative inquiry values thick description and seeks to understand the "particular" in order to inform the "general." By centering lived experience, qualitative methods enabled an exploration of how trauma-informed knowledge was internalized, adapted, and put into practice.

This study employed a qualitative approach to collect contextualized understandings of how three preservice teachers interpreted, reflected on, and applied TIPs and AEN principles. As Stake (1995) and Denzin & Lincoln (2011) note, qualitative methods prioritize depth, context, and participant perspective over generalizability. The approach aligns with the study's goal to trace developmental shifts in thinking, feeling, and practice across time and context.

Multiple Case Study with an Instrumental Purpose

This research utilized a multiple-case study design with an instrumental purpose (Creswell & Poth, 2018; Stake, 1995). Each participant, Mia, Sami, and Abby, represented an individual case selected for its potential to provide insight into the broader phenomenon of trauma-informed teacher development. The cases were studied individually and then synthesized to identify cross-case patterns, enabling both in-depth and comparative analysis.

Stake's (1995, 2006) constructivist lens guided the interpretation of each case. The study emphasized the co-construction of meaning between the researcher and each of the three participants, indicating how knowledge evolves through reflective engagement. The iterative nature of the design enabled evolving data collection strategies as emerging themes warranted further investigation.

Building on the iterative and reflexive approach outlined above, this study employed a multiple-case study design to further build understanding of how preservice teachers implemented TIPs and AEN. The research allowed for a comparative analysis of preservice teachers' unique experiences and strategies, focusing on three preservice teachers as individual cases. Yin (2014) emphasizes that multiple-case designs strengthen analytic generalizability. This approach enabled the study to examine how TIP and AEN unfold across contexts, each shaped by distinct classroom placements, prior beliefs, and lived experiences. These case

comparisons enhanced the analysis, offering a comprehensive perspective on how trauma-informed knowledge is applied and transformed across contexts.

The instrumental case study methodology in this study enabled me to utilize each case not only for its individual story but also as a window into systematic questions surrounding teacher preparation, regulation, student engagement, and pedagogical transformation. The methodology bridged the coursework and real-world classroom dynamics, providing a layered understanding of preservice teacher learning and identity formation.

This methodology is well-suited for exploring complex social situations in which it is challenging to separate the phenomenon from its context (Stake, 1995; Yin, 2014). In this study, those surroundings include both university coursework and elementary classrooms. By examining these two settings, the research provides a comprehensive understanding of how preservice teachers learn and apply trauma-informed strategies. This approach emphasized the challenges and complexities of applying theory in real-world educational environments.

Stake (1995) emphasizes that case studies are powerful tools for exploring participants' real-world experiences, especially when context and personal interpretation are central. This is essential for addressing research questions about how preservice teachers perceive, adapt, and apply trauma-informed and AEN frameworks to support the "whole child" (Basco, 2023; McMillan, 2015). By delving deeply into these lived experiences, the study aimed to reveal how trauma-informed and AEN practices are implemented, aligning with its goal of understanding teacher development.

This study also used an instrumental case study approach to explore broader issues in teacher education. As Stake (1995) explains, instrumental case studies examine specific cases to shed light on more significant themes, making them an excellent fit for research aimed at

improving teacher preparation. In this study, each preservice teacher's experience served as an individual case, providing a means to explore more significant questions about the effectiveness of trauma-informed and AEN training. This approach found common patterns and differences by analyzing multiple cases, offering a deeper understanding of these practices across various contexts.

Building on the strengths of both case study and instrumental case study methods, this research examined how preservice teachers incorporate TIPs and AEN into their teaching. This approach provided insight into their experiences and generated findings to shape future teacher preparation programs, thereby advancing the field of trauma-informed education in educational settings.

Study Context

This research utilized a multiple-case study design with an instrumental purpose (Creswell & Poth, 2018; Stake, 1995). Each participant, Mia, Sami, and Abby, represented an individual case selected for its potential to provide insight into the broader phenomenon of trauma-informed teacher development. The cases were studied individually and then synthesized to identify cross-case patterns, enabling both in-depth and comparative analysis.

Stake's (1995, 2006) constructivist lens guided the interpretation of each case. The study emphasized the co-construction of meaning between the researcher and each of the three participants, indicating how knowledge evolves through reflective engagement, consistent with the interpretivist emphasis on meaning-making in context (Denzin & Lincoln, 2011). The iterative nature of the design enabled evolving data collection strategies as emerging themes warranted further investigation.

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Coursework

The coursework laid a comprehensive foundation for elementary preservice teachers by integrating the heart of trauma, regulation, and neuroscience with pedagogical reflection and classroom application. Each component of the coursework was intentionally designed to build the knowledge, empathy, and reflective skills necessary for trauma-informed, brain-aligned

teaching. The course combined theory, experiential learning, and structured reflection to connect the *why* (neuroscience and trauma theory) to the *how* (instructional and relational practice).

The first portion of the course introduced foundational trauma content, including Adverse Childhood Experiences (ACEs) and their long-term effects on learning, health, and behavior (Felitti et al., 1998; SAMHSA, 2014). This section allowed elementary preservice teachers to consider trauma as both an individual and systemic issue, developing awareness of how early experiences shape a child's capacity for safety and engagement in the classroom (Burke-Harris, 2016; Felitti et al., 1998). By grounding the three participants' understanding in neuroscience, the elementary preservice teachers learned to recognize how stress physiology, memory, and executive function intersect with classroom behavior (Perry & Winfrey, 2021; Siegel, 2012).

Building upon this theoretical base, the next series of sessions focused on Applied Educational Neuroscience (AEN) principles (Desautels, 2020, 2021). These lessons provided tools for teacher regulation, co-regulation, brain-state awareness, and strategies to help students move from survival to learning states (Desautels, 2020). Through activities such as “Brain State Mapping,” “Co-Regulation Scenarios,” case studies, and reflective journaling, elementary preservice teachers practiced interpreting complex neuroscience concepts into student-friendly language and classroom routines (Desautels, 2023; Siegel, 2017). These experiences modeled how teacher regulation directly influences student regulation, an essential AEN and TLT connection that emphasizes self-awareness and reflective change (Desautels, 2020, 2023; Mezirow, 1991).

The final portion of the course centered on Trauma-Informed Practices (TIPs) and classroom design. Sessions explored how predictability, visual cues, relationship rituals, and feedback strategies can create a positive and structured environment where students feel safe to

learn and connect. Participants developed trauma-informed classroom plans that integrated relational discipline, social-emotional learning, and neurobiological safety into lesson design. These projects provided tangible evidence of preservice teachers’ cognitive and emotional shifts, the essence of transformation in TLT.

Each learning strand, trauma, AEN, and TIPs served a specific yet interdependent purpose. Together, they cultivated an understanding of how preservice teachers can embody regulation, foster a sense of belonging, and design classrooms that respond to students’ brain-body states. The course’s intentional scaffolding emphasized the phases of TLT (Mezirow, 1991): disorienting dilemmas that challenged prior assumptions; reflection through journaling and dialogue; and the reintegration of new perspectives into professional identity and practice.

The following table outlines the structure of these sessions, highlighting their focus areas, objectives, and connections to both the research questions and TLT framework.

Table 3.1. *Coursework Alignment with Research Objectives*

Session Title	Focus Area	Objective	Relevance to Research	Connection to TLT Framework
Trauma and Adverse Childhood Experiences (ACEs)	Understanding the impact of trauma on student behavior and learning.	Recognize and address trauma’s effects on learning and behavior.	Provides a foundational understanding of trauma for research focus.	Disorienting dilemma – challenges prior assumptions about student behavior
The Brain and Trauma	Applied Educational Neuroscience and Polyvagal Theory.	Explore the body and brain’s stress response and its impact on learning.	Builds a neurological basis for trauma-informed practices for educators, students, and colleagues.	Critical reflection – shifts perspective on student regulation and behavioral response

Session Title	Focus Area	Objective	Relevance to Research	Connection to TLT Framework
Window of Tolerance	Regulation and Co-Regulation Strategies.	Learn strategies for maintaining optimal arousal levels.	Supports research focus on maintaining learning and behavior in the elementary classroom.	Planning a course of action – fosters adaptive strategies for real-time teaching adjustments.
Trauma-Informed Practices and Classroom Management	Implementation of TIPs, applying SAMHSA principles (2014) and the effect in the classroom.	Develop trauma-informed strategies that foster a positive and structured elementary classroom environment.	Examines application of TIPs in the elementary classroom.	Exploring new roles – promotes application of new teaching paradigms through reflective practice
Building Relations to Motivate Students with Trauma	Relationship building (teacher-student and student-student) to increase motivation and engagement in the elementary classroom.	Foster connections to support students impacted by trauma.	Focuses on the ability of the teacher regulation and relationship to build motivation and engagement through TIPs.	Reintegration – deepens empathy and relational shifts in teacher–student dynamics
Resilience and Coping	Fostering resilience in students impacted by trauma.	Equip students with academic and emotional resilience-building strategies.	Highlights long-term impacts of trauma-informed teaching on student and teacher well-being.	Transformative action – cultivates resilience as a hallmark of teacher identity and growth

The coursework sequence provided preservice teachers with theoretical and practical tools to integrate TIPs and AEN into their developing instructional identities. Each class session is intentionally aligned with TLT (Mezirow, 1991), progressing from awareness and reflection to application and reintegration. This framework established a foundation for the professional development and microteaching experiences that followed.

Professional Development

Professional development served as a bridge between coursework and applied practice, allowing participants to expand their understanding of trauma-informed practices (TIPs) and applied educational neuroscience (AEN) through expert-led sessions. These sessions

complemented the course content by situating theory in real-world contexts and offering multiple perspectives from practitioners specializing in trauma-responsive education, neuroscience, and resilience.

Each session aligned with the research objectives and the phases of Transformative Learning Theory (TLT; Mezirow, 1991, 2009), offering preservice teacher’s opportunities to confront disorienting dilemmas, engage in critical reflection, and explore new ways of thinking about student behavior and learning. Experts guided the three participants in examining the neurobiological foundations of regulation and co-regulation (Desautels, 2020), the relational aspects of student motivation (Brown et al., 2020), and the long-term effects of trauma on learning and development (Sporleder & Forbes, 2016).

The sessions summarized in Table 3.2 provided a framework for integrating theoretical knowledge into practice. Each topic added to participants’ evolving understanding of how trauma impacts student learning, how neuroscience informs classroom interactions, and how educators can cultivate environments that promote safety, belonging, and resilience.

Table 3.2. *Professional Development Alignment with Research Objectives*

Session Title	Focus Area	Objective	Relevance to Research	Connection to TLT
Trauma and Adverse Childhood Experiences (ACEs)	Impact of trauma on learning	Recognize and address trauma’s effects in educational settings	Provides a foundational understanding of trauma’s influence	Disorienting dilemma – prompts critical reflection on previous assumptions
Neuroscience of Trauma	Applied Educational Neuroscience	Apply neuroscientific insights to classroom practice	Focuses on applied educational neuroscience for educators and students	Critical assessment of assumptions – deepens understanding of behavioral challenges

Session Title	Focus Area	Objective	Relevance to Research	Connection to TLT
Creating a Trauma-Informed Classroom Environment	Building resilience in classroom culture	Foster a trauma-sensitive, supportive learning environment	Examines the implementation of trauma-informed methods	Exploring new roles – encourages adoption of relational, brain-aligned management approaches
Situations and Case Studies	Real-world application of trauma responses	Analyze and respond to real-life trauma scenarios	Enhances problem-solving and reflective practice	Planning a course of action – supports integration of new strategies in authentic contexts

Each professional development session intentionally bridged theory and practice, emphasizing reflection, experimentation, and integration, the key phases of Transformative Learning Theory (Mezirow, 1991). These experiences complemented the university coursework by supporting TIPs and AEN within authentic teaching contexts. Together, the two settings created a continuum for the participants' transformation as trauma-responsive educators. Through coursework and professional development, the three participants applied their learning in the classroom through their microteaches, which allowed them to put theory into practice.

Microteaching

Building on their university coursework, the three participants entered elementary classrooms within Professional Development Schools (PDS) partnerships for structured microteaching experiences. These PDS collaborations, organized around the Nine Essentials (NAPDS, 2021), offered authentic settings for the participants to apply and rehearse instructional practices alongside mentor teachers. Although the partner schools were not explicitly designed as

trauma-informed environments, the microteaches provided a controlled opportunity for participants to integrate and reflect upon TIPs and AEN concepts explored in their coursework. Consistent with prior studies that have used microteaching to examine preservice teacher growth (Allen & Ryan; Iliasova, 2025; Long, 2019), this study utilized data from candidates' microteaching reflections to analyze how they transferred TIPs and AEN into authentic classroom contexts.

The partner schools included both suburban and rural sites, representing a range of socio-economic and demographic contexts. This diversity was critical for examining how three preservice teachers adapted trauma-informed strategies to environmental demands. Factors such as student background, socio-economic status, class size, and resource availability shaped how participants implemented co-regulation, relationship-building, and emotional safety practices.

In these classrooms, the three elementary preservice teachers assumed new roles as educators, a pivotal phase aligned with Mezirow's TLT (1991). The three participants implemented trauma-informed routines, modeled regulation strategies, and built connections with students. The three participants reflected on these experiences and adjusted their practices in response to feedback from students, mentors, and their own observations. These placements linked theoretical learning to authentic implementation, enabling participants to test and refine their strategies in real-time.

Through hands-on experience, the three participants developed an understanding of the challenges and opportunities involved in trauma-informed teaching. These field experiences, combined with university coursework and professional development, offered an understanding of how theory translates into emotionally responsive instruction.

Environmental Factors and Variables

Multiple environmental influences shaped how the three elementary preservice teachers applied TIPs and AEN concepts. The study accounted for both external and internal factors, including emotional, cognitive, and social dynamics that affected participant implementation. Taking a holistic view was essential for evaluating how training in trauma-informed practice translated into classroom strategies (McMillan & Schumacher, 2014).

Classroom and School Characteristics

The three participants completed fieldwork in elementary classrooms across a range of partner schools with varied educational conditions. These included both rural and suburban settings, each offering different challenges and affordances for trauma-informed teaching. Environmental characteristics, such as school location, resource availability, and class size, influenced the extent to which the three participants could implement individualized or co-regulation strategies. In resource-constrained schools, a lack of support staff made it more difficult to respond to trauma-related behaviors (Souers & Hall, 2016). In large classrooms, the ability to engage each student meaningfully was limited, hindering the building of trust and the provision of tailored support.

Socio-Economic and Demographic Diversity

Beyond structural factors, the socio-economic and demographic makeup of student populations also influenced the application of TIPs and AEN. The participants taught in classrooms where students faced poverty, food insecurity, or had experienced multiple ACEs (SAMHSA, 2014). These high-need environments often heighten behavioral challenges and emotional dysregulation, requiring teachers to flexibly adapt their trauma-informed strategies (Sporleder & Forbes, 2019). Linguistic diversity, cultural differences, and the presence of dual-

language learners added complexity but also offered opportunities for the three participants to apply TIPs and AEN. The range of school and student variables enriched the study by revealing how TIPs and AEN strategies could be flexibly applied across classroom contexts.

Participants

This study focused on three elementary preservice teachers enrolled in an elementary education program at a small Midwestern university. During the 2024-2025 academic year, all three participants were enrolled in Block One, a course block that integrates foundational methods courses with a microteaching placement in local elementary classrooms. Each participant was simultaneously enrolled in *Trauma and Resilience in the Educational Setting*, a course I, the researcher, led that emphasized AEN and TIPS.

The sample was purposefully selected (Patton, 2015) to ensure participants had intentional exposure to TIPs and AEN content, as well as opportunities to apply it in authentic educational settings. Inclusion criteria required participants to be elementary preservice teachers enrolled in Block One and *Trauma and Resilience in the Educational Setting* during the 2024-2025 academic year. Preservice teachers not enrolled in this course were excluded from the study. Of approximately 48 preservice teachers, three volunteered (see Appendix A) and met the inclusion criteria. No attrition occurred; all three completed the study. While this study focused on a small subset of students, the participants represented the broader preservice teacher cohort and offered varied perspectives on how TIPs and AEN concepts shaped their developing professional identities.

All three participants grew up in rural communities and expressed a lifelong desire to become teachers. While the study participants and most students in the program identified as White, study participants reflected varied lived experiences, family structures, and educational

pathways. Each had previously worked with children through substitute teaching, daycare, or afterschool programs, bringing personal knowledge of the challenges young learners face. The following profiles provide an in-depth introduction to each participant. To protect confidentiality, the names Mia, Sami, and Abby are used as pseudonyms.

Together, Mia, Sami, and Abby offered three distinct perspectives shaped by their family backgrounds, school experiences, and motivations for entering the teaching profession. To explore how these preservice teachers engaged with TIPS and AEN, I collected data from multiple sources designed to capture their voices, reflections, and applied decision-making processes. The following section outlines these data sources in detail and explains how each instrument contributed to understanding the transformative learning process.

Mia

Mia was an elementary preservice teacher enrolled in Block One methods courses. She was an only child and extremely close to her parents, with one of her parents working as an educator. Having grown up around schools, Mia said she knew from a young age that she wanted to be a teacher. She spoke with enthusiasm about working with children and credited her many educator role models with shaping her career path.

Mia explained that she chose to take the Trauma and Resiliency course because she wanted to be challenged. She described her own upbringing as traditional and structured: in the schools she attended, teachers were respected, students followed instructions, and defiance was rarely seen. She reported having zero Adverse Childhood Experiences (ACEs), and she acknowledged that life had been easier for her than for many of her peers. Because of this, she believed the class would not only help her better understand her future students but also her

colleagues. She added that individuals from her home district had told her it was increasingly important to understand trauma as more children entered classrooms carrying those experiences.

Mia entered the course as an honors student eager for academic rigor. She wanted to be challenged not only by new knowledge but also by ideas that pressed against her preexisting beliefs. This openness positioned her to reflect critically on her perspectives and to consider how TIPs and AEN might reshape her identity as a teacher.

Sami

Sami was an elementary preservice teacher enrolled in Block One methods courses and a first-generation college student. She grew up in a family of seven as the third of five children. Sami said she loved her position in the middle of the family because she could turn to her older siblings for advice while playing school with her younger siblings. She described her hometown as a small place where “everyone knows everyone, or they are related.” She cited playing school throughout her childhood and the community's respect for teachers as inspiration to become a teacher. A course she took in high school solidified her career choice. The class gave her the chance to spend time in elementary classrooms across multiple grades, and she recalled that experience as the moment she knew teaching was her calling.

Sami explained that she chose to take the *Trauma and Resilience in the Educational Setting* course because she wanted to learn how to support every student who would enter her future classroom. She reported having one ACE, which she said made her more resilient in certain ways, but did not elaborate. While the schools she attended were rule-driven and tightly connected to family networks, so much so that behaviors rarely surfaced, her work in an afterschool program opened her eyes to the prevalence of trauma in students' lives. She said she

often felt unprepared to help children who were “crying out for help,” and saw this course as a way to gain the tools she needed.

Sami expressed a strong interest in the neuroscience of trauma, noting that “the brain is the hub of memories, emotions, and learning.” She recognized how trauma could affect student performance both academically and emotionally. By enrolling in the course, she said she hoped to better understand those impacts and create a classroom that was both safe and loving. She described her motivation simply: she wanted to be the kind of teacher who could recognize the signs of trauma and respond with compassion and skill.

Abby

Another Block One student, Abby, grew up in a stable family with her parents and one sister. Abby was from a small town just outside a suburban area, which she called “idyllic.” She explained that all families knew each other and teachers were part of the community, shopping at the same grocery store, attending the same church, and seeing the same people at the gas station. Because of these close ties, Abby said that the school felt like a second home, where teachers loved and knew every child who walked through their doors. She recalled that during her K-12 experience, there was one class per grade, and everyone knew everyone; she considered each of her classmates a friend.

Abby spoke fondly of her school years, describing the environment, the teachers, and the love of learning as inspirations for becoming a teacher. She said her teachers often told her she would one day be an educator, which motivated her further. At the same time, she reflected that her school was traditional in structure, with little emphasis on social-emotional learning, and she admitted that behavioral issues were almost nonexistent in her own school experience.

Abby explained that she enrolled in the *Trauma and Resilience in the Educational Setting* course because of her work in a preschool, the grade level she hoped to teach one day. There, she encountered both verbal and physical aggression among students, which initially confused her because it contrasted sharply with her own upbringing and school experience. As she got to know the preschool families, she realized the importance of understanding not only behaviors but also the trauma that might underlie them. She said she wanted “tools in her pocket” to support students effectively and to ensure she was doing the best she could for them. Although she had some basic knowledge of trauma, Abby acknowledged the need to learn much more and expressed excitement about engaging with the course's topics and practices.

Data Sources and Collection

To capture the complexity of the three elementary preservice teachers’ transformative learning, I drew on four complementary data sources: semi-structured interviews, reflective journals, scenario and document analysis. Together, these instruments provided both breadth and depth, allowing me to examine how participants described, reflected on, and applied TIPs and AEN across time and context. Interviews documented participants in dialogue, journals captured their ongoing self-reflection and learning, and case studies revealed their applied decision-making in real-world scenarios. Using multiple tools also enhanced the trustworthiness of the research through triangulation (Denzin, 1978; Patton, 2015), aligning with TLT (Mezirow, 1991), which emphasizes dialogue, reflection, and disorienting dilemmas as pathways to perspective transformation. The following subsections provide a detailed description of each data source, its role in addressing the research questions, and its connection to the broader methodological design.

Semi-Structured Interviews

Semi-structured interviews were conducted in two rounds with each of the three participants, once in January 2025 and again in May 2025. Each session lasted 30 to 45 minutes. In the first round, I asked participants to share their prior teaching experience, assumptions about student behavior, and initial understanding of TIPs and AEN. These interviews established a baseline for participants' beliefs and pedagogical approaches prior to their engagement in the course. In the second round, I revisited the topics and invited participants to reflect on how their perspectives and practices had shifted across the semester. Interview questions are included in Appendix B.

Semi-structured interviews were well-suited for this study because they combined structure with flexibility, allowing me to ask consistent, guiding questions while also probing further into participants' experiences (Kvale & Brinkmann, 2009; Merriam & Tisdell, 2016). This format enabled participants to share their stories in their own words, yielding rich, descriptive data that aligned with the case study methodology (Stake, 1995). The dialogue-oriented nature of the interviews also reflected the principles of TLT (Mezirow, 1991), in which reflection and discourse are central to perspective transformation.

The iterative structure of the interviews provided insight into the dynamic nature of participants' learning. In particular, the second round revealed disorienting dilemmas and reflective shifts that had occurred since the first interview, indicating how preservice teachers reconsidered discipline, regulation, and engagement strategies in light of new knowledge (Mezirow, 1991, 1997). For example, when participants described moving away from compliance-driven systems toward a relationship-based regulatory framework, these narratives

reflected both theoretical alignment with TIPs and AEN and changes in their developing teacher identities.

The interviews directly addressed the study's three research questions. They captured how preservice teachers described their integration of TIPs and AEN concepts into their instructional methods (RQ1), their strategies for designing positive, structured classroom environments (RQ2), and their efforts to engage and motivate students affected by trauma (RQ3). By situating participants' transforming perspectives within their lived experience and coursework, the interviews provided a window into how theory translated into practice.

Finally, the interviews functioned as both a data source and a reflective practice tool. Through sharing their knowledge and understanding aloud, the three participants engaged in the kind of critical reflection that TLT describes as essential to perspective transformation (Freese, 2006; Mezirow, 1991). The dual role of the interviews as both a research instrument and a pedagogical support reinforced their value in exploring the intersections of TIPs, AEN, and teacher identity development.

Reflective Journals

I asked participants to maintain reflective journals throughout the semester, responding to guided prompts after each course module, following their microteaching experiences, and again at the conclusion of the course and Block One (see Appendix C). These journals invited participants to record their thoughts, challenges, and understanding as they engaged in TIPs and AEN. Because the entries occurred across multiple stages of learning and practice, the journals provided a longitudinal view of participants' evolving perspectives. Through continuous reflection, participants documented not only their immediate reactions but also patterns of growth over time, allowing me to trace their transformative learning journey.

I designed journal prompts to foster ongoing critical reflection, which Mezirow (1991) identifies as central to TLT. Prompts encouraged participants to examine their assumptions, describe classroom encounters, and connect theoretical knowledge to practical applications. For example, one prompt asked participants to reflect on a moment when their beliefs about student behavior were challenged, while another invited them to describe how they might apply Pillar Two of AEN's coregulation strategies in their future classroom. These reflections served both pedagogical and research purposes by helping participants make meaning of new content while also producing data aligned with the study's research questions. Journal prompts are included as Appendix B.

Reflective journaling is a well-established practice in teacher education because it supports metacognitive awareness, professional growth, and perspective transformation (Boud, Keogh, & Walker, 1985; Larrivee, 2006; Moon, 2006; Schon, 1983). In this study, the journals provided insight into how the three participants interpreted TIPs and AEN concepts, processed their classroom experiences, and experimented with new roles as developing teachers (Mezirow, 1991). Journaling also bridged theory and practice by encouraging participants to articulate how TIPs and AEN could shape their instructional choices (Schon, 1983).

The reflective journals addressed all three research questions. The journals revealed how participants internalized TIPs and AEN concepts into their instructional practices (RQ1), how they envisioned building safe, structured classroom environments (RQ2), and how they considered strategies to engage and motivate students affected by trauma (RQ3). By capturing these reflections at multiple points in time, the journals documented the iterative process of learning, application, and adaptation that characterizes transformative professional development (Mezirow, 1997; Thomas et al., 2019).

Ultimately, the journal provided more than just supplementary data; it functioned as a mirror through which each participant could see their own growth. In documenting their reflections, participants not only recorded their transformation but also enacted it, embodying the core principles of TLT by facing disorienting dilemmas, critically reassessing assumptions, experimenting with new approaches, and reframing their emerging teacher identities.

Scenario Analysis

I conducted scenario analyses twice during the study: once at the beginning of the course and again at the end (See Appendix D). At each point, participants examined a detailed classroom scenario involving a student with trauma-related behaviors. They proposed strategies, justified their decisions, and reflected on how they might respond as teachers. This process allowed me to capture participants' initial perspectives on trauma-informed practice and then compare them to their responses after completing coursework and professional development.

This approach served both diagnostic and evaluative purposes. At the beginning of the semester, participants' responses provided a baseline of their prior knowledge, beliefs, and default strategies for addressing challenging behavior. At the end of the semester, their reanalysis of the same scenario revealed how their thinking had shifted, expanded, or deepened after engaging with TIPs and AEN. By tracking growth over time, the case study method provided direct evidence of participants' transformation in strategic thinking and pedagogical decision-making.

Scenario Studies were well-suited to this research because they presented participants with a “disorienting dilemma” (Mezirow, 1991) that required them to critically examine assumptions and test new perspectives. Reanalyzing the same case after training created opportunities for transformative reflection, as participants compared their earlier beliefs with the

strategies they had acquired. This use of disorienting dilemmas directly aligned with TLT's emphasis on perspective transformation (Mezirow, 1997).

Educational researchers emphasize the value of scenario studies for exploring complex, real-world challenges in which context matters (Craig, 2016; Stake, 1995; Yin, 2014). In trauma-informed education, specifically, case analyses enable preservice teachers to apply theoretical knowledge to realistic classroom scenarios, thereby bridging the gap between coursework and practice (Thomas et al., 2019). In this study, the scenario analyses not only served as an instructional activity but also functioned as a research instrument, showing how preservice teachers integrated TIPs and AEN frameworks into their pedagogical identities.

By drawing on semi-structured interviews, reflective journals, and scenario analyses, I gathered data that documented participants' voices, reflections, and applied decision-making across time and context. Collectively, these three instruments provided triangulation and alignment with TLT (Mezirow, 1991), offering multiple entry points into how participants described, reflected on, and enacted TIPs and AEN concepts.

Document Analysis

In addition to interviews, reflective journals, and case studies, document analysis served as a fourth data source for this study. As Bowen (2009) explains, document analysis involves systematically reviewing and interpreting existing written materials to elicit meaning, gain understanding, and develop empirical knowledge. In qualitative case study research, documents serve as a valuable means of triangulation, providing contextual depth and insight into participants' beliefs, reflections, and evolving identities (Creswell & Poth, 2018; Merriam, 2009; Stake, 1995).

For this study, four course-based assignments were analyzed as part of the document data set: *Removed* Reflection, a written reflection following the viewing of *Removed*, a short film that portrays the emotional and behavioral impact of trauma on children in the foster care system. *Paper Tigers* Reflection, a structured response to the documentary *Paper Tigers*, in which participants reflected on the transformation of a trauma-affected high school through relational safety and staff regulation. Brain Architecture Game Reflection, a collaborative, experiential activity designed to show how early experiences shape neural development. Participants documented their reflections on how relational and environmental factors influence brain growth, resilience, and learning readiness. Trauma-Informed Classroom Design Project, a final project in which preservice teachers designed a classroom environment grounded in trauma-informed practices (TIPs) and applied educational neuroscience (AEN) principles, integrating predictability, co-regulation, and emotional safety into both physical and relational spaces.

These documents were selected because they captured moments of applied understanding and reflection aligned with Mezirow's (1991) Transformative Learning Theory (TLT). Each assignment prompted participants to analyze their assumptions, engage in critical reflection, and articulate changes in their beliefs and practices related to trauma-informed and neuroscience-aligned teaching.

Documents were analyzed through open and axial coding, alongside other data sources, to identify recurring patterns, phrases, and conceptual shifts related to the study's three research questions. This process enabled the triangulation of data across sources, ensuring a richer and more credible representation of each participant's learning experience (Lincoln & Guba, 1985; Patton, 2015).

Study Activities Timeline

To provide a clear picture of when and how each data source was collected, Table 3.3 summarizes the timeline of study activities. This table illustrates the sequence of coursework, professional development, microteaching, and reflection opportunities, as well as the points at which interviews, journals, and case studies were conducted. The timeline illustrates how data collection was integrated throughout the semester to capture participants' immediate responses and ongoing transformations, ensuring alignment with both the study's research questions and the principles of TLT (Mezirow, 1991).

Table 3.3. Timeline

Dates	Activities
January 2025 to May 2025	Participants enrolled in <i>Trauma and Resilience in the Educational Setting</i> , a course designed to build knowledge of trauma-informed practices (TIPs) and applied educational neuroscience (AEN). Topics included Adverse Childhood Experiences (ACEs), the brain's stress response, regulation strategies, co-regulation, resilience, and trauma-informed classroom management. Document analysis will be done throughout the year on assignments, <i>Removed</i> reflection, <i>Paper Tigers</i> Reflection, The Brain Architecture Game, and Trauma-Informed classroom design project.
January 2025	Semi-Structured Interviews - Initial: The first round of semi-structured interviews established a baseline of participants' knowledge, beliefs, and classroom strategies related to trauma-informed practices. Initial Scenario Analysis: Participants analyzed a classroom scenario involving trauma-impacted students to reveal their baseline approaches to classroom management and student support. Initial Reflective Journals: Participants documented their expectations, current teaching philosophies, areas for potential growth, and strategies for supporting students. The pre-test served as a baseline for their initial approaches. Reflective Journals – Initial Entries Participants kept reflective journals to document their initial thoughts on trauma-informed teaching. These entries captured

	their expectations and current teaching philosophies, and identified areas of potential growth
March 2025	Professional Development Sessions: Participants attended four intensive sessions on (a) Trauma and ACEs, (b) Neuroscience of Trauma, (c) Creating a Trauma-Informed Classroom, and (d) Case Studies and Situational Analysis. Mid-Course Journals: Participants reflected on new insights, challenges, and their evolving practices.
April 2025	Second Interviews: The second round of interviews focused on transformative learning experiences, real-life applications of strategies, and the challenges participants encountered during their placements.
May 2025	Microteaching Reflections: Participants wrote reflective journal entries following their microteaching placements, documenting how they applied TIPs and AEN strategies in authentic classroom contexts. Final Journals: Participants completed final journal entries at the end of Block One, summarizing their overall learning, insights from microteaching, and shifts in their teaching philosophy. Final Scenario Analysis: Participants revisited the same classroom scenario from January, applying their newly acquired knowledge and comparing their responses to those from their initial analysis. This demonstrated growth in understanding and strategic decision-making.
July 2025	Final Report Preparation: Data were synthesized into a final report, connecting participants' experiences to Transformative Learning Theory (TLT) and the principles of trauma-informed teacher preparation
July 2025 to November 2025	Finalized data analysis and completed the writing of Chapters Four and Five. This phase focused on integrating findings, refining interpretations through cross-case analysis, and preparing the dissertation for final defense.

Together, these activities created a layered record of participants' experiences across coursework, professional development, and microteaching. Collecting data through semi-structured interviews, reflective journals, and scenario analyses provided both depth and breadth,

allowing me to capture participants' voices, reflections, and applied decision-making over time. Triangulation across these sources strengthened the trustworthiness of this study (Denzin, 1978; Patton, 2015) and aligned with TLT (Mezirow, 1991), which emphasizes reflection, dialogue, and disorienting dilemmas as key elements of perspective transformation. The following section describes the analytic process I used to prepare, code, and interpret these data, moving from detailed accounts to overarching themes that addressed the study's three research questions.

Data Analysis

This study employed a structured, iterative approach to analyze the qualitative data collected from semi-structured interviews, reflective journals, scenario and document analyses. Following Saldaña's (2016) framework, I engaged in multiple phases of coding, including open, axial, and selective coding, moving from detailed initial insights to broader thematic understandings. This process ensured that the analysis remained grounded in participants' voices while aligning with Mezirow's (1991) TLT, TIPs, and AEN.

Phase 0: Organize and Familiarize

Before coding began, I immersed myself in the data to become familiar with and ensure accuracy (Creswell & Poth, 2018; Saldaña, 2016). I personally transcribed pre-/post semi-structured interviews, compiled reflective journals submitted throughout the semester, and gathered both initial and final case study responses. I removed identifying information, labeled each file by participant and date, and formatted them for consistency. I then read through each transcript, journal, and case study multiple times, highlighting key passages and writing analytic memos to capture early impressions. This preparatory step enabled me to begin identifying recurring ideas, documenting disconfirming evidence, and establishing an audit trail to guide systematic analysis.

Phase 1: Open and In Vivo Coding

In the first stage of coding, I conducted a line-by-line review of all data sources. I generated descriptive open codes and incorporated in vivo codes and participants' own words, to preserve their authentic voices (Saldaña, 2016; Strauss & Corbin, 1998). This process captured details of participants' experiences, including how they interpreted trauma-informed practices, reflected on their nervous system states, and applied AEN strategies in classroom contexts. By remaining close to the data, I ensured that participants' meanings, not my assumptions, shaped the analysis.

Phase 2: Axial Coding

Next, I organized the open codes into broader categories by examining relationships and connections (Charmaz, 2014; Saldana, 2016; Strauss & Corbin, 1998). This axial coding stage revealed how participants' understandings transformed over time, particularly as they applied trauma-responsive strategies in real-world microteaching placements. For example, I compared causal conditions (e.g., prior beliefs about discipline), contextual influences (e.g., classroom settings, student needs), and intervening conditions (e.g., participants' personal histories or ACEs scores) that shaped participants' implementation of TIP and AEN strategies. This phase revealed the developmental process participants underwent as they transitioned from traditional views of teaching to relational and neuroscience-aligned practices in alignment with TLT.

Phase 3: Selective Coding

In the final stage, I synthesized the categories into overarching themes that directly addressed the study's three research questions. Selective coding highlighted the intersection between theory and practice, demonstrating how participants redefined their pedagogical identities, reimaged classroom environments, and reconfigured engagement through the lens of

trauma-informed and neuroscience-aligned strategies. These themes provided the cohesive narrative presented in Chapter Four, showing not only what participants experienced but how those experiences reflected phases of transformative learning (Mezirow, 1991) and the concepts of TIPs and AEN.

The analytic process outlined above provided a systematic way to identify and interpret patterns across semi-structured interviews, reflective journals, and case studies; however, rigorous analysis alone does not guarantee that findings are trustworthy. To ensure that results accurately reflected participants' voices and experiences, I integrated multiple rigor strategies throughout the study. These included triangulation across data sources, member checking of interview transcripts, maintaining an audit trail of coding decisions and memos, reflexive journaling to account for my dual role as researcher and instructor, and continuing analysis until saturation was reached. Together, these measures enhanced the study's credibility, dependability, and confirmability while also providing the thick, rich description needed for transferability. In the following section, I describe these strategies in greater detail using Lincoln and Guba's (1985) four criteria of trustworthiness: credibility, transferability, dependability, and confirmability.

Trustworthiness

To establish trustworthiness in this study, I incorporated multiple strategies aligned with Lincoln and Guba's (1985) four criteria: credibility, transferability, dependability, and confirmability. These measures ensured that the findings reflected participants' voices, preserved the integrity of their experiences, and aligned with the study's purpose of exploring TIPs and AEN.

I enhanced credibility by triangulating data across semi-structured interviews, reflective journals, scenario and document analyses (Denzin, 1978; Patton, 2015; Stake, 1995, 2006). This cross-validation ensured that findings were not dependent on a single source but consistently reflected participants lived experiences. Member checking further enhanced credibility, giving participants the opportunity to review their pre- and post-interview transcripts to clarify their perspectives (Lincoln & Guba, 1985). Data collection and analysis continued until saturation was reached, when no new themes or patterns emerged (Creswell & Poth, 2018; Guest et al., 2006).

To improve transferability, I provided thick, detailed descriptions of participants, their backgrounds, and their classroom context. By contextualizing their experiences, I enabled readers to assess whether the findings might be applicable to other teacher preparation programs or educational settings (Lincoln & Guba, 1984). This strategy aligned with the study's focus on lived experiences, acknowledging that while findings are not generalizable, they are transferable to similar contexts.

I maintained dependability by applying consistent procedures across all participants. Each participant received the same semi-structured interview prompts, reflective journal guidelines, scenario, and document analyses. I documented analytic decisions in an audit trail and employed iterative, open, axial, and selective coding to trace how initial codes evolved into overarching themes (Saldana, 2016; Strauss & Corbin, 1998). These strategies created a clear record of how interpretations were formed, enabling others to follow the logic of the analysis.

I strengthened confirmability by practicing reflexivity throughout the study. As both instructor and researcher, I maintained a reflexive journal to record assumptions, positionality, and emerging interpretations (Finlay, 2002). I also engaged in peer debriefing to examine my decisions and potential biases. These practices ensured that findings were grounded in

participants' perspectives rather than my own, supporting the study's alignment with TLT (Mezirow, 1991).

By strengthening these strategies, the study's credibility, dependability, transferability, and confirmability were enhanced. Additionally, it was equally important to acknowledge my role as both researcher and instructor. Because my positionality shaped how I engaged with participants, interpreted their reflections, and navigated ethical considerations, I practiced reflexivity throughout the study. The following section outlines my positionality, including the professional and personal experiences that informed my perspective and the steps I took to minimize bias and privilege participants' voices.

Positionality Statement

Because my role as researcher and instructor intersected in this study, I recognized the importance of making my positionality explicit. My professional expertise in TIPs and AEN shaped how I designed the study and interpreted participants' experiences. At the same time, this dual role introduced potential bias, as my prior knowledge and instructional position could influence how I understood participants' reflections.

To address these challenges, I engaged in reflexive practices throughout the research process. I maintained a reflexive journal to document my assumptions, evolving interpretations, and decision-making processes, and I participated in peer debriefing sessions to ensure that my analyses were critically examined from multiple perspectives (Berger, 2015; Finlay, 2002). These practices helped me remain mindful of how my interpretations might affect data collection and analysis, thereby enhancing the study's overall credibility.

My personal experiences with trauma also shaped how I connected with participants. While these experiences gave me empathy and understanding, I remained aware that they could

influence my interpretation. To mitigate this risk, I prioritized participants' voices, invited member checking of transcripts, and maintained transparent communication throughout the study (Lincoln & Guba, 1985). This reflexive approach aligns with TLT (Mezirow, 1991), which emphasizes critical self-examination as a foundation for growth. By continually interrogating my role and perspective, I sought to create conditions that honored participants' transformative learning without imposing my own interpretations onto their experiences.

Summary

This chapter outlines the methodology that guided this qualitative, multiple-case study with an instrumental purpose. Grounded in the constructivist paradigm, the study drew on Mezirow's (1991) TLT as its theoretical framework to examine how TIPs and AEN shaped the developing pedagogies and professional identities of elementary preservice teachers. The research design employed purposeful sampling of three preservice teachers enrolled in an elementary education program, each of whom provided a perspective on the application of TIPs and AEN within the context of teacher preparation.

Data collection comprised four sources: semi-structured interviews, reflective journals written throughout the semester, scenario analyses conducted at the beginning and end of the course, and document analyses throughout the semester. Together, these instruments provided a triangulated and longitudinal view of participants' learning journeys. The inclusion of both university coursework and elementary microteaching placements offered a context for exploring how theory translated into practice.

Analysis followed Saldana's (2016) multi-phase coding process, beginning with immersion and organization (Phase 0) and moving through open, axial, and selective coding. This structured approach ensured that initial codes evolved into categories, which ultimately

became themes that directly addressed the research questions. I established trustworthiness through triangulation, member checking, saturation, reflexivity, and an audit trail, with Lincoln and Guba's (1985) criteria of credibility, transferability, dependability, and confirmability serving as benchmarks of rigor.

By detailing the research design, participants, data sources, analytics strategies, and measures of trustworthiness, this chapter established the foundation for interpreting how preservice teachers engaged with TIPs and AEN concepts. The following chapter presents the study's findings, organized by research questions and illustrated with participants' voices. In chapter four, I describe the themes that emerged from the analysis and demonstrate how preservice teachers' experiences reflected both the concepts of TIPs and AEN and the transformative learning process outlined by Mezirow (1991).

This chapter established the methodological foundation for exploring how three preservice elementary teachers engaged with TIPs and AEN within the TLT framework. Building on this design, Chapter Four transitions from process to discovery, presenting the findings from data analysis. The results are organized by research questions and supported by participants' narratives, illustrating how preservice teachers' experiences integrated TIPs and AEN concepts through Mezirow's (1991) phases of transformative learning. In this next chapter, the focus shifts to interpreting how participants' reflections, classroom applications, and evolving beliefs reveal a process of transformation from awareness to action.

Chapter 4 - Findings

“Transformation is not a destination. It is a journey of becoming.”

-Adapted from Mezirow (1991)

This chapter presents the findings from a multiple case-study with an instrumental purpose (Stake, 1995, 2006) that explored how trauma-informed practices (TIPs; SAMHSA, 2014) and applied educational neuroscience (AEN; Desautels, 2020, 2021) influenced the transforming instructional beliefs, classroom strategies, and student engagement approaches of three preservice elementary teachers: Mia, Sami, and Abby. The selected participants were chosen for their potential to provide insight into trauma-informed preservice teacher development. Through these illustrative cases, the study aimed to gain a deeper understanding of how principles of TIPs and AEN concepts serve as a catalyst for transformative learning (Mezirow, 1991) during teacher preparation.

The findings are organized by the study’s three guiding research questions. Each is explored first through a within-case analysis and then through cross-case synthesis. Guided by transformative learning theory (TLT; Mezirow, 1991), each case indicates how participants experienced disorienting dilemmas, engaged in critical reflection, and redefined their professional roles. Data sources included pre- and post-structured interviews, reflective journals, pre-and post-scenario analyses and document analyses. All data were analyzed using thematic analysis through a three-cycle coding process (i.e., open and in vivo coding, axial coding, and selective coding) (Saldana, 2016). To summarize the key features of the resulting themes, direct quotes from participants were selected to center the preservice teacher's voice in these descriptions, thereby capturing authentic experiences while also aligning the findings with relevant literature on TIPs principles and AEN pillars.

Research Question One: How do applied educational neuroscience and trauma-informed coursework influence preservice teachers' practices in elementary education?

Mia: From Behavior Management to Brain-Aligned Curriculum

At the onset of the course, Mia conceptualized behavior management as applying discipline to students. For instance, Mia explained in her pre-interview how she “just thought students who acted out needed to be redirected or given consequences.” Additionally, as she considered her role in regulating personal and student emotion when students exhibit challenging behavior in the initial case study, she wrote:

I own my regulation. I would send the student to the hall or counselor to discuss their behavioral choices, and then the student returns when they are ready to learn. Meanwhile, 24 other students need to learn, and one student cannot dictate or control whether learning can happen.

This perspective framed misbehavior as an issue of control rather than a communication of need. As Mia engaged more intensely with the course materials, a shift in her thinking became evident. Her reflections and evolving classroom strategies revealed three major areas of growth: disrupting the discipline narrative through empathy and observation, shifting from control to co-regulation by embracing a relational lens, and planning for trauma-informed practice through routines and regulation.

Disrupting the Discipline Narrative Through Empathy and Observation

Early in the semester, Mia experienced a disorienting dilemma, the first phase of Mezirow's (1991) transformative learning theory, as she began to question her belief in the effectiveness of behavior clip charts. A behavior clip chart is a classroom management system in which students are “clipped” to a visual, color-coded chart (e.g., green, yellow, red) and moved

up or down based on their behavior throughout the day (McIntosh et al., 2020). These movements are typically public, offering immediate feedback but also exposing students to praise or shame in front of their peers.

During a *Trauma and Resilience in the Educational Setting* class session, Mia and her peers first individually identified the pros and cons of using behavior clip charts before joining table groups to reach a consensus on whether a behavior clip chart might be beneficial for a student who has experienced trauma. Mia, having experience with these charts herself as an elementary student, initially believed they would be helpful for students because “the student, whether impacted with trauma or not, will quickly know that the behavior was unacceptable; how do these students fix behaviors if we do not call them out?” However, through intentional discussion with peers, intentionally listening, observing, and researching on her own, she later described in her second reflection journal:

I used to think structure meant strictness. Now I understand that structure with compassion creates the safety students need. I now see the behavioral clip chart as almost humiliating. In an observation, I watched a teacher have a student come up in front of the classroom and clip down. The student was crying due to being hungry. The issue was hunger, which the teacher could have addressed by sending the student to the social worker to obtain food. However, instead, the whole class watched as the tearful student went up to the chart and clipped it down; it was a bit of an eye-opener. The student continued to scream, ‘I am just hungry.’ Teachers have students clip down without realizing what the real issue is, so I wonder if this problem will get fixed.

After observing the implementation of behavior clip charts in an elementary classroom and empathizing with a student who was “just hungry,” Mia experienced a critical turning point. This experience marked the earliest and most visible moment when she began to challenge her assumptions about discipline. Mia no longer viewed the clip chart as a neutral tool for accountability but began to see how such systems could unintentionally shame students and overlook the real stories behind their behavior. The moment the student tearfully explained, “I

am just hungry,” disrupted more than her view of discipline; it pierced a deeper belief that fairness in the classroom came from treating everyone the same. For Mia, who had internalized the idea that structure and public accountability created order and justice, witnessing a vulnerable student publicly punished for a physiological need was unsettling and eye-opening.

Emotionally, this moment made Mia uncomfortable. The humiliation she witnessed didn’t align with her values, especially as someone who believed fairness equaled firmness. In her journal, she wrestled with this internal tension, writing, “I wonder if this problem will get fixed.” That simple sentence captured the softening of Mia’s once rule-driven stance, a quiet but powerful admission that perhaps something about the system needs to change. It marked her disorienting dilemma, the first phase of Mezirow’s (1991) Transformative Learning Theory (TLT), in which a previously held assumption, structure equals fairness, was no longer sufficient to explain what she had seen. The behavior clip chart moment forced her to see behavior as something to understand rather than something to correct. not as something to correct. Her mindset shifted from discipline and consequences to curiosity and compassion.

This understanding was not isolated to a single incident; it became a lens through which Mia viewed other systems and practices. For instance, during a guest speaker’s visit on trauma-informed classroom strategies, the students were tasked with reading “Ditch the Clip!” (McIntosh, Sugai, & Simonsen, 2020), which critiques behavior clip charts as systems that may appear neutral but reinforce racial and behavioral inequities and fail to teach replacement behaviors (Okonofua & Eberhardt, 2015; McIntosh et al., 2020). Mia’s engagement during this session was memorable. She wrote a question on a sticky note for our class “parking lot,” asking, “How are you teaching replacement behaviors, and is this hard when you are also trying to teach the content? How do you balance time?”

The question revealed growth in Mia's learning: she was beginning to wrestle with how to apply alternatives to traditional discipline systems even within the constraints of academic instruction. Her willingness to publicly discuss the balance between content delivery and social-emotional support showed that she began to view behavior as instructional, rather than just disciplinary. This was a pivotal moment in which she transitioned from passive reflection to active inquiry, revealing her developing identity as a teacher who seeks not just compliance, but connection and capacity-building.

Mia's experience observing the behavior clip chart moment and questioning her prior beliefs about discipline opened the door to a re-evaluation of her role in the classroom. The disorienting dilemma (Mezirow, 1991) gave way to critical reflection, in which she began to question both the behavior management tools she used and the foundational beliefs that shaped her response to student behavior. No longer content to interpret misbehavior as willful defiance, Mia began to ask herself, "What is going on within them?" Case study analysis of her post-interview reflections and teaching journals revealed a growing understanding of trauma's impact on behavior and an emerging awareness of her role as a co-regulator, who should be someone whose presence and emotional regulation set the tone for student safety and learning (Desautels, 2020; Perry & Winfrey, 2021).

This shift from a compliance-driven mindset to a relational, trauma-informed stance did not happen all at once. It happened gradually as Mia reimagined her teaching identity and began to see co-regulation not as an add-on, but as a core responsibility of an educator. The following theme, Shifting from Control to Co-Regulation: Embracing a Relational Lens, captures the transformation.

Shifting from Control to Co-Regulation: Embracing a Relational Lens

As Mia leaned into a relational lens, she began experimenting with co-regulation practices. Early in the course, her responses to student misbehavior were rooted in separation and removal, sending students out of the room or to the counselor until they were “ready to learn.” But her transforming understanding of brain-aligned practices reframed her thinking. In Reflective Journal #4, she wrote, “Starting the day with a predictable routine and a greeting changed everything. Even my most dysregulated students calmed down when they knew what to expect and that someone cared.” Mia was adding routines as proactive regulation tools, a core principle of AEN’s Pillar Two (coregulation) and Pillar Four (teaching students’ brain and body states) (Desautels, 2020, 2024).

One of the clearest applications of this shift occurred during a microteaching lesson, when a student became visibly agitated mid-lesson. Rather than sending the student out or ignoring the behavior to power through content, Mia paused instruction and led the class in five deep breaths. Mia reflected, “Her body softened, and she rejoined her peers in the activity. That moment taught me how powerful co-regulation is,” she wrote in a microteaching reflection. This pause, though brief, reveals a transformation in practice that centers on creating safety and regulation rather than control (Desautels, 2020; Siegel, 2012). It reflects what Desautels (2020) refers to as the “felt sense of safety” that must precede cognitive engagement.

Mia also began to recognize the importance of teaching neuroscience to both educators and students. In an informal conversation outside of class, she excitedly shared an experience from a school visit for a job interview. She described observing a kindergarten classroom where students began their day with a brain-based affirmation routine:

I went into the Kindergarten classroom, and these little friends started the day by putting one hand on their brainstem and saying, ‘I am safe’ and then on the side of their head to represent the amygdala and said, ‘I am loved’ and finally touched their prefrontal cortex and said, ‘I am ready to learn.’ Then the teacher said, ‘Kiss that brain because we are

ready for a great day!’ It was amazing! Even the principal at the end of announcements said, ‘In case no one told you today, Mr. S loves you.’

Earlier in the semester, Mia had expressed skepticism in her journals about whether young children could understand concepts like brain anatomy or regulation. However, this classroom moment offered a lived example that challenged those assumptions. For Mia, seeing neuroanatomy paired with relational affirmations, especially the phrase “I am loved,” revealed that even the youngest learners could internalize a sense of emotional safety through brain-aligned language and rituals. Desautels (2020) points out that even young children can benefit from understanding basic neuroanatomy when it is embedded in relational and predictable routines. Teaching students phrases like “I am safe,” and “I am ready to learn,” linked to brain structures, supports their ability to regulate and build emotional literacy (Immordino-Yang, 2016).

This observation marked a shift in Mia’s perspective on AEN Pillar Four: teaching neuroanatomy to students. In the class final, she wrote that integrating brain-based language into her daily routines would be a priority in her future classroom. This moment was a significant full-circle realization: what began as conceptual doubt transformed into excitement and application grounded in relational safety, TIPs, and AEN.

These experiences, moments of relational presence, did not remain isolated for Mia. Instead, they became the foundation for her planning a trauma-informed classroom. As Mezirow (1991) describes in the later phases of transformative learning, learners begin to integrate new perspectives into their ongoing practice by developing competence and confidence in applying them. By the end of the course, Mia went beyond simply reflecting on change to designing it herself.

Mia's journal reflections, assignments, and instructional choices demonstrated intentional efforts to embed TIPs into her routines, classroom culture, and instructional planning. This movement from reflection to action aligns with Thomas et al. (2019), who argue that preservice preparation must integrate trauma-sensitive principles to equip future teachers to meet student needs. Similarly, Alisic (2012) indicates the urgency of such coursework, noting that many educators feel underprepared to support trauma-impacted students and seek strategies to build both competence and confidence. This shift from questioning to designing marked Mia's transition to a deliberate application, in which TIPs and AEN concepts became the foundation of her instructional approach.

Planning for Trauma-Informed Practice Through Routine and Regulation

Mia's growth extended into Mezirow's (1991) action-planning phase, in which new perspectives are applied to real-world contexts. By the end of the course, Mia went beyond reflecting on what trauma-informed teaching entails, actively designing a classroom environment grounded in emotional safety, predictability, and relational connection.

In her final journal, she wrote: "I'll start every day with a check-in and use visuals with emotions, and coping skills to help kids feel grounded. I want students to know they're safe with me. That starts with how I show up, not just what I teach." For Mia, her role as an educator was no longer synonymous with control; it became a daily opportunity to co-regulate, model calm, and build trust.

This commitment marked a transformation in Mia's teaching philosophy. No longer viewing classroom management as a means of controlling behavior, she began to embrace it as a platform for co-regulation, students' empowerment, and relational safety. Her reflections and actions showed how TIPs and AEN concepts fostered not just skill acquisition but an identity

shift, one in which the teacher becomes a co-regulating presence (Desautels, 2024) who models emotional literacy and cultivates safety through predictability and trust (SAMHSA, 2014).

Mia’s learning aligns with prior research on trauma-informed teacher preparation, which emphasizes educator self-regulation, emotional attunement, and relationship-centered pedagogy (Brunzell et al., 2016; Perry & Szalvitz, 2017). Desautels (2020) argues that when educators understand their brain-body states and intentionally co-regulate with students, they can disrupt cycles of trauma-related reactivity and restore pathways to connection and learning. Mia’s journey provides an indication of this process. By internalizing TIPs and AEN, she reimagined her role from behavioral enforcer to co-regulator and advocate, someone who sees each behavior not as defiance but as data.

Her case supports findings from Craig (2016), who noted that preservice teachers require explicit modeling and coursework to reframe trauma responses and implement healing-centered strategies. Through structured learning experiences in the course, ongoing reflection, and embedded fieldwork, Mia underwent what Mezirow (1991) calls a “perspective transformation,” a shift that is both cognitive and affective as well as behavioral. Ultimately, her transformation exemplifies how trauma-informed coursework, when grounded in AEN and relational practice, can prompt preservice teachers to move from reactive discipline to intentional, neuro-aligned, and equity-driven teaching.

Table 4.1. *Summary of Mia’s RQ1 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Observed punitive discipline practices and recognized their limitations.	Safety & Trustworthiness- seeing behavior as communication.	Pillar 1: Educator Brain & Body State- teacher regulation precedes student regulation.	“Starting the day with a predictable routine and a greeting changed everything.”

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Critical Reflection	Questioned traditional management rooted in separation and control.	Empowerment & Voice- building relational safety through connection.	Pillar 2: Co-Regulation- sharing calm through presence and tone.	“That moment taught me how powerful co-regulation is.”
Planning Action	Implemented greeting rituals, breathing exercises, and brain-based affirmations.	Peer Support & Collaboration- creating predictable, safe routines.	Pillar 3: Touchpoints-brief, repeated connections building safety	Introduced daily emotional check-ins and visual regulation supports.
Reintegration	Designed a trauma-informed classroom plan centered on safety and relational trust.	Empowerment & Cultural Awareness- valuing every student’s need for safety and belonging.	Pillar 4: Teaching Neuroanatomy- helping students understand and regulate brain-body states.	“I’ll start every day with a check-in ... That starts with how I show up, not just what I teach.”

Note. This table illustrates Mia’s RQ1 transformation through Mezirow’s (1991, 2009) TLT phases, aligned with SAMHSA’s (2014) TIPs and Desautels’ (2020) Four Pillars of AEN, and demonstrates how perspective shifts emerged through reflective and relational practice.

As summarized in Table 4.2, Mia’s transformation reflects a shift from behavior control to relational co-regulation. Her transforming understanding of TIPs and AEN exemplifies Mezirow’s phases of perspective transformation, culminating in the reintegration of new beliefs into her identity as an educator.

While Mia’s journey began with questioning disciplinary tools she had once accepted, Sami’s transformation emerged from a more foundational shift: realizing that not all students arrive at school ready to learn. Unlike Mia, whose disorienting dilemma stemmed from witnessing public discipline, Sami’s turning point was emotional and internal, rooted in the unsettling realization that not all children experience safety, support, or predictability at home.

Her story illustrates how preservice teachers can move from a focus on compliance to a commitment to relational safety, regulation, and trust.

Sami: From Survival Mode to Safe Learning Spaces

Sami entered the course with a strong belief in fairness, clarity, and control. In her pre-interview, she explained, “I need order in the classroom, or kids won’t learn, and rules make things fair.” Like many novice educators, she equated structure with discipline and saw rule enforcement as the foundation of equity. Her early case study responses reinforced this perspective, describing how she would redirect or remove students who disrupted instruction to protect the learning process for the majority. Growing up in a small, close-knit town where disruptions were rare, Sami had limited exposure to students whose behavior stemmed from trauma or unmet emotional needs, but that changed within the very first week of class.

The course opened with a viewing of *Removed*, a documentary that follows a young girl navigating foster care, abuse, and the heavy responsibility of caring for her toddler brother. For Sami, this documentary served as a disorienting dilemma, the first phase of Mezirow’s (1991) Transformative Learning Theory, because it forced her to confront a lived reality she had never imagined. As she watched the girl fall to the school bathroom floor in tears, carrying the worries of school, physical wounds, and emotional weight of survival, something shifted. The certainty she once felt about fairness and behavior began to crack. In her first reflection journal, she wrote:

I never realized that some kids live in a state of fight or flight every single day. I always thought bad behavior meant disrespect, but now I wonder what happened to them first. After seeing the young girl in the video with so much going on, from an alcoholic man her mom was with, verbal and physical abuse, on top of having to be the provider for her two-year-old brother. Her behaviors in school were a cry for help.

This moment disrupted the foundation of Sami’s belief system. Her definition of fairness, once tied to order and consistency, no longer explained what she had seen. As the girl in the film

whispered, “You may know my story, but you will never understand it,” Sami recognized the limitations of her own assumptions. In her next journal, she reflected more deeply:

Structure does not mean rigidity; it means consistency, predictability, and care, especially for students impacted by trauma. That girl needed someone to care for her; it was almost as if she wasn't seen by anyone in the school. She falls on the bathroom floor and just cries due to having a black eye on picture day. I think what affected me the most was when she said, ‘You think you know my story, you may know my story, but you will never understand my story,’ which made me realize how important it is to understand how she is in the brainstem when she enters school. I have to connect and make a student like her feel safe.

Sami’s disorienting dilemma emerged from emotional dissonance. The framework she had built her teaching identity upon, order equals fairness, no longer aligned with what she now understood about childhood adversity. As Mezirow (1991) describes, disorienting dilemmas initiate transformation by shaking the very assumptions that ground our worldview. For Sami, this was the beginning of a shift from judgment to curiosity, from control to connection. Her story began with a single moment of awareness that forced her to rethink what it means to truly see a student.

This emotional dissonance marked more than a personal awakening; it catalyzed Sami’s shift toward trauma-informed teaching. As she progressed through the course, her reflections and actions revealed a growing willingness to question long-held assumptions and reimagine her role as a teacher. What began as emotional discomfort soon evolved into cognitive and professional transformation. The first clear sign of this shift emerged as Sami began to reframe behavior not as defiance but as communication, a shift rooted in brain science and co-regulation.

Reframing Behavior as Communication Through the Lens of Brain Science

Sami’s evolving understanding of trauma-informed teaching accelerated during a course module on the nervous system. As participants explored Polyvagal Theory (Porges, 1994), they learned how autonomic nervous system states, dorsal vagal shutdown, sympathetic hyperarousal, and

ventral vagal engagement influence learning, behavior, and relational presence. As part of an assignment, participants tracked their own nervous system states across a week using Desautels' (2020) brain-body tracking tool. For Sami, this practice marked a turning point in her personal knowledge and professional empathy. In a reflection of what she learned from the assignment, she shared:

Wow, I can see why students will either be engaged or not. I noticed during this assignment that when I had a relationship with professors who genuinely cared about me, I was in a state of social engagement, in the ventral vagus. My work was better, I was excited to engage in the course, and even though I am quiet, I participated. I won't name the course, but in that course and at my job, I was mainly in the dorsal vagal. I was almost detached from what the professor was saying or what my boss was telling me to do; it felt like I was giving them the energy they were giving me.

There are three primary states of the autonomic nervous system: ventral vagal (safety and social engagement), sympathetic (mobilization or fight/flight), and dorsal vagal (shutdown or collapse) (Desautels, 2023). Within the framework of AEN, this chart supports Pillars One and Four, Educator Brain and Body State, and Teaching Neuroanatomy, by helping students and teachers recognize their brain-body states and develop shared language for regulation. When educators integrate tools like the Polyvagal Chart into classroom routines, they model self-awareness, normalize physiological responses to stress, and strengthen co-regulation practices (Desautels, 2020, 2023), core components of TIPs and TLT in practice.

Sami's recognition that connection, not compliance, fuels engagement strengthened her trauma-informed identity. The nervous system tracking assignment moved theory into lived experience. She began to see classroom behavior as communication that reflected a student's internal state rather than defiance. Her thinking aligned with Desautels' (2020) assertion that all behavior originates from a brain-body state. With this understanding, Sami reframed her

response to student behavior as an opportunity for co-regulation, rather than correction, as she wrote in a case study:

When kids flip desks and yell, it is not because they want attention. It is often because their nervous system is overwhelmed. So it all relates. I think that prior to knowing this, I would have sent the student to the office and had the administration deal with it. However, if I know the student and can gauge their brain-body state, I can communicate and co-regulate with them to see what they need.

This perspective shift came into focus during her microteaching experience. When a student she was working with crawled under a desk and shut down, she became concerned. Sami's first instinct was to coax him out and resume the lesson, but she caught herself. Rather than pushing forward with instruction, she paused and prioritized emotional safety.

Today, a student crawled under a desk and just shut down. My first instinct was to coax him out and resume instruction. But I quickly thought it was superficial if I did that. I did not need him to talk; I needed him to feel safe first. I gave him a Post-it that stated, 'When you are ready, I am here.' That changed everything. He came out, and we talked about the frustration he felt, and then he got to work. I knew he was not in the prefrontal cortex, and he was not in a position to learn. I first needed him to feel safe and loved. - Microteaching Reflection

This simple moment represented a major pivot in Sami's teacher identity. Her decision to pause, connect, and offer quiet presence rather than compliance embodied the trauma-informed principles of empowerment and voice (SAMHSA, 2014) as well as AEN Pillar Two: Co-regulation. By recognizing that the student was dysregulated and not yet ready to engage in higher-order thinking, Sami honored the principle that regulation must precede instruction (Desautels, 2020, 2025).

Sami's actions during this lesson reflected Phase Eight of Mezirow's (1991) Transformative Learning Theory: the provisional use of new roles and strategies. She was no longer theorizing; she was living out her learning in real time. Her teaching moved beyond managing behavior; it became a vehicle for restoration, connection, and trust. One quiet moment,

one Post-it note, one shift in approach signaled that a trauma-informed education was no longer a concept. It had become her practice.

The disorienting dilemma sparked the undoing of Sami's original framework. As she engaged in critical reflection, her focus shifted from classroom control to student connection. Understanding trauma required more than empathy for Sami; it called for an understanding of how the brain and body respond to adversity. The following phase of Sami's learning journey illustrates how neuroscience became the lens through which she reinterpreted student behavior, guiding her into the next stage of transformation.

Centering Regulation and Relationships in Classroom Design

As Sami's understanding expanded, she moved into what Mezirow (1991) describes as later phases of transformative learning, exploring new roles and relationships, planning new actions, and reintegrating a transformed perspective into her professional identity. Her thinking had evolved from enforcing rules to fostering safety, and now she wanted to equip students with the language and tools to regulate their emotions. She became especially drawn to Pillar Four of AEN: teaching neuroanatomy to students (Desautels, 2020). In her post-interview, Sami described how she had begun introducing this concept to her students during her work at the Boys and Girls Club after-school program. She explained:

I started teaching my students about their brains. I loved Dr. Dan Siegel's (2015) distinction between the upstairs brain, where students can be rational and solve problems, and the downstairs brain, where we go when we are scared, angry, or have intense emotions. I told them that the best thing is you don't have to stay in the downstairs brain. I gave them strategies to get back to the upstairs brain! The students got it! They started

using that language themselves. I wish I could follow them to see if they continue and begin using the strategies.

Her goal was to create opportunities for students to identify their internal states and access strategies to regulate their emotions via neuroscience. Later in the same interview, Sami returned to this experience with excitement, describing a tangible strategy she had introduced:

I went to the Dollar Tree and bought all my students pinwheels and showed them how they could use this as a breathing tool. I had them take a deep breath in, and then had them breathe out, aiming at the pinwheel. They loved seeing it spin! I told them when they are frustrated about something they can use. I said, 'I do this five times when I am frustrated at my school.' We went on to practice!

This moment exemplified the expansion of Sami's trauma-informed lens. She was no longer simply discussing co-regulation in theory; she was modeling it, practicing it, and embedding it in everyday interactions with students. The pinwheel became more than a breathing tool; it was a symbol of her transformed practice, a bridge between neuroeducation and relational presence. Her efforts reflected the core of AEN and TIPs: teaching students that emotional regulation is possible, that they are not broken, and that trusted adults can offer both safety and skill-building. Sami's shift toward proactive, brain-aligned teaching reflected her integration of TIPs and AEN concepts as well as her growing confidence in her role as a co-regulator and learning guide.

That shift became more visible in her final trauma-informed classroom design project. Rather than decorating her classroom with motivational posters or rigid rules, Sami designed a space built around emotional awareness and regulation. She included a dedicated "brain break corner," visual check-ins for emotions, and tangible tools students could use to identify and shift their nervous system states.

The 'brain break' corner will allow my students to demonstrate that they recognize they are dysregulated and in the downstairs brain. Visuals of strategies in the corner will help students return to the upstairs brain. This way, they will be able to rejoin our classroom family and thrive within it. This will work if I have a solid relationship with each student;

they will need to trust me. I would have never thought of doing this before. I would have just done what I had seen, send them to a buddy room.

Her quote captures the essential transformation: from inherited discipline practices like “buddy rooms” to relationally anchored, trauma-informed design. Sami’s decisions aligned with the trauma-informed principle of trustworthiness and transparency (SAMHSA, 2014), ensuring that students understood both what they felt and how to return to a state of readiness to learn. Her classroom became a space for co-regulation, safety, and restoration.

Later in her final classroom design project, Sami outlined how she would continue embedding trauma-informed principles into her daily practice. Drawing from knowledge across the trauma and resilience course and her concurrent coursework, she identified relationship-building as central to sustaining emotional safety. Specifically, she referenced strategies from Sprenger’s (2020) work in another course, which emphasizes the importance of teacher behaviors that foster relationships, connection, and belonging. During a classroom design project (Appendix E), she wrote:

To intentionally build relationships with students, I plan to implement two strategies from Sprenger’s book that have stayed with me: *Five Ways to Show You Care* and *Write Notes to Students*. The first strategy, *Five Ways to Show You Care*, I loved due to its organization and how it will build relationships.

Providing Structure: I will do this by creating a Social Contract like the Capturing Kids’ Hearts uses, so that every student’s voice is heard, and I create that family vibe in the classroom.

Offering Choice: In your other course, I loved creating Choice Boards or creating more than one way for students to show what they know. Like you say, it gives students some control while I can still assess mastery of the standard- it is a WIN-WIN!

Showing Interest: I think this is the most important. I need to, as you say, ‘know who I am teaching before what I am teaching.’ If I know them, I can incorporate what they love into our learning and have sidebar conversations to show that I am listening, and I see each of my students.

Being Optimistic: This will be the hardest for me. Admittedly, I'm a Debbie Downer sometimes, but I need to show up believing in them and in myself.

Acknowledging their Feelings: By doing this, I can help build their self-awareness and help them recognize the behavior they may be projecting. Then I can ask, 'What do you need from me right now?' I loved this strategy the most!

Sami then referred to the second strategy, writing notes to students (Sprenger, 2020), as she shared the following: "I love how you do this. I have zero trauma, but I look at those notes sometimes when I want to give up on assignments or everything I am doing. Intentionality is key! I already have my notecards picked out!"

These reflections show how Sami's transformation moved beyond surface-level understanding and into daily, intentional practice. She had both reframed her beliefs about student behavior and reconstructed her classroom around the core trauma-informed principles of empowerment, connection, and predictability (SAMHSA, 2014). In doing so, she positioned herself as a teacher who would meet individual needs, co-regulate, and model relational safety every day.

Sami's early transformation centered on how she viewed students, recognizing their behaviors as communication, designing safe spaces, and embedding brain-based tools into her instruction. As the semester progressed, she began to shift her focus inward. Her growing understanding of trauma-informed practice revealed a deeper truth: co-regulation begins with the adult. As Porges (1994, 2011) explains through Polyvagal Theory, students' nervous systems detect the regulation or dysregulation of the adults around them. Similarly, Perry and Winfrey (2021) emphasize that "state drives story," meaning that adult emotional presence shapes the classroom's tone and engagement. Desautels (2020) reinforces this in her work in AEN, asserting that educators must first regulate themselves to effectively co-regulate with students. This next

phase of Sami's journey marked a move into Mezirow's (1991) later stages of transformation, where learners not only apply new strategies but also integrate them into a redefined sense of self. Sami's story now turned toward the most critical relationship in the classroom: the one between her own nervous system and her students'.

Becoming a Regulated Educator

One of Sami's most profound transformations went beyond how she viewed her students as she began to understand herself as the emotional center of the classroom. At the beginning of the course, Sami placed the burden of emotional regulation and control on her students. She expected compliance to precede instruction and saw disruptions as threats to fairness. However, by the end of the course, she began to realize that a trauma-informed classroom is built first on *her* internal state. This marked her progression into the later stages of Mezirow's (1991) TLT, specifically, Phase Eight, planning a course of action, and Phase Ten, reintegration with a new perspective. This insight began to solidify as she examined her own nervous system patterns during a self-tracking assignment. In Reflective Journal Four, she wrote:

Wow, I never realized I needed to check in with myself before checking in on students. When I am calm, I can co-regulate with students with trauma or intense behaviors. Everything I say verbally or non-verbally must be regulated, as I can trigger students. It makes sense, but I think this is the first time I have been told this. I am going to have to have a plan. I do breathing and movement when I am dysregulated, but I am going to have to pause so nothing spills out of my mouth that I can't take back. Honestly, I need to grow my tolerance level.

Sami's reflections illustrate what Perry and Winfrey (2021) refer to as the "regulating presence" of the adult nervous system, reinforced by Porges' (1994, 2011) Polyvagal Theory, which identifies co-regulation as an essential precursor to student safety and engagement. Desautels (2020, 2024) similarly argues that educator regulation is foundational to building relational safety and learning readiness.

Sami's realization became more concrete through a class discussion of *Paper Tigers*, a documentary that follows the journey of trauma-impacted students and the educators who support them in a trauma-informed school. The documentary and subsequent class debrief left a lasting impression on her. She wrote:

I do not know how those teachers kept their cool. The teachers poured so much into the students; they took Aaron and Stephen on college visits, and they continually made sure their families had what they needed. Even the ISS teacher took Dianna in when her mom kicked her out of the home. That teacher knew that if she didn't, Dianna would be in foster care.

One scene in particular stayed with her:

Stephen texted his science teacher, Mr. Gordon, blaming him for failing the course and not coming to school. He said, 'You are a real shitty teacher. I hope you know that.' And Mr. Gordon just texted back, 'Man, I'm sorry you're in a dark place, but know this, I love you and I'm here for you when you're ready to talk. Love you, man.' The regulation this teacher showed was incredible! I want to be Mr. Gordon!

This moment served as a mirror. For Sami, watching Mr. Gordon respond with calm, compassion, and steady presence, even after being insulted, was a teaching moment. She saw him as an example teacher whom she wanted to become. His ability to co-regulate from a place of empathy, grounded in brain-body awareness, reflected exactly what she was learning in the course. As Perry and Winfrey (2021) explain, this kind of relational buffering, where an adult's regulated nervous system helps calm and rewire a child's dysregulated one, is not just neuroscience, it's a relational act of love. Sami recognized that Mr. Gordon was leading with his own set of rules that went beyond logic. For her, this clarified the power of presence, reminding her that how a teacher shows up emotionally might matter more than anything they say.

The most important thing I can do for my students is to know my own brain and body state. If I don't, my classroom will be a tornado. I never realized how much of the

classroom climate was due to the teacher. My emotions even build student well-being. And think about those students with trauma, they need this from me the most.

Sami's post-case study reflections confirmed this discernment. She no longer saw trauma-informed teaching as a checklist of classroom strategies; she came to understand that she herself had to be the first layer of safety. "Before I put any strategies into play," she wrote in her post-case study, "I have to make sure I am regulated." This marked a shift in her thinking: regulation became a responsibility she claimed for herself. In that same reflection, she added:

This will trigger the students more than they already are. I think I can do this by being vulnerable, telling them my TRUE feelings and what I need to do to get back to my prefrontal cortex. I also think I need to be honest by saying things like, 'Your excessive talking while I am trying to help you learn is frustrating me. I need to take a moment.

This moment revealed that Sami was no longer positioning herself as the enforcer of order, but as the model of emotional regulation and relational honesty. Her choice to use the word vulnerable was significant. The word choice revealed a shift from the tightly controlled, rule-bound persona she had envisioned at the start of the course. Now, she understood that safety came from authenticity rather than compliance, and that her willingness to name her own emotions, rather than suppress or ignore them, could teach students how to do the same.

Sami's evolving philosophy of teaching no longer centered on managing behavior from the outside in, but rather on managing it from the inside out, starting with herself. She came to see that regulation was a presence she had to embody. This awareness shaped how she approached even in the most challenging moments in the classroom and how she prepared herself to lead with intention. In her reflection on personal growth, Sami summarized:

I realize now that it is not about student behavior; it is first about mine. This kind of blew my mind. I think I will be challenged in maintaining regulation, but I need to make sure I REALIZE it, so that I can communicate it, tag out if needed, and practice regulation strategies. As you say a lot, 'You can't expect more from your students than you do yourself.' This is truer than true with my own regulation. I hope that made sense.

Sami’s words summarize the heart of her transformation, both in how she perceived her students and in how she came to understand herself. What began as a course on trauma-informed practices evolved into a personal reckoning. She realized that co-regulation did not begin with a strategy, a system, or a script; it began with her. Her ability to remain grounded, transparent, and emotionally attuned became the anchor of safety her students needed. In naming her own dysregulation and modeling how to return to calm, she offered students calm, relational presence, going beyond behavioral management.

This shift reflects one of the phases of Mezirow’s (1991) TLT: reintegration. Sami began internalizing a new professional identity in vulnerability, neuroscience, and relational safety. As she put it, “It is not about student behavior, it is first about mine.” Her reflection reveals holistic development, from enforcing fairness through rules to living regulation as a shared power dynamic.

Table 4.2. *Summary of Sami’s RQI Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Realized that many students come to school without basic safety or regulation; emotional shock at learning a student had no consistent caregiver.	Safety & Trustworthiness – Recognizing safety as prerequisite for learning.	Pillar 1 – Educator Brain & Body State: Teacher self-awareness and regulation create classroom safety.	“I kept thinking – how can I teach reading when my kids don’t even feel safe?”

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Critical Reflection	Questioned compliance- based discipline that ignored emotional needs	Empowerment & Voice – Listening to students lived realities.	Pillar 2 – Co- Regulation: Modeling calm through body language and tone.	“My calm helps them calm; I don’t match their energy anymore.”
Planning Action	Began implementing predictable transitions, breathing breaks, and visual schedules	Peer Support & Collaboration – Using routines to build collective stability	Pillar 3 – Touchpoints: Short, consistent rituals reinforcing belonging.	Created a “safe start” morning routine with affirmations and stretching.
Reintegration	Redefined classroom management as emotional connection; committed to teaching regulation.	Cultural & Historical Awareness; Empowerment: Valuing each student’s background and emotional world	Pillar 4 – Teaching Neuroanatomy: Helping students name emotions and understand brain-body links.	“When kids know how their brains work, they stop feeling ‘bad’ and start feeling in control.”

Note. This table illustrates the participant’s progression through Mezirow’s (1991, 2009) phases of TLT, aligned with SAMHSA’s 2014 TIPs and Desautels’ (2020) AEN pillars. The alignment demonstrates how reflection, regulation, and relationship-building contributed to the participant’s evolving professional identity as a trauma-informed educator.

As shown in Table 4.2, Sami’s journey reflects a move from behavioral movement to empathetic connection. Her growth centered on recognizing safety and co-regulation as the foundations for learning.

While Sami’s transformation emerged from emotional dissonance and the deconstruction of previously held beliefs about structure and fairness, Abby’s growth stemmed from quiet

observation and a desire to connect. Lacking personal experiences of trauma, Abby entered the course with compassion and curiosity, intuitively recognizing that emotional safety matters long before she had the tools to create it.

Abby: From Caring Intentions to Trauma-Informed Action

Abby entered the course with a desire to support her students. In her pre-interview, she shared, “I want every child to know they matter. I want them to feel safe with me.” Her early conceptualization of that safety, however, reflected more traditional behaviorist strategies such as sticker charts and token economies. In her pre-case study, she wrote, “If I reward kindness and good behavior, they will be more kind and behave better.” For Abby, the role of the teacher was primarily about creating joy and motivation through external incentives, a well-intentioned but incomplete model when viewed through the lens of trauma-informed care.

Her perspective began to shift early in the semester. During the first week of class, Abby watched a documentary on childhood trauma that disrupted her assumptions about learning. This marked her disorienting dilemma, the first phase of Mezirow’s (1991) TLT. In Reflective Journal One, she admitted. “I cried through parts of it. I had no idea how trauma affects the brain, and how much school can trigger those stress responses. The reward system might be hurting some kids.” This emotional response triggered an internal reckoning for Abby. Later, after reflecting on a guest speaker's message about the limitations of reward systems for students with trauma, Abby’s thinking began to shift more substantially.

The speaker emphasized that trauma could alter brain development in ways that make intrinsic motivation difficult to access, especially for students operating in the survival brain state. As a result, students may develop an unhealthy dependence on reward systems, reinforcing this pattern rather than resolving it. The speaker also cautioned that such systems can

inadvertently create a fear of failure, shame, or peer inadequacy, triggering trauma responses tied to imbalanced relationships, like when a caregiver caused harm and later tried to “make up for it” with gifts and rewards. This new knowledge resonated with Abby. In a Reflective Journal One, she wrote:

I realize that I am the type of person who wants everyone to be happy, and the reward system would be a short-lived happiness that does not address the underlying issues in the long term, much like a band-aid. I need to build relationships and create safety, especially for students who have experienced trauma, so they trust me to guide them to help them understand their big emotions.

Abby’s reflection marked a critical turning point in her conceptualization of behavior. Rather than viewing classroom management as a system of incentives and consequences, she began to understand it as a relational and neurological process rooted in the child’s brain-body state. This internal shift signaled her entry into Phase Four of Mezirow’s (1991) TLT: recognizing that others have negotiated similar transformations. As Abby engaged in course readings and peer discussions, she came to realize that her discomfort with reward systems was not hers alone; it was shared by many who began to see the mismatch between traditional discipline models and the emotional needs of trauma-impacted students. This understanding paved the way for Abby to see her role as a co-regulating presence, someone who could support emotional safety through connection, predictability, and attunement. This reconceptualization of behavior laid the foundation for Abby’s first major shift: learning to view student responses through the lens of regulation rather than rewards.

From Reward to Regulation: Recognizing Brain-State

With this new lens, Abby began to analyze the strategies she used in her current role as a preschool teacher assistant. In her first-class session, she spoke to the joy her students experience when receiving a sticker: “They wear the sticker like a badge of honor; it is just so cute.” But

through reflection and exposure to trauma-informed content, she began to question the long-term effects of such systems. In Reflective Journal Two, she acknowledged, “I used to think that stickers and treasure boxes would solve behavior issues. I now understand that stickers and rewards will not get a student out of a dysregulated state.”

This realization went beyond the theoretical; it was personal. Abby began to reflect on how regulation, not rewards, had impacted her own learning and emotional state. She recognized that her own calm came from connection, not prizes. This understanding set the stage for one of the most transformative assignments in the course: the Upstairs/Downstairs Brain Project (See Appendix F), based on Dr. Dan Siegel’s (2015) model of brain integration. Participants were asked to design a visual representation of the brain, labeling the emotional “Downstairs Brain” (amygdala, limbic system) and the rational “Upstairs Brain” (prefrontal cortex), and then to identify the kinds of experiences and strategies that helped students move upward into a learning-ready state.

For Abby, this was more than a cognitive exercise; it was a mirror. She quickly saw how regulatory strategies could serve as a bridge between chaos and calm. She wrote about this understanding in her reflection: “I realized I needed to learn how to get myself back to the upstairs brain and how to do the same.”

Her newfound understanding transferred directly into practice during her classroom microteaching experience. While leading an activity, Abby observed a student struggling with transition. She communicated in the journal, “his fists clenched, his face turned red, and it was clear he was entering a dysregulated state.” Understanding, shaped by trauma-informed learning, took over. She later wrote in her journal:

Rather than getting upset with him, I quickly thought to give him a nonverbal signal letting him know I care. I also told him that sometimes I have to do breathing exercises,

and I then modeled for him. He started doing it with me, and I was like, ‘Holy Moly, I am co-regulating with him!’

This moment marked Abby’s movement into Phase Six of Mezirow’s (1991) TLT: planning a course of action. She was no longer experimenting with ideas; she applied them, integrating new knowledge into her evolving identity as a trauma-informed educator. What had started as a shift in mindset was now a shift in behavior.

In her final assessment, Abby summarized this transformation with intention and clarity: “No longer do I think rewards will increase behaviors. It is relationships and regulation. If I do this, I will also help build their resilience.” Her statement reflects a trauma-informed emphasis on connection over compliance (Desautels & McKnight, 2020) and mirrors AEN’s Pillars One and Two: adult regulation and co-regulation (Desautels, 2020, 2024). Abby was beginning to exemplify the teacher she hoped to become, one who leads with presence and brain-aligned strategies rather than incentives.

Growing awareness of regulation and brain state laid the groundwork for Abby’s continued transformation. As she began to internalize that safety and connection were prerequisites for learning, she moved beyond individual strategies toward more systemic thinking. The question was no longer just how to support a student in a moment of dysregulation, but how to intentionally build a classroom environment where regulation, trust, and belonging are embedded in daily practice. This shift signaled Abby’s entry into the next phase of her professional development: translating trauma-informed knowledge into relational rituals, coregulation routines, and environments designed to support every student’s emotional and neurological needs.

Co-Regulation as the Cornerstone of Classroom Culture

Building on her understanding of brain-state awareness, Abby began to reimagine the classroom as an environment to nurture regulation and relationships. No longer satisfied with isolated interventions, she began to explore how daily routines and classroom design could serve as co-regulatory anchors (Desautels, 2020, 2024), offering not only academic instruction but also emotional containment and relational safety.

A pivotal shift in Abby's understanding occurred during the Brain Architecture Game (Center on the Developing Child at Harvard University & University of Southern California, 2016), a hands-on simulation that demonstrates how early life experiences shape neural development (See Appendix G). Working in small groups, Abby and her peers used pipe cleaners and straws to construct a model brain, with each neural connection representing the presence or absence of supportive experiences. As the game progressed, Life Experience Cards introduced either protective factors or adversities, with weights added to simulate the burdens of stress and trauma. Abby's group, representing a child with multiple ACEs, struggled to maintain the brain's structure. "It kept collapsing," she later recalled. The fragility of the model mirrored what she was learning: that without a strong foundation in the early years, compounded adversity can have a long-term neurological impact (Center on the Developing Child at Harvard University & University of Southern California, 2016; Perry & Winfrey, 2021; Shonkoff et al., 2012). The structure they built, top-heavy and full of gaps, visually reflected minimal early support and escalating stress over time, representing the mounting toll of toxic stress on brain architecture. Abby described the experience in a powerful journal reflection:

This game taught me, first and foremost, that early interactions and relationships are crucial. Students with trauma, like my group, experienced neglect in the first three years. No one held the child (brain) for the first year. In the third year, an adult in the home went to prison. In later years, food was scarce, and many other traumas occurred. As we built our brains, the trauma weighed them down, and that is when I realized I need to be the adult to help build neuroplasticity, co-regulate, love, trust, and build safety in each of

my students' lives. I have zero adverse childhood experiences (ACES), so this was an eye-opener.

Figure 4.1. *Brain architecture model created by Abby's group*



Note. Photograph by the researcher, used with participant consent in accordance with IRB protocol.

Figure 4.2 shows the brain model constructed by Abby's group during *The Brain Architecture Game* (Center on the Developing Child at Harvard University & University of Southern California, 2016). The activity served as an experiential learning exercise illustrating how early relationships, stability, and adversity shape neural development. This realization that trauma can change the brain represents a transformative learning moment (Mezirow, 1991), as Abby connected theory to practice, recognizing her future role in supporting students through safety, co-regulation, and relational trust, key tenets of AEN and TIPs that will allow for

neuroplasticity to occur if the brain collapses due to trauma (Center on the Developing Child at Harvard University & University of Southern California, 2016).

Abby began to see herself as what Desautels (2020, 2024) describes as a co-regulating relational presence, a figure of safety and connection in the classroom. Her statement, “I need to be the adult to help build neuroplasticity,” reflected the empowerment emphasized in SAMHSA’s (2014) TIPs and in Brunzell, Waters, and Stokes’ (2016) finding that trauma-informed educators not only create safety but also actively support student resilience.

By recognizing her role as the “support straw” in the game, offering reinforcement and balance, Abby aligned her teaching philosophy with the neuroscience of relational safety. Her knowledge supports foundational research from the Center on the Developing Child at Harvard University (2023), which asserts that early relationships are the active ingredients in brain development. When these are absent or unstable, trauma interrupts learning pathways (Center on the Developing Child, 2023; Desautels, 2024; Perry & Winfrey, 2020).

The Brain Architecture game helped Abby visualize how trauma's effects impact learning and how teachers can build buffers through predictable routines and relational rituals. Her transformation demonstrates the later phases of Mezirow’s (1991) TLT, including the planning of new actions, acquisition of knowledge, and reintegration into her role as a future teacher. As she noted in her final reflection, “Teaching is such a crucial job. Not only am I teaching them, but I also have to understand that the heart is just as important as the brain. Like you always say, know WHO you teach before WHAT you teach.” Ultimately, Abby recognized that to create a learning environment, she must first support safety. Her transforming identity reflects a shift from managing behavior to nurturing brains and hearts, one connection at a time.

Abby's transformation also manifested in the tangible planning of her trauma-informed classroom. In her final project, she designed a space that prioritized visual schedules, predictable routines, and emotional vocabulary charts, tools intentionally chosen to support her belief that "connection must come before correction," a guiding principle she had carried throughout the course. These decisions reflected not only a pedagogical shift, but also a philosophical one; a movement toward viewing the classroom as an emotional and neurological ecosystem. During her post-interview, she elaborated:

My students need to feel seen and safe before they can learn. I now realize that they are walking in with trauma and hurt that I did not experience as a child; therefore, it will be hard for these students to learn. My job is not just teaching content, such as math; my job is to ensure they are regulated so that they can learn, make friends, and enjoy the classroom. Co-regulation is not an option for my classroom, especially because I hope to teach Preschool or Kindergarten.

This statement reflects SAMHSA's (2014) trauma-informed principles, particularly safety, empowerment, and trustworthiness, and aligns closely with AEN Pillars One and Two: adult regulation and co-regulation (Desautels, 2020). Abby came to view co-regulation as a professional responsibility and part of her daily presence and planning instead of a technique to try.

In her final course reflection, Abby credited the trauma and resilience course with moving her beyond abstract empathy, which, while important, is insufficient on its own; educators must be equipped with relational and regulatory practices that make care visible, consistent, and sustainable. Abby's awareness aligns with Craig's (2016) argument that empathy alone is insufficient; educators must be equipped with relational and regulatory practices that make care visible, consistent, and effective.

Together, Abby's insights from the Brain Architecture Game, her daily relational rituals, and her future classroom design demonstrate how co-regulation became an anchor for trauma-

informed teaching. Her learning curve exemplifies Phases Eight and Nine of Mezirow's (1991) TLT, the development of competence and confidence in her new role, and the reintegration of this role into her transforming professional identity. Abby went beyond simply applying strategies; she was becoming a teacher grounded in regulation and relationships.

Teaching from the Inside Out: Regulation and Relational Safety

As Abby neared the end of the course, she began to redefine what it meant to be an educator. Her role expanded from delivering content to cultivating connection; from managing behavior to modeling regulation. Through experiential learning, trauma-informed coursework, and reflection, she began to understand that her state of being in the classroom and the relational presence she offers matter as much as what she teaches. Abby was embodying a new professional identity.

This transformation aligns with Mezirow's (1991) final phases of transformative learning: building confidence in her new role and reintegrating her transformed perspective into action. It also reflects core trauma-informed principles of empowerment, voice, and safety (SAMHSA, 2014), as well as Pillar One of AEN: the educator's brain-body state as a foundation for co-regulation (Desautels, 2020, 2024).

In her final reflections and interview, Abby emphasized that a calm, authentic presence would become a consistent source of safety for her future students. She now understood that how she showed up each day would shape the classroom's emotional and neurological climate. As she described in her microteaching reflection and classroom plan, she was committed to leading with love, modeling vulnerability, and creating rituals that signaled belonging:

I am not just teaching content; I am teaching humans. That means I will have to show each day with compassion, love, structure, and patience. I now realize that we have so many courses in teacher preparation that prepare us for reading, math, and other content, but not the soft skills that students with trauma need to have success. I come from a

district that is wealthy, and there were not a lot of “known” traumas or behaviors, so really, the content was all that was taught. Looking back, I do not have a teacher who really built a relationship with me, and now I realize it is probably the most important thing I can do for my future students. It's like you say all the time, ‘Lead with love.’

This reflection represents Mezirow’s (1991) later transformative phases: the planning of a course of action and reintegration into one’s professional identity. Abby’s realization that relationships, not rigid compliance or content coverage, form the foundation of her effective teaching marked a shift in both her mindset and mission. She moved from cognitive recognition to emotional investment and intentionality, characteristics of transformative learning.

Her journey is also closely aligned with TIPs related to empowerment and voice (SAMHSA, 2014) and with Pillar One of AEN: adult regulation. As Abby’s awareness grew, she began to examine her own capacity for regulation. After watching the documentary *Removed*, she wrote:

I have zero ACES. After watching this, how do I remain regulated? I am a pretty sensitive person, and I think it will hurt my soul to see the angst and trauma my students walk in with. Pillar One of AEN for me is the most important, just knowing my brain and body state, so I can remain regulated when students walk in with their trauma. This is something I need to start practicing now, I mean, looking at ways to stay grounded when chaos surrounds me. I believe I read somewhere that teachers account for over 70% of behaviors due to their handling of situations, so staying regulated will have to be at the forefront of who I am as a teacher.

Her growing awareness that her own regulation precedes student regulation reflects what Desautels (2020, 2024) terms internal intentionality, the proactive use of neuroscience to create emotionally safe classroom environments. Abby now saw her emotional presence as central to classroom success.

By the final week of the course, Abby had begun turning knowledge and understanding into action. In her trauma-informed classroom design project, she intentionally integrated co-regulation strategies, posted emotional visuals, held morning meetings, and used predictable

visual schedules. These tools were no longer just helpful ideas; they were non-negotiables, relational safeguards integrated daily. During her post-interview, she described the teacher who inspired her:

I need to be the teacher I saw in microteaching. All students in that third-grade classroom knew their teacher loved them. On the inside of the classroom door, she had this quote: As you leave our family's classroom, remember I love you, and I am already excited to see you again. This made me think that it's not just for when they go home; the students see this before specials, lunch, and recess. It may seem crazy, but I could feel the love and belonging she had built in the classroom. I also substituted in that room on a Friday, on the board was written, 'As you know, I am gone, remember I LOVE YOU, and make me proud.' The students were great that day, and I think it is because of the relationship she has with them; they do not want to disappoint her.

At this moment, Abby's reflections were solidified. She was no longer designing a classroom around management or efficiency but around belonging and connection. Her goal, as she wrote in her final course reflection, was simple yet profound: "Every child will walk into my classroom with something. I want to be the kind of teacher who helps them carry it, not adds to it." Abby's evolution from reward charts to relational rituals reflects the purpose of trauma-informed teaching, not simply to manage students, but to meet them with presence, patience, and regulation. Her story demonstrates how preservice teachers can internalize and embody TIPs and AEN when supported with knowledge, reflection, and modeling.

Table 4.3. *Summary of Abby's RQ1 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Noticed that punitive classroom systems increased student anxiety and withdrawal.	Safety & Peer Support – Creating conditions for emotional trust.	Pillar 1 – Educator Brain & Body State: Recognizing her own stress response in conflict situations.	"I realized when I got tense, the kids did too – we feed off each other.

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Critical Reflection	Reflected on her own perfectionism and need for control; saw how it limited the student voice.	Trustworthiness & Transparency: Admitting mistakes and repairing relationships.	Pillar 2 – Co-Regulation: Practicing calm tone and shared problem-solving.	“Instead of giving a consequence, I started asking, ‘What do you need right now?’”
Planning Action	Designed visual supports and feedback systems focused on growth and self-reflection.	Empowerment & Choice: Inviting students into goal setting and regulation.	Pillar 3 – Touchpoints: Embedding daily check-ins and relationship rituals.	Implemented “brain break choices” and student-led calm corners.
Reintegration	Articulated a teaching philosophy centered on empathy, predictability, and belonging	Cultural Awareness & Empowerment: Modeling inclusivity and connection.	Pillar 4 – Teaching Neuroanatomy: Explaining brain states to normalize emotions and recovery.	“I want my students to know that their feelings make sense – their brains are doing their job.”

Note. This table illustrates the participant’s trajectory through Mezirow’s (1991, 2009) phases of TLT, aligned with SAMHSA’s (2014) TIPs and Desautels’ (2020) AEN pillars. The alignment shows how emotional regulation, reflection, and relational trust contributed to the participant’s transformation toward a trauma-informed teaching identity.

Table 4.3 illustrates Abby’s growth from a control-oriented mindset toward a trauma-informed approach rooted in predictability, empathy, and student agency. Her reflective practice revealed the integration of AEN principles and the final phase of Mezirow’s (1991) transformative process, in which new beliefs are reintegrated into professional identity.

Having explored each participant's journey, the next section turns to a cross-case analysis that synthesizes the common threads and meaningful divergences among Mia, Sami, and Abby. While each preservice teacher entered the course with distinct perspectives, experiences, and assumptions, all three underwent significant transformations through their engagement with TIPs and AEN. Using Mezirow's (1991) TLT as a framework, this synthesis shows how shared coursework, critical reflection, and classroom application combined to reshape participant beliefs about behavior, teaching, and professional identity. What follows is an analysis of the key similarities and differences across their experiences that reveal how TIPs and AEN training can equip preservice teachers to support the emotional and neurological needs of every student.

RQ 2: In what ways do applied educational neuroscience and trauma-informed coursework affect preservice teachers' strategies for creating a positive and structured classroom environment?

This section explores how trauma-informed and AEN coursework shaped the strategies of the three participants for building structured yet emotionally responsive classroom environments. While RQ1 focused on identity shifts and beliefs about behavior, this question examines how those internal transformations translate into external design, routines, tools, and expectations. Drawing on semi-structured interviews, reflective journals, and case study responses, the findings illustrate how each elementary preservice teacher adapted their classroom planning to align with trauma-informed principles of consistency and relational trust. Though the specifics varied, all three participants moved beyond traditional classroom management strategies to embrace more intentional, brain-aligned design of the learning environment.

Mia: Redefining Structure as Safety

Mia's transformation centered on redefining structure as a relational framework anchored in emotional safety, predictability, and brain and body awareness, rather than rigid control. Through practices such as daily check-ins using neuro-language, regulation spaces, intentional feedback, and visually clear routines, she moved from consequence-based management toward trauma-sensitive design. Her classroom shifted into what Perry and Winfrey (2021) describe as a regulating ecosystem, where safety is co-created and students are not just managed but understood. Mia viewed routines as anchors of predictability that help regulate the nervous system, especially for students living in chaos. Her emphasis on celebrating student growth, creating safe spaces, and fostering relational consistency reflected a commitment to positive, structured environments aligned with trauma-informed principles (Craig, 2016; Desautels, 2020).

From Control to Co-Regulation: Designing Relational Structure

When Mia began the course, her understanding of a structured classroom was familiar and traditional: rules were posted, consequences were enforced, and behavior was redirected quickly so that learning could continue. In her pre-interview, she confidently explained, "Structure matters. Students must know expectations to follow them, and if they get off track, they will see the expectations on the board." For Mia, order was a sign of a well-run classroom. Her ideal classroom was clear and consistent, but student behavior management was external. The systems she trusted were built around managing students' actions, not understanding the emotional states driving them.

But as the semester continued, Mia's beliefs began to shift. Coursework went beyond memorizing terms to applying new concepts in reflections, requiring her to see her classroom through an entirely new lens. The turning point came during the module on brain-body states. As

she learned about the autonomic nervous system, AEN, and the role of co-regulation in student engagement, she began to ask herself a different kind of question, not “how do I manage this behavior?” but “What is this behavior telling me?”

In Reflection Five, this shift began to take shape:

I used to think of routines as a checklist that every teacher has, lining up, turning in work, raising hands, and when to talk during class. Now I think of the routines more as anchors that will ground the students, creating safety, like a brain break, morning meetings, and checking in on them. It is almost like the routines need to be relational and brain-aligned to create a positive space for my students.

Her language echoed Desautels’s (2020) description of emotional scaffolding, the practice of designing environmental routines to support emotional regulation. Mia was no longer thinking of structure as something she did to keep students on task. She was starting to see it as something she created to help students feel safe enough to learn. This realization became even clearer in her post-case study, where Mia imagined beginning each day with a simple but intentional question:

Where is your brain? Is it in the red zone, you are upset- or is it in the green zone- you are ready to go! Or is your brain in the blue zone- you are tired, or you are sad? I will commit to this because it will create safety not just for the student who might be in the red or the blue, but all the other students. I need the classroom to be safe, and a positive place they all want to be. If they do indicate they're in the red, I will have a one on one conversation with the student, or offer the peace corner, or if there is another adult they are connected to, I will ask them for assistance. I will know my students well enough to see what they need.

This wasn’t a gimmick. It was a strategy rooted in co-regulation and emotional literacy.

For Mia, this strategy went beyond checking in with students to building a connection with them before instruction. She called it “neuro-language.” With this new idea, Mia redefined her view of structure. She was learning how to hold space for student behavior as opposed to simply managing it.

In Journal Five, she wrote that predictability through tools like visual schedules were essential for students living in chaos. “There is so much unpredictability in their lives. If I can give them a small sense of control, like knowing what is coming next, it reduces anxiety and helps them feel safe.” The purpose of classroom structure became tied to emotional and relational regulation.

Mia’s shift was not superficial; it reflected a transformation in how she viewed her role as an architect of the classroom environment. As she noted in her post-interview:

I still 100% believe in structure, but now I see it completely differently. It is going to be more than consistency with rules and expectations, I mean both are important and will still be present. It is more now about being consistent in how I show up daily, and how I hold space for them when things get or feel hard, that is when it truly counts in creating a classroom environment, they and I really want to be part of.

Mia’s transformation reflects a shift from enforcing behavior through external control to designing systems to hold space for behavior through predictability, relationships, and brain-aligned strategies. She no longer saw structure and connection as opposites; they became intertwined in her vision for the kind of classroom she hoped to create.

One of her most significant realizations was the role of intentional praise in shaping the classroom's emotional tone. In an assignment on creating a positive and structured environment, she explained, “Intentional feedback is like intentional listening; it helps students want to do what is being asked. It makes people feel seen. I want to celebrate growth because many students with trauma do not get the small celebrations.” For Mia, creating a positive and structured environment came to mean more than following procedures; it meant creating a structured atmosphere to support student emotional support. In her post-interview, she reflected:

I 100% believe in structure. But now I see it completely differently. It’s about being consistent in how I show up, how I hold space when things get hard. That’s what creates the classroom I want to be in, and the one my students want to be in. That is what is needed.

Mia’s transformation aligns with Mezirow’s (1991) phases of change, particularly Phase Six, planning a course of action, and Phase Seven, acquiring knowledge and skills for implementation. Her shift also reflects Craig’s (2016) research, which found that trauma-informed preservice teachers often move from managing students to co-regulating with them. Alsic (2012) similarly emphasizes the power of environmental predictability and relational attunement in supporting students impacted by trauma.

By the end of the course, Mia no longer saw structure and connection as separate concepts. They had become inseparable in her vision of a trauma-informed, brain-aligned classroom. She had moved from enforcing rules to creating rhythms, in sync with safety and consistency.

Table 4.4. Summary of Mia’s RQ2 Transformative Learning Process

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Realized structure rooted only in rules fails to meet students’ emotional needs	Safety & Trustworthiness – Predictability as emotional safety.	Pillar 1 – Educator Brain & Body State: Teacher regulation sets tone.	“What is this behavior telling me?”
Critical Reflection	Reframed routines as relational anchors rather than checklists.	Peer Support & Empowerment – Seeing routines as scaffolds for safety.	Pillar 2 – Co- Regulation: Designing rituals that regulate the nervous system.	“Routines need to be relational and brain- aligned to create a positive space.”
Planning Action	Implemented neuro-language, emotional check-ins, and peace corners.	Collaboration & Mutuality – Co- creating safety with students.	Pillar 3 – Touchpoints: Predictable check-ins as daily anchors.	“Where is your brain? Red zone or green zone?”

Reintegration	Redefined structure as relational consistency and emotional availability.	Empowerment & Cultural Awareness – Teacher as safe, predictable presence.	Pillar 4 – Teaching Neuroanatomy: Using brain language to build self-regulation.	“It’s about being consistent in how I show up daily and hold space when things get hard.”
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Note. This table illustrates the participant’s development through Mezirow’s (1991, 2009) phases of TLT as applied to designing positive, structured classroom environments, aligned with SAMHSA’s (2014) TIPs and Desautels’ (2020) AEN pillars. The alignment highlights how reflection, regulation, and relational safety informed the participant’s shift from viewing the classroom as a space for behavioral control to an emotional ecosystem.

While Mia’s transformation centered on redefining structure and predictability through a relational lens, Sami’s path began in a different place. Mia started with consequence-based discipline and evolved toward emotional scaffolding, but Sami’s early views were anchored in fairness and consistency, a belief that treating all students the same created safety. But through coursework and reflection focused on creating understanding of trauma and the nervous system, Sami began to reframe what “structure” really means. For her, the shift was about infusing routines with empathy, relational purpose, and nervous system regulation.

Sami: Designing From Control to Connection, Reimagining Structure Through Safety

Sami’s design for a structured and positive classroom environment emphasized the emotional tone set by the teacher and the power of routines infused with empathy. Originally rooted in fairness through consistency, her practice evolved to recognize that true structure must be relational. Her nervous system became the anchor, and she intentionally planned for her own regulation as a prerequisite to co-regulating students (Desautels, 2020, 2024). She embraced

visual schedules, safe spaces, and quick, intentional feedback to reduce anxiety and provide clarity. Greeting students at the door, using restorative conversations, and promoting student voice (especially for those often overlooked) became foundational to her trauma-informed environment. Sami described this approach to fairness, redefining it as giving each student what they need, a practice supported by research emphasizing emotional attunement in trauma-impacted classrooms (Alisic, 2012; Thomas et al., 2019).

Relational Routines and Emotional Anchors: Creating Predictable Safety

Before the course, Sami's idea of a positive and structured classroom was clear-cut and familiar: clear rules, equal consequences, and fairness achieved through sameness. "Good management means everyone knows the rules and follows them," she explained in her pre-interview. Her vision was well-intentioned and organized, but it was rooted in teacher control of student behavior and a belief that predictability and discipline alone would create safety. Sami's views shifted early in the course when, while watching the documentary *Removed*, she was struck by a simple, emotional moment. She wrote:

That little girl could have cared less about the rules on the wall the teacher had posted. The structure she needed in the classroom environment was one that provided safety, with someone simply asking, 'What can I do for you?' The environment was not a positive space for her; a positive space would be one that is safe for her, yet still structured. All she needed was compassion, empathy, and love. I don't even feel like she knew she was a human. She had no friends, no sense of belonging, so how could that classroom be a safe space for her?

That moment became her disorienting dilemma, the jolt that cracked open her thinking and made room for something new. She began to see that structure without safety is not truly structured at all, especially for students impacted by trauma. In Reflective Journal Five, she noted, "If I don't know my brain-body state, my classroom becomes a tornado. I realized regulation isn't just about students; it starts with me."

This understanding emerged further during the module on AEN and Polyvagal Theory. She began using Dr. Desautels' (2020) nervous system chart for both students and herself. What began as a visual aid evolved into a tool for teaching self-awareness. It helped her to check in with her own emotional regulation so that she could prepare to be emotionally available in order to create a positive classroom environment. From there, her classroom vision transformed.

In her post-case study, Sami described how she would design her physical environment to bring about emotional safety, creating calm corners with sensory tools and soft lighting, posting visual schedules to reduce cognitive overload, and ensuring consistent routines that students could rely on. "It's not just about following the schedule anymore," she stated in her post-interview. "It's about students being able to look at a whiteboard with the schedule and know they are safe because they know what is coming next." These shifts moved her from managing behavior reactively to proactively, designing a classroom that supports nervous system regulation. Her understanding aligns with Thomas et al. (2019), who found that teacher regulation and consistency are foundational to creating trauma-informed spaces, and that structured environments can be effective only when paired with emotional connection and student agency.

Sami also began to rethink her role in building relationships. In her post interview, she explained, "I thought fairness meant treating everyone the same. Now, I see fairness as knowing what each student needs, and responding with empathy, not just rules." In Reflective Journal Five and Creating a Positive and Structure for Students assignment, she outlined how she would use restorative conversations after conflicts, celebrations of academic and emotional growth, intentional feedback loops that acknowledged students' small efforts, not just big wins, and social-emotional learning lessons that taught students how name emotions, self-regulate, and

build peer to peer relationships. These were not afterthoughts. They were part of how she would build predictability with purpose.

As she wrote in her final reflection, “Structure without relationships is just control. I want students to feel proud, wanted, and like they belong. That’s what makes them want to show up.” Sami’s transformation aligns with Mezirow’s (1991) Phases Six and Seven, where new roles and skills are integrated into action. Her journey also reflects Brunzell et al. 's (2016) finding that trauma-informed educators shift their strategies toward building relational safety and consistent routines that balance emotional needs with academic expectations.

By the end of the course, Sami no longer believed that rules alone created order. She came to see that belonging was the real foundation of structure. Her classroom would still have routines, but they would be built on connection and emotional trust. As she stated in her post-interview:

I will have to know who I am teaching before what I am teaching. That way I am able to co-regulate and use touchpoints to connect with students impacted by trauma. I will still have rules, but they will be based on a social contract, a community promise. Another thing I will do that is structured is greet the students daily, not with fancy handshakes and all that, but with an intentional question that depends on the student I am greeting. If I do this intentionally, I will create a safe, positive environment that still has structure. One thing I took away from your other class is that we have to give them some control, and not every student will need the same thing, so I will have to do intentional touchpoints. These changes reflect what Desautels (2020, 2024) describes in AEN Pillar One, adult

brain and body state, and Pillar Three, touchpoints. Sami realized that her own nervous system sets the tone for the classroom and allows her to make continual connections with students so she can meet them where they are. Sami went beyond enforcing expectations to holding space for students.

Table 4.5. *Summary of Sami’s RQ2 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Moved from fairness as sameness to fairness as meeting individual needs after watching Removed.	Safety & Peer Support – Recognizing unique needs of each child.	Pillar 1 – Educator Brain & Body State: Teacher regulation as anchor.	“That little girl could have cared less about the rules on the wall.”
Critical Reflection	Realized structure without safety is not structure at all.	Trustworthiness & Transparency: Acknowledging student stories.	Pillar 2 – Co- Regulation: Sharing calm and adjusting tone and pace.	“If I don’t know my brain-body state, my classroom becomes a tornado.”
Planning Action	Designed calm corners, visual schedules, and restorative routines.	Collaboration & Mutuality: Building community through shared rituals.	Pillar 3 – Touchpoints: Intentional greetings and check-ins to build belonging.	“It’s about students looking at the schedule and knowing they are safe.”
Reintegration	Reimagined fairness as relational equity; safety as structure.	Empowerment & Voice: Giving students agency and choice within structure.	Pillar 4 – Teaching Neuroanatomy: Explaining brain states to normalize emotion.	“Structure without relationships is just control.”

Note. Table 4.6 illustrates the participant’s progression through Mezirow’s (1991, 2009) phases of TLT, aligned with SAMHSA’s (2014) TIPs and Desautels’ (2020, 2024) AEN pillars. The alignment highlights how collaboration, predictability, and emotional attunement supported the participant’s transformation in viewing the classroom as a relational, co-regulatory environment that fosters belonging and safety.

While Sami began to see classroom structure as something built through belonging and attuned connection, Abby's journey brought yet another lens to the question of classroom environment. From the beginning, Abby approached teaching with warmth and compassion, but her idealized classroom strategies relied heavily on external motivators: sticker charts, treasure boxes, and praise for compliance. However, as she encountered TIPs and AEN, Abby's understanding of what it takes to create a positive, structured environment expanded. Her transformation was less about replacing structure and more about embedding safety and emotional literacy into the routines she already valued.

Abby: Creating Safety Through Predictability and Relationship

While Abby entered the course with a compassionate, encouraging teaching style, her early strategies for structuring the course were rooted in behaviorism. She leaned on sticker charts and reward systems to motivate students, a method she had seen used effectively in the classrooms where she worked. These strategies felt familiar, and for a time, they felt sufficient. But as she engaged with the coursework, Abby began to recognize a critical gap: her methods focused on external compliance rather than internal safety.

Through key course assignments and reflective moments, such as the Brain Architecture Game and viewing the documentary *Removed*, Abby came to understand that students impacted by trauma often exist in a heightened state of stress. What these students need most is not a system of rules and rewards, but a sense of belonging and emotional predictability. This realization was central to her transformation and closely aligned with Mezirow's (1991) Phases Five-Seven: critically examining assumptions, exploring new roles, and planning actions.

Predictability as a Pathway to Safety

Abby entered the course with a belief in structure, but her version of structure leaned heavily on rigid routines and reward systems. Her early strategies reflected a traditional behaviorist lens, and she associated effective teaching with maintaining control. “All kids want and need structure,” she explained in her pre-interview. “That is what helps them succeed.” For Abby, structure meant that rules were consistently enforced, and students received external motivators, such as sticker charts or treasure boxes, to reinforce compliance.

At first glance, these strategies appeared supportive, but as she engaged with the course material, particularly TIPs and AEN, she began to question whether her tools taught students how to regulate or simply how to behave. This disorienting dilemma appeared, in part, through viewing the documentary *Removed*, which centers on the emotional experience of a trauma-affected elementary-age girl experiencing the foster care system. “That little girl couldn't care less about the rules I have posted,” she wrote in Reflective Journal Two. She continued, stating, “The structure she needed from the classroom was one that gave her safety. She needed someone to say, ‘What can I do for you?’ That is the structure. Compassion, empathy, and love.” In her post interview, Abby stated:

I never really thought my classroom environment would come from the homes my students are leaving each day. I mean, I have zero ACEs. I know I have said that quite a bit, but it is critical that I walk in my students' shoes to understand their perspective. Some students are coming from homes that are caring and loving, like I did, but some are coming from homes where there is no food, abuse, or even neglect occurring, like the little girl from *Removed*. Her positive, structured environment is about safety and meeting basic needs, like Maslow's hierarchy of needs. Like I knew morning greetings are awesome, but that is the structure students like her need, welcoming, telling them I am glad they are there, and seeing how they are doing. There is so much I will have to do before even teaching.

Abby began to see that the pathway to structure is safety. This awareness marked a shift from compliance to co-regulation. Abby began to envision a classroom grounded in predictable care, where consistency remained, softened by emotional connection and responsive strategies.

She emphasized daily check-ins, visual schedules, and defined safe spaces as regulatory anchors for students navigating stress. “Predictability is what makes them feel safe, and that is structure,” she explained in her post-interview. “No surprises, that is all so many of these students need.”

Abby’s idea of structure expanded. She planned to create routines that included greeting students at the door, using soft music to signal transitions, and allowing students a space to step away and regulate. In her post-case study response, she noted, “I will be the first face they see when they walk in, and I want that face to say, ‘I am so happy you are here!’” She began to see herself as a pathway to creating a safe, structured classroom environment. Continually, in classroom discussions, she stated, “Man, a teacher’s job is hard. We are prepared for the instructional part, but not so much the human side.”

This evolution aligns with Immordino-Yang’s (2016) work, which describes the importance of emotionally safe environments in fostering learning. It also reflects Craig’s (2016) finding that trauma-informed preservice teachers move from rule enforcement to strategies that scaffold regulation through relationship and consistency. Abby was beginning to associate structure with a sense of safety and belonging.

Redefining Relationship as a Strategy, not a Bonus

While Abby entered the course with a kind and compassionate demeanor, her understanding of why relationships mattered was surface level. She saw rapport as helpful but not essential to the classroom environment. However, over time, she came to see relationship building as the cornerstone of a structured and positive environment, especially for students impacted by trauma. In a guest speaker reflection, she explained, “Students can’t meet expectations if they do not trust the person setting them. They won’t ask for help if they think they’ll be judged. And they won’t share what’s wrong if they feel they are ignored.” She began

to value relationships over rewards, writing, “it is like you say, know who you are teaching before what you are teaching, this has stuck with me and shows me it is not a choice to build relationships,” in her final journal reflection.

Abby’s relational strategies became more intentional as she planned to use Wlodkowski’s (1983) 2x10 method. In this strategy, teachers engage in two minutes of connection with a student each day for ten days to build trust with students who might otherwise withdraw. She noted this strategy in her Trauma-Informed Classroom Design project. She also emphasized shared vulnerability as a strategy:

If I make a mistake, I’ll own it in front of them. That way, they see that mistakes don’t mean failure; it is a path for growth. I also want them to see my perseverance, coping strategies, and I can do this by a ‘Think Aloud.’

This kind of vulnerability and transparency was new for Abby. It challenged her initial belief as shared in the pre-interview, “I loved my teachers, I mean, it was a professional relationship, they may not know what I love to do, but they taught me so much content.” Abby later addressed this in the post-interview, stating, “Now I see that a relationship is not something extra. It is the reason students feel safe enough to show up in my class each day and put effort into whatever we are doing. Relationships with students are non-negotiable.” This shows that Abby came to see student relationships as the plate on which all learning is served; without a foundation of trust and belonging, even the best lessons have nowhere to land.

Abby’s transformation reflects what Bruznell, Waters, & Stokes (2016) describe as “engagement through care,” the idea that classroom routines, expectations, and environments must be filtered through a lens of safety and dignity for students who carry trauma. She no longer saw structure and relationships as opposites; in fact, it was their combination that formed the foundation of the environment she hoped to build. As she summed up in her post-interview,

“Now I know why all of what you are teaching matters. Structure isn’t about rules. It is about safety. I needed to understand that safety doesn’t come from silence or perfect behavior, it comes from being seen and feeling valued.”

Table 4.6. *Summary of Abby’s RQ2 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Recognized behavioral rewards-built compliance, not safety, after watching Removed.	Safety & Trustworthiness: Prioritizing emotional predictability.	Pillar 1 – Educator Brain & Body State: Self-awareness of stress response.	“That little girl could care less about the rules I have posted... She needed someone to say, ‘What can I do for you?’”
Critical Reflection	Questioned behaviorist methods and reframed structure as belonging.	Empowerment & Voice: Centering student needs and perspective.	Pillar 2 – Co- Regulation: Building trust through predictable care.	“Predictability is what makes them feel safe, and that is structure.”
Planning Action	Introduced daily check-ins, visual schedules, and relationship rituals.	Peer Support & Collaboration: Shared responsibility for safety.	Pillar 3 – Touchpoints: 2x10 connections and authentic vulnerability.	“If I make a mistake, I’ll own it in front of them... so they see resilience.”
Reintegration	Replaced external reward systems with emotional literacy and student voice	Cultural Awareness & Empowerment: Validating diverse emotional experiences.	Pillar 4 – Teaching Neuroanatomy: Helping students understand feelings as normal brain responses.	“Structure isn’t about rules; it’s about safety – being seen and feeling valued.”

Note. The table illustrates the participant's movement through Mezirow's (1991, 2009) phases of TLT as applied to designing positive, structured classroom environments, aligned with SAMHSA's (2014) TIPs and Desautels' (2020) AEN pillars. The alignment highlights how empathy, shared vulnerability, and student voice informed the participant's transformation toward creating emotionally predictable spaces grounded in trust, safety, and relational presence.

RQ 3: In what ways do applied educational neuroscience and trauma-informed coursework influence preservice teachers' beliefs and strategies for engaging students impacted by trauma?

At the heart of trauma-informed teaching is the belief that engagement is not something teachers demand; it is something they cultivate (Brunzell et al., 2016; Craig, 2016). For Mia, Sami, and Abby, this belief took root slowly, unfolding over the course of a semester as they came to redefine what it means to truly engage students, particularly those affected by trauma. The participants began the course with ideas shaped by their own school experiences in which engaged students were compliant and responsive. As they learned about brain-body states, co-regulation, and the emotional landscapes of trauma, their definitions shifted. Engagement shifted from performance to presence. Teaching became less about checking boxes and more about checking in.

This section captures how each preservice teacher's journey led to a reimagined understanding of engagement, grounded in safety, trust, connection, and emotional accessibility. While participant paths were distinct, they shared a common thread of engagement through relationships.

Mia: Engagement Begins with Feeling Seen

Mia entered the course with a clear picture of what engagement looked like: students sitting quietly, listening, raising their hands, and following directions. “When I think about an engaged student,” she shared in her pre-interview, “I picture a student who does everything they are supposed to.” For Mia, engagement had long been synonymous with compliance.

But that lens began to blur after the brain-body states module. As she studied the nervous system and the impact of trauma on attention and behavior, Mia’s understanding started to shift. “The science part got me,” she admitted in her post-interview. “You can’t argue with brain science. If they are in the red or blue zone, like angry or sad, they will not be engaged, so no learning will take place until I co-regulate with them.” This moment marked a turning point in Mia’s understanding of engagement. She began to realize that before she could expect students to participate in learning, she had to see them first, not just physically, but emotionally and neurologically. Recognizing a student’s brain state became a prerequisite to instruction. Co-regulation, once an unfamiliar term, became a necessary first step to engage her students. For Mia, the pathway to engagement became connection rather than compliance. Engagement, she discovered, wasn’t something she could demand; it was something she had to cultivate through attunement, regulation, and relational presence.

This realization opened a new door. In her post-case study, Mia wrote, “I will greet students not just to welcome them, but to make sure they are okay. If their brain isn’t ready, I can’t expect engagement. I must notice this first.” Her new approach prioritized co-regulation over control. Instead of interpreting silence or disengagement as defiance, she began to see it as data. “Sometimes quiet is safety-seeking,” she reflected in her final reflection. She began to realize that although participation may be quiet, the student can still be engaged.

Mia built engagement around structure and safety, using daily check-ins, predictable routines, and “emotional anchors” such as calm corners and brain breaks. Her strategy aligned with Desautels’ (2020) AEN Pillars and Perry and Winfrey’s (2021) work on co-created safety. Engagement wasn’t about energy; it was about access. “My role is not just to teach, it is to help them feel safe enough to engage in learning, but to feel safe, they will need to be seen,” she stated in her post-interview. This shift reframed her entire approach. She began to see engagement as something teachers invite through consistency and emotional attunement. Mia came to understand that students needed to feel emotionally safe and seen before they could access higher-order thinking. Her role, then, was not just instructional; it was relational and regulatory. “If I can notice their brain state and offer them space to reset, I am not losing learning time, I am creating the conditions for learning to even be impossible,” as she explained in her final reflection.

Ultimately, Mia’s transformation speaks to a foundational principle of trauma-informed practice: students engage when they feel safe, seen, and co-regulated. Her journey reflects Mezirow’s (1991) Phase Seven, acquiring new skills and knowledge to implement transformed beliefs, and supports Brunzell et al. 's (2016) finding that trauma-informed educators design environments where safety precedes instruction. Mia no longer defined engagement by outward compliance. Instead, she understood that engagement begins with feeling seen, a quiet, powerful shift that redefined her role as a teacher.

Table 4.7. *Summary of Mia’s RQ3 Transformative Learning Process*

TLT Phase (Mezirow)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Realized that engagement is	Safety & Trustworthiness:	Pillar 1 – Educator Brain	“You can’t argue with brain

TLT Phase (Mezirow)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
	not compliance but emotional and neurological readiness.	Students must feel safe before learning can occur.	& Body State: Teacher awareness of brain-body states	science. If they are in the red or blue zone, they will not be engaged.”
Critical Reflection	Recognized that disengagement often signals stress, not defiance.	Peer Support & Collaboration: Building safety through understanding behavior.	Pillar 2 – Co-Regulation: Sharing calm before teaching content.	“Sometimes quiet is safety-seeking.”
Planning Action	Implemented daily greetings, emotional check-ins, and calm routines before instruction.	Empowerment & Choice: Encouraging emotional awareness in students.	Pillar 3 – Touchpoints: Morning greetings and emotional anchors.	“I will greet students not just to welcome them, but to make sure they are okay.”
Reintegration	Reframed engagement as presence, connection, and co-regulation.	Cultural, Historical, and Gender Awareness: Recognizing individual emotional experiences.	Pillar 4 – Teaching Neuroanatomy: Teaching students to identify brain states.	“My role is to help them feel safe enough to engage in learning by feeling seen.”

Note. This table illustrates the participant’s transformative learning process in redefining student engagement as connection and safety rather than compliance. The alignment with SAMHSA’s (2014) TIPs, Desautels’ (2020) AEN pillars, and Mezirow’s (1991, 2009) phases of TLT highlights how relational attunement and co-regulation became central to the participant’s evolving understanding of engagement.

As summarized in Table 4.9, Mia's transformation reflects how engagement begins not with compliance, but with connection and safety. Her journey demonstrates the early phases of transformative learning, moving from disorienting dilemmas to reflective action, where TIPs and AEN concepts became central to her instructional identity. While Mia's transformation was rooted in the cognitive understanding of brain science and predictable systems, Sami's path developed through empathy and fairness. Her engagement story emerged from an emotional place during which she realized that belonging and emotional safety are not outcomes of engagement, but the conditions that make it possible.

Sami: Engagement Grows from Belonging and Emotional Safety

When Sami first considered student engagement, she equated it with fairness and equal treatment. In her pre-interview, she noted, "My idea of a well-run classroom is one where everyone is treated the same. That is what keeps things structured and respectful." For Sami, engagement was closely tied to behavior: if students followed the rules, they were engaged. After watching *Removed* and hearing a guest speaker from a rural district, her definition of engagement began to shift. "That little girl in *Removed* didn't need another rule to become engaged, like she couldn't engage due to her ACEs," Sami wrote in her second reflective journal. "She needed someone to connect with her, someone to ask. 'What can I do for you?' This would have made her feel like she belonged and that she was cared for; this could have allowed for engagement." Sami realized that engagement was beyond the classroom, that the trauma she was carrying did not allow her to engage in academics.

This moment became a disorienting dilemma that cracked open her view of engagement. A classroom was no longer a place for equal treatment; it was a place for equitable belonging. As she reflected in Journal Five, "Relationships are critical in everything; they will increase

engagement, allow them to feel proud, wanted, and a sense of belonging, so learning can happen.” Sami realized that to get students to show up in the classroom, they had to feel part of it and emotionally safe before engagement. “Engagement is not just a great lesson; it has to do with emotions and experiences that may occur before coming into the classroom. I have to let them know I care and build trust to build engagement,” she stated in her post-interview. The shift indicated that she began to see that multiple factors influence engagement, indicating that she will have to be a tool for engagement beyond the lesson plan; she would have to check in with the whole child.

Sami’s vision of engagement evolved into a relational one. “I will greet them daily, not due to it being a routine, but because it tells them I care, and will do what it takes for them to be able to engage and thrive in my classroom,” she explained in her post-interview. Engagement had become a relational invitation rather than a behavioral expectation. Her new vision aligned with the trauma-informed principle of fostering trust and safety (SAMHSA, 2014) and Desautels’ (2020) Pillar Three: touchpoints. These small but meaningful moments, such as greetings, could help her to assess a student’s readiness to engage in academics as well as cultivate a sense of belonging.

Sami also reimagined classroom participation. In her post-case study, she wrote about a student in the after-school program who rarely contributed.

He didn't talk much, didn't do his work, and honestly, I used to think he was disengaged. But when we started creating goals together and talking about his day, something shifted. He began opening up a little, and when he met those goals, his whole face lit up; this was engagement!

This experience cemented her belief that engagement is not always loud; it is often quiet and rooted in trust. “Now I know,” she stated in her final journal, “that engagement starts with connection. It does not always start with a raised hand. It starts with a relationship and a sense of

belonging.” Sami began to see that engagement would increase with relationships and emotional safety in the classroom. The interaction with the student in the after-school program opened her up to a shift in understanding the concept of engagement.

By the end of the course, Sami’s approach reflected Mezirow’s (1991) Phase Seven: acquiring knowledge and skills for implementing new roles. She created a vision of engagement built on empathy, equity, and co-regulation. As she summarized in her post interview, “My classroom will be structured, yes. But more than that, it will be a place where students feel they belong. When they feel that, engagement will come.”

Table 4.8. *Summary of Sam’s RQ3 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Realized engagement is not fairness or equal treatment but belonging and emotional safety.	Safety & Peer Support: Students engage when they feel they belong.	Pillar 1 – Educator Brain & Body State: Regulation begins with the teacher.	“That little girl in <i>Removed</i> didn’t need another rule to become engaged, like she couldn’t engage due to her ACEs,”

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Critical Reflection	Recognized engagement is relational and emotional, not behavioral.	Trustworthiness & Collaboration: Building trust to support engagement.	Pillar 2 – Co- Regulation: Sharing calm and emotional presence to build readiness.	“Engagement starts with connection; it doesn’t always start with a raised hand.”
Planning Action	Designed relational routines and daily check-ins to build safety	Empowerment & Choice: Supporting engagement through student voice.	Pillar 3 – Touchpoints: Small, daily gestures to build belonging.	“I will greet them daily, not due to it being a routine, but because it tells them I care, and will do what it takes for them to be able to engage and thrive in my classroom,”

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Reintegration	Defined engagement as co-created through safety, fairness, and trust.	Cultural Awareness & Mutuality: Recognizing diverse student needs.	Integration of All Four Pillars: Safety, co-regulation, and emotional literacy	“When they feel they belong, engagement will come.”

As summarized in Table 4.10, Sami’s transformation illustrates how engagement grows from belonging and emotional safety rather than uniform expectations or rule compliance. Her journey reflects a relational understanding of teaching, one grounded in empathy, fairness, and co-regulation, where connection became the bridge to authentic engagement. Through her transformative insight, Sami demonstrated the later phases of transformative learning, translating awareness into deliberate classroom design and action.

While Sami’s transformation centered on fairness and relational belonging, Abby’s began from a place of compassion and care. Her path was not about learning to connect with students for the first time, but about building that connection through trust, vulnerability, and emotional literacy. Where Sami discovered that engagement thrives in belonging, Abby came to see that engagement is built through shared humanity and the safety to be seen and heard.

Abby: Engagement Through Trust, Voice, and Shared Humanity

Abby entered the course with a nurturing disposition, already committed to building a caring classroom. In her pre-interview, she explained, “I want students to like being in my classroom. I want them to know I care.” However, her early engagement strategies relied heavily on external motivators: sticker charts, behavior incentives, and public praise. She associated engagement and student compliance with positive demeanor. “I know I was a good student because I followed the rules. That is how I learned and showed I cared about academics,” she reflected in her first journal. For Abby, engagement initially meant doing what is expected without disruption.

This understanding shifted as Abby encountered TIPs and the neuroscience behind student behavior. The turning point came during the class screening of *Removed* and the Brain Architecture Game. In her second reflective journal, she wrote: “That little girl, a sticker chart would not have helped, she needed someone to say, ‘Are you okay, what can I do for you?’ I realized that I have been focusing too much on what kids do and not enough on what they might feel.” This moment marked the beginning of Abby’s transformation, one that reframed engagement as an outcome of emotional safety and relational trust rather than as a response to external motivators.

Throughout the course, Abby began exploring how trust, vulnerability, and student voice could replace extrinsic motivators. In her post-interview, she noted, “Some students might not follow every direction, but I realize they could be communicating a need. I am toxic positivity, encouraging them to stay engaged and motivated, but I might be missing out on a deeper connection. This is probably creating a lack of trust they have in me, if that makes sense.” Abby began to realize that she needs to understand the student as a human to better understand their disengagement or lack of motivation. This realization aligned with SAMHSA’s (2014) TIPs on empowerment, voice, and choice, as well as with Brunzell et al. ’s (2016) research

emphasizing the importance of relational trust in supporting engagement among students with trauma histories.

Abby redefined what it meant to be an engaged student. Instead of valuing external motivators, she began to focus on more authentic participation, such as students asking for help, sharing emotions, or simply showing up. “Sometimes engagement looks like showing up tired and giving what you can or asking to take a break when frustration is building,” she wrote in her final journal. “That is the kind of engagement I want to honor also.” In her Trauma-Informed Environment Design project, Abby planned spaces where students could quietly regulate without being punished and included time for emotional check-ins as part of her daily routine.

Abby began to incorporate shared vulnerability as a deliberate teaching tool. In her post-case study, she shared, “If I make a mistake, I want my students to see me own it. That shows them it’s safe to mess up and still be okay. That is engagement too, being brave enough to try even when you are scared.” Abby’s view echoed Immordino-Yang’s (2016) research, which shows that students engage most deeply when they feel emotionally safe and connected to the learning experience.

By the end of the semester, Abby saw herself less as a behavior manager and more as a relational guide. She planned to use strategies such as the 2x10 method (Wlodkowski, 1983) to build trust with withdrawn students and to use think-aloud to model perseverance and increase engagement. As she wrote in her post-interview, “Engagement comes from students feeling like they matter, that they belong, and that the person teaching them sees and hears them.” She began to realize that creating an engaging environment requires understanding students.

Mia, Sami, and Abby shared two significant similarities and three key differences in how they came to understand and apply engagement strategies for students impacted by trauma. Their

journeys, while individually unique, converged around a powerful truth: student engagement can't be demanded; it must be cultivated through safety, trust, and emotional accessibility (Brunzell et al., 2016; Craig, 2016).

Table 4.9. *Summary of Abby's RQ3 Transformative Learning Process*

TLT Phase (Mezirow, 1991)	Key Learning Experience	TIPs (SAMHSA, 2014)	AEN (Desautels, 2020)	Illustrative Evidence (Quote or Action)
Disorienting Dilemma	Realized that external motivators (stickers, rewards) do not foster authentic engagement	Safety & Empowerment: Engagement begins with emotional security	Pillar 1 – Educator Brain & Body State: Recognizing emotional cues in students.	“A sticker chart would not have helped, she needed someone to say, ‘Are you okay?’
Critical Reflection	Understood that trust and voice drive engagement more than compliance.	Trustworthiness & Collaboration: Building relationships as a foundation	Pillar 2 – Co-Regulation: Responding with empathy and curiosity.	“Some students might not follow every direction, but I realize they could be communicating a need.”
Planning Action	Developed trust-based strategies: 2×10 method, think-aloud, and vulnerability modeling.	Peer Support & Choice: Building reciprocal trust with students.	Pillar 3 – Touchpoints: Daily relational connections and transparency.	“If I make a mistake, I’ll own it, so they see it’s safe to mess up and still be okay.”
Reintegration	Redefined engagement as authenticity, connection, and student empowerment.	Cultural & Historical Awareness: Honoring diverse emotional experiences.	Integration of All Four Pillars: Safety, connection, co-regulation, and shared humanity.	“Engagement comes from students feeling like they matter, that they belong, and that the person teaching them sees and hears them.”

Note. This table illustrates Abby’s transformative learning process in redefining engagement through emotional safety, trust, and authenticity. The alignment with SAMHSA’s (2014) TIPs, Desautels’ (2020) AEN pillars, and Mezirow’s (1991, 2009) phases of TLT highlights how vulnerability, student voice, and shared humanity became central to the participant’s evolving understanding of engagement.

As summarized in Table 4.11, Abby’s transformation highlights how engagement is created through trust and student voice. Her shift from external motivators to authentic connection indicates the essence of TIPs and AEN, reframing engagement as presence rather than performance. Abby’s journey, like Mia’s and Sami’s, reflects the culmination of Mezirow’s later transformative phases, where new knowledge and self-awareness are integrated into a redefined professional identity.

The participants’ evolving conceptions of engagement connected around a shared understanding that safety and connection are prerequisites for learning. Although Mia emphasized predictability and co-regulation, Sami prioritized belonging and fairness, and Abby focused on trust and shared humanity; each transformation reflected the integration of TIPs, AEN, and TLT. Collectively, their experiences demonstrate that authentic engagement cannot be forced; it must be cultivated through relational attunement, emotional safety, and mutual trust. These findings show the human dimensions of teaching and provide a foundation for the discussion in Chapter Five, where implications for teacher preparation and future research are explored.

Chapter 5 - Discussion

Chapter Five provides a synthesis and interpretation of the study's findings through the lens of Transformative Learning Theory (TLT; Mezirow, 1991) and the frameworks of Trauma-Informed Practices (TIPs; SAMHSA, 2014) and Applied Educational Neuroscience (AEN; Desautels, 2020). Building upon the data presented in Chapter Four, this chapter begins with a cross-case synthesis of Mia, Sami, and Abby to illuminate shared patterns and unique variations in how the three preservice teachers experienced transformation across instructional practice, classroom design, and student engagement.

By positioning the cross-case synthesis at the beginning of this chapter, the discussion first establishes a comprehensive view of the findings before moving on to a deeper interpretation and implications. This synthesis highlights how preservice teachers' understandings evolved through disorienting dilemmas, critical reflection, and the integration of new beliefs and practices—hallmarks of Mezirow's transformative learning process.

The chapter then interprets these findings through three interconnected themes that mirror the study's research questions: (1) a shift from behaviorist students who have experienced traumatic engagement, (2) a reconceptualization of classroom environments as emotional ecosystems, and (3) a reframing of motivation and engagement through safety, trust, and identity. Each theme is analyzed in relation to TIPs, AEN, and the broader literature, revealing how preservice teachers' growing awareness of brain-body regulation and relational safety redefined their conceptions of teaching and learning.

Finally, the chapter concludes by examining the implications of these findings for teacher preparation, in-service professional development, and future research. Together, these interpretations underscore the transformative potential of reflective, neuroscience-informed

teacher education in cultivating educators who can meet the complex needs of trauma-affected students.

Before examining each theme in depth, it is important to revisit the participants' collective journeys to illustrate how their transformations unfolded across the three research questions. The following cross-case synthesis provides a holistic overview of how Mia, Sami, and Abby integrated trauma-informed practices (TIPs) and applied educational neuroscience (AEN) throughout the semester. By examining their shared and divergent experiences, this synthesis establishes the foundation for understanding the layered nature of transformation within preservice teacher preparation. It also contextualizes the three major themes that follow, each representing a distinct dimension of growth, practice, environment, and engagement, through which the participants redefined what it means to teach the whole child.

RQ1: Cross-Case Comparison of Mia, Sami, and Abby

This cross-case analysis offers contextual understanding of how three elementary preservice teachers experienced transformation in their instructional practice through coursework centered on TIPs and AEN. Though their entry points into the course varied in background, belief, and prior training, all three encountered critical moments that reshaped their assumptions about student behavior, discipline, and the educator's role in creating emotionally safe, brain-aligned classrooms. Each participant's journey maps onto Mezirow's (1991) TLT, beginning with disorienting dilemmas and progressing through phases of critical reflection, planning, and integration. In this section, I examine the significant similarities and differences in how these three elementary preservice teachers made sense of TIPs and AEN concepts, and how those concepts influenced their evolving classroom practices.

Significant Similarities

One of the most striking similarities across participants is that each engaged in a transformative journey that began with tension, a disruption between what they had long believed about student behavior and what they were coming to understand. Mezirow (1991) describes this as a disorienting dilemma, Phase One in his TLT, in which new knowledge collides with established assumptions, requiring a fundamental shift in perspective. Though the catalysts varied, each participant experienced a personal moment that opened space for critical reflection. Mia began to question why students were punished for being dysregulated rather than supported. Mia wrote in a microteaching reflection:

Basic needs are the most essential for humans. I feel like every professor reference Maslow's Hierarchy of Needs, and I honestly sometimes hear 'blah, blah, blah, ' but now I see why it is critical for me to understand. Honestly, this should be a check-in; no student will learn if they are hungry. You can't punish the hungry out of them.

Sami reevaluated her belief that fairness means treating all students the same, realizing that equity required understanding emotional and physiological states. Sami, through interactive neuroscience simulations and reflective journaling, began to let go of behaviorist techniques that no longer aligned with her growing understanding of trauma and the brain. In Reflective Journal Four, Abby admitted:

I did not realize how much the brain was impacted by trauma, but between the book we are reading, the game we played and everything else, I have to be equipped with strategies to remain regulated and teach my students about neuroscience, the behavior is due to the brain. I honestly thought behavior was a choice.

These moments did not remain at the surface level. Each participant moved through Mezirow's phases of self-examination and recognition of shared discontent (Phases Two through Four), realizing that what had once been framed as 'misbehavior' often reflected unmet needs or

the body's stress response. As Mia wrote in her post-case study: "I used to think behavior was something to manage. Now I see it as a clue."

Across their coursework, reflections, and hands-on experiences, behavior became something to listen to rather than control. This redefinition aligns with Desautels (2020) and Perry and Winfrey (2021), who assert that behavior is the language of the nervous system—a message shaped by experiences, not merely a choice.

Another shared turning point emerged in how each participant began to understand themselves as part of the behavioral equation. Across all three cases, each participant came to recognize that their own emotional state was central to teaching. As Mia noted, the regulation started with the adult. Sami realized she must be aware of her own nervous system, and Abby affirmed that educators cannot expect students to exercise emotional control if they do not model it themselves. They didn't just learn about regulation; they learned that their *own* regulation was essential (Desautels, 2020, 2024). This parallels what Siegel (2012) and Porges (1994) describe as neuroception, the way students subconsciously detect safety through cues from adults. Sami developed visual strategies to track her stress. Mia reflected that her "energy walks in first," realizing that co-regulation starts before any content is taught.

As the course progressed, another shared shift began to emerge, one that extended beyond personal understanding and into the intentional design of learning environments. Each participant moved from reacting to behavior to planning for connection. In this way, they entered the later stages of Mezirow's (1991) TLT, Phases Nine and Ten, where a new worldview is both internalized but also enacted. The participants began to reimagine the classroom not simply as a site of instruction, but as a relational ecosystem, a living space where everything, including

student emotions, adult regulation, peer dynamics, sensory input, and routines, interacts to shape the well-being of the whole.

Drawing from Simat and Smith's (2012) definition, an ecosystem is a network of living and nonliving components that influence and respond to one another, constantly adjusting to maintain balance or, when disrupted, revealing tension. The participants began to see their classrooms in this way. Teacher regulation became like air: subtle but vital (Desautels, 2020). Mia recognized that her calm presence set the tone before a lesson even began. Co-regulation functioned like water, a necessary resource that helped soothe and sustain students during moments of crisis. Sami's safe space and visual cues offered hydration to dysregulated students, giving them a way to rest without shame. Structure and routine, predictable transitions, visual schedules, and consistent rituals became the soil, grounding students who may otherwise feel emotionally uprooted. Abby's daily greetings and morning circles anchored students in familiarity. Relationships acted as sunlight, nurturing connections, safety, and growth across all corners of the room.

This metaphor illustrates how the participants reconceptualized their role as ecosystem agents, attending to the air they breathe, the water they provide, the soil they cultivate, and the light they offer. It was no longer about reacting to behavior but nurturing the conditions under which students could regulate, connect, and learn. As Abby stated in her post interview:

My classroom will need to be safe, not just physically, but emotionally. That has made me rethink my Pinterest Board. It is full of cute decorations, the colors I want. I need to be intentional, I want a Grace Space where there are sensory tools, I also need to ensure that I am creating relationships with my students like the book states making touchpoints (Desautels,2020). If I build what my students need based on what I learn for connection it will build harmony, in my opinion. The environment that I create will either let me float, or sink. It is kinda my choice.

The participants, through their newfound understanding of TIPs and AEN, began to realize that the classroom environment centers on intentionally creating an emotionally and physically safe environment. Their realizations disrupted traditional views of student behavior and the classroom environment, and each began to see that their presence and intentionality were ripples throughout the entire system. When one part suffers, the others feel it. But when one part is nurtured, the classroom, like an ecosystem, thrives.

Significant Differences

Before they ever stepped into a teacher preparation course, each participant had already spent years forming ideas about what teaching looked like. Some of the ideas came from time in the classroom, substitute teaching, assisting in after-school programs, and helping out in preschools. Others were absorbed just by being students themselves, watching teachers manage rooms, handle disruptions, and define what it meant to be “in control.” These experiences created quiet but powerful templates for how school should work. As Lortie (1975) described in his idea of the “apprentice of observation,” elementary preservice teachers often carry a mental archive of strategies, expectations, and assumptions based on what they’ve seen in classrooms growing up.

The first significant difference among the participants lay in the initial perspectives they brought into the course and the distinct disorienting dilemmas that began to unravel those perspectives. Mia held a discipline-first mindset, seeing classroom management as a matter of protecting instructional time. “If one student is disrupting learning,” she shared in her pre-interview, “they need to be removed so the others can continue to learn.” Her perspective centered on fairness through structure, where consequences safeguard learning. Sami, in contrast, emphasized clarity and control. She believed in the power of routine and consistency, assuming that if rules were applied equally, students would fall into place. Abby brought a different tone

altogether. Her compassion and positivity were evident from the start in the pre-case study, but her strategies reflected a behaviorist lens. Sticker charts, treasure boxes, and external rewards were her go-to tools because, as she pointed out in her pre-interview, “it’s what I knew, what I saw work in classrooms growing up.” Despite their varied perspectives, none of the participants had yet examined whether the approaches they were familiar with taught students to regulate. The course disrupted these assumptions.

The second significant difference emerged in how each participant’s transformation developed, specifically in how they redefined their professional identity and classroom practice. As they moved through the later phases of Mezirow’s (1991) TLT—examining assumptions, exploring new roles, and integrating these insights into action—their learning went beyond shifting what they knew to reshaping who they were becoming as educators.

For Mia, this reshaping took the form of designing structured routines that honored student regulation without sacrificing high expectations. Her early focus on redirecting misbehavior gave way to proactively teaching students about their brain states. She began embedding co-regulation into the flow of the day, using brain state language, check-in rituals, and short breaks. Her transformation leaned toward integration, combining her natural relational instincts with newfound neuroscience knowledge to reframe how safety and structure could coexist. Teaching neuroanatomy became part of her instructional identity, not as an add-on but as a foundation for emotional literacy in the classroom.

Sami’s change, while equally meaningful, took a more inward route. Her early belief that fairness meant treating all students the same was disrupted by an evolving awareness of nervous system states, including her own. She became intentional about her own emotional regulation, redesigning classroom routines to account for her stress cues and relational presence. She began

planning for regulation as part of her day, both for herself and for students. While Mia taught students the language of the brain, Sami modeled emotional awareness through her own shifts in tone, pace, and responsiveness. She moved from rule-giver to emotional guide.

Abby’s transformation emphasized emotional consistency and a sense of classroom belonging. Her early reliance on sticker charts and rewards faded as she realized those tools lacked the depth needed to support trauma-impacted students. Her growth centered on replacing extrinsic motivators with relational rituals. Abby focused on cultivating a culture of compassion and safety through predictable transitions, daily check-ins, and classroom circles. While Mia emphasized cognitive understanding of behavior, Sami focused on internal regulation, and Abby grounded her new identity in relational trust. Her evolution was rooted in the emotional rhythm of the day and in helping students feel safe and valued.

In short, Mia stepped into the role of a relational teacher, using brain-based language to equip students with tools for self-understanding. Sami redefined herself as a co-regulator, prioritizing emotional safety through her own attunement. Abby became a nurturer of belonging, building relational consistency into the structure of her day. Though their identities shifted in different directions, each reflected a reimagining of what it means to lead with presence, compassion, and purpose.

Table 5.1. *Cross-Case Synthesis for Research Question 1: How Do Trauma-Informed Practices (TIPs) and Applied Educational Neuroscience (AEN) Influence Preservice Teachers’ Practices?*

Theme	Mia	Sami	Abby	Theoretical Environment
Theme One: Disrupting the Discipline Narrative Through Empathy and Observation	Recognized that behavior communicates unmet needs; shifted from punitive views to relational understanding.	Discovered that traditional discipline escalated distress; learned to observe emotional triggers first.	Realized lack of motivation stemmed from stress; reframed student “defiance” as dysregulation.	AEN Pillar 1 (Adult Regulation); SAMHSA – Safety, Trustworthiness; TLT – Disorienting Dilemma & Critical Reflection

Theme	Mia	Sami	Abby	Theoretical Environment
Theme Two: Shifting from Control to Co-Regulation: Embracing a Relational Lens	Began practicing coregulation by greeting students and maintaining a calm presence	Practiced breathing and emotional regulation to model calm for students in distress.	Prioritized teacher modeling of emotional balance; integrated mindfulness into lessons.	AEN Pillar 2 (Co-Regulation); SAMHSA – Peer Support, Collaboration; TLT – Trying New Roles, Planning Action
Theme 3: Planning for Trauma-Informed Practice Through Routines and Regulation	Developed morning rituals and predictable transitions to build safety.	Introduced structured calm corners and visual regulation prompts.	Implemented SEL check-ins and brain-based discussions.	AEN Pillars 3–4 (Touchpoints & Teaching Neuroanatomy); SAMHSA – Empowerment, Voice, Choice; TLT – Reintegration of New Perspective.

Note. This table synthesizes patterns across the three participant cases (Mia, Sami and Abby) for RQ 1, illustrating convergence among TIPs (SAMHSA, 2014), AEN (Desautels, 2020), and Mezirow’s (1991, 2009) TLT. The synthesis demonstrates how participants collectively shifted from behavior management toward relational, regulation-based approaches, highlighting shared phases of reflection, perspective transformation, and reintegration.

Across cases, all three participants demonstrated parallel trajectories, beginning with disorienting dilemmas about behavior, engaging in critical reflection, and moving toward intentional co-regulation and structured, relational planning. While the depth of transformation varied, each preservice teacher developed increased self-awareness, empathy, and confidence in applying TIPs and AEN.

RQ2: Cross-Case Comparison of Mia, Sami, and Abby

Mia, Sami, and Abby shared two key similarities and differences in how they applied AEN and TIPs to design classroom environments rooted in both structure and emotional safety. While their journeys reflected shared transformations in core beliefs, each participant’s evolution

was shaped by their unique background and personal interpretations of structure and connection. As Vaughn et al. (2021) note, preservice teachers' visions of teaching are mediated by their prior experiences, professional identities, and learning context. For these three preservice educators, TIPs and AEN served as mirrors, amplifying what each student brought to the table and reorienting their view of the role of classroom design in student well-being.

Significant Similarities

Mia, Sami, and Abby shared two similarities in how they applied TIPs and AEN to develop positive and structured classroom environments. These shared understandings centered on redefining structure as a form of regulation rather than compliance and recognizing relationships as the foundation upon which all structure and safety must rest. Through coursework, guided reflections, and experiential learning, each participant reimagined the physical, emotional, and relational components of the classroom as part of a system that supports the brain and body.

The first shared understanding across all three participants was a redefinition of structure as a form of neurological and emotional regulation. Initially, all three participants held the conventional belief that structure means control, which involves enforcing rules and using behavioral systems to ensure classroom compliance. However, through course readings and reflections on AEN concepts such as brain-body states and neuroplasticity, they began to view structure as a signal of safety and predictability to the nervous system.

Mia, Sami, and Abby each shifted from external behavior management tools to brain-aligned routines designed to foster co-regulation. Their revised classroom strategies included visual schedules, regulation spaces, calm corners, emotional check-ins, and predictable transitions. These changes reflect what Desautels (2020, 2024) describes as AEN Pillar One, the

adult brain and body state. As the teacher's regulation becomes the foundation for classroom tone, structure evolves into a supportive scaffold for students' emotional and physiological needs.

In her post-interview, Mia described this change by stating, "I still believe in structure, but now it means showing up consistently for my students, not just expecting rule followers." For Sami, visual schedules and emotional tone replaced rigid rules as the anchor of their environment. She noted that "structure without relationships is just control," emphasizing that safety must precede expectations. Abby, who initially relied heavily on sticker charts and token systems, began to see the link between structure and internal safety: "Predictability is what makes them feel safe," she shared. "That is structure."

This shared reframing aligns with Craig's (2016) findings, which argued that trauma-informed preparation enables preservice teachers to move beyond behaviorist frames toward environments designed for nervous system regulation. Similarly, Alisic (2012) emphasized the importance of emotional safety and structure for students impacted by trauma, particularly when routines are predictable and calming rather than punitive or reactionary. For all three participants, regulation became the purpose of structure, not just the byproduct.

The second key similarity involved the recognition that relationships the infrastructure that supports both structure and learning. As participants' understanding of trauma expanded, each of them came to view trust and relational attunement as prerequisites for a positive classroom climate. This shift aligns with Brunzell et al. (2016), who describe relational safety as the foundation of trauma-informed practice, and Immordino-Yang (2016), who highlights the integration of emotion and cognition in student learning.

All three participants saw relational rituals, such as personalized greetings, shared vulnerability, and space for student voice, as essential practices that fostered safety and predictability. Sami wrote, “Structure without relationships is just control,” capturing the central understanding that connection drives both engagement and compliance. Mia began referring to routines like morning check-ins as “emotional anchors,” designed not just to start the day, but to send signals of safety and consistency. Abby, reflecting on the importance of connection, described relationships as “the plate that holds everything else,” acknowledging that even the most carefully designed routines would fail without a foundation of trust and belonging.

Participants’ collective realization aligns with Craig’s (2016) argument that emotionally responsive teaching is central to creating environments where students can learn and thrive. Each of them recognized that a positive and structured classroom requires not only clear expectations but also teachers who model regulation, empathy, and relational consistency.

Together, these similarities reflect a collective transformation in how these preservice teachers came to understand and design classroom environments. They moved from viewing structure as a tool for behavioral control to embracing it as a neurological and relational support system. In doing so, they redefined their own roles as co-regulators, relationship builders, and architects of emotional safety. By grounding the practices in both TIPs and AEN, Mia, Sami, and Abby created classroom blueprints that prioritized dignity, consistency, and connection, indicators of a supportive and structured learning environment (Perry & Winfrey, 2021).

Significant Differences

Despite their shared redefinition of structure and recognition of the importance of relationships, Mia, Sami, and Abby experienced three key differences in how they designed a trauma-informed, positive, and structured classroom environment. These differences were

shaped by their personal entry points, underlying beliefs, and interpretations of their future educator roles. Each participant took a unique path through their learning, influenced by their histories, personalities, and transformative pathways, in which adult learners reconstruct meaning through experiences aligned with their personal context and prior meaning structures. The first major difference lay in how each participant entered the course and what initially challenged their thinking. Each participant's transformation began with a disorienting dilemma, but the content and emotional triggers varied significantly.

Mia entered the course holding a traditional view of classroom management, equating structure with control and compliance. She believed rules, clip charts, and behavioral consequences were sufficient for maintaining order and promoting learning. Her transformation began with neuroscience. AEN content, particularly relating to brain-body states, co-regulation, and neuroplasticity, provided a concrete, research-based rationale for changing her practices. As she explained in her post-interview, "You can't argue with science." Her shift was rooted in her identity as a Type A personality who values logic, systems, and predictability, which made the biological explanations of student behavior particularly compelling.

Sami, on the other hand, entered the course with a deep sense of fairness and justice. She believed that treating all students the same was the most equitable approach. Her disorienting moment came while watching the documentary *Removed*, which exposed the emotional needs of trauma-impacted children. That moment, followed by a guest speaker from a rural school who discussed trauma-informed shifts, led Sami to reframe fairness as providing each student with what they need, not simply applying rules equally. "Fair doesn't mean the same anymore," she stated in her post-interview. "It means seeing them and meeting them where they are."

Abby's entry point was rooted in kindness and care, but also in a reliance on behaviorism. She believed reward systems, sticker charts, and consistent enforcement of rules created structure. The documentary *Removed* and the Brain Architecture Game caused her to question whether she was creating safety or simply motivating compliance. As she noted in Journal Reflection Two, "This little girl didn't need rules. She needed someone to say, 'What can I do for you?' That is the structure." Abby's transformation was grounded in emotional literacy, realizing that even kind classrooms can overlook trauma if they fail to address students' neurological and relational needs.

The second key difference appeared in the way each participant envisioned and designed their trauma-informed classroom. While all three prioritized emotional safety and predictability, their strategies reflected their personal strengths and beliefs.

Mia's design emphasized predictable systems, regulation-focused routines, and visual structure. Her strategies centered on environmental consistency and brain-aligned rituals. She used visual schedules, regulation corners, and calm transitions as tools to reduce anxiety and co-regulate students' nervous systems. "It's not just about lining up and raising hands," she explained. "It's about giving them emotional anchors, something steady they can rely on." Her classroom structure was rhythmic and visually clear, designed to scaffold regulation through routine.

Sami's design focused more heavily on emotional tone, belonging, and flexibility. She prioritized greeting students with intention, adapting routines to students' brain-body states, and using restorative practices to foster connection. She created flexible structures that allowed for student agency and honored individual emotional needs. As she put it, "If I don't know my brain

state, how can I help theirs? My structure has to start with me.” Sami’s trauma-informed classroom was not only consistent but also emotionally attuned.

Abby’s design leaned into emotional predictability through shared vulnerability and relational presence. While she maintained clear expectations and routines, she began embedding empathy into every aspect of her structure. She used co-created rules, daily check-ins, and modeled emotional regulation by narrating her own coping strategies. For Abby, structure became synonymous with emotional presence, providing a constant, compassionate presence that helped students feel safe.

While Mia, Sami, and Abby all moved toward trauma-informed, brain-aligned practices, their pathways were shaped by different disorienting dilemmas, emotional triggers, and conceptual anchors. Mia leaned into systems thinking and predictable rhythms rooted in neuroscience. Sami centered on belonging, fairness, and emotional tone. Abby built her vision around relational presence and emotional safety. These differences are not contradictions, but reflections of how trauma-informed teaching is personal and responsive not only to student needs, but to the evolving identities of the teachers themselves. As Vaughn et al. (2021) noted in their study of teacher transformation, “visioning is mediated by context identity, and history.” So too were these preservice visions for what a truly positive and structured classroom could be.

The transformation in Mia, Sami, and Abby’s understanding of what it means to create a positive, structured classroom environment reveals the significant impact of TIPs and AEN coursework. What began for each participant as traditional notions of order, fairness, and behavior evolved into dynamic, relational, and neurobiologically attuned classroom design strategies. Across their journeys, structure became a vehicle for safety, equity, and emotional co-regulation. Though each participant entered with unique beliefs and backgrounds, all three

emerged with classrooms rooted in predictability, student voice, connection, and care. Their experiences reinforce the notion that trauma-informed environments are not built on compassion rather than compliance, where structure is not abandoned but reimaged through the lens of nervous system regulation and relational trust. These findings support existing research and suggest that preservice teacher preparation programs can catalyze lasting shifts in how future educators approach the emotional architecture of learning.

Table 5.2. *Cross Case Synthesis for RQ2: Creating Positive and Structured Classroom Environments*

Cross-Case Theme	Shared Understandings Across Participants	Distinct Applications	Theoretical Alignment (TIPs / AEN / TLT)	Illustrative Evidence (Quotes or Actions)
Structure as Regulation, Not Control	All three redefined structure as neurological and emotional regulation rather than compliance	Mia designed visual schedules and check-ins as “emotional anchors.” Sami used calm corners and tone awareness to stabilize the classroom. Abby connected predictability to safety through daily greetings and co-created routines.	TIPs: Safety & Trustworthiness AEN: Pillar 1 (Brain & Body State), Pillar 2 (Co-Regulation) TLT: Phases 6–7 (action planning & skill acquisition)	“Predictability is what makes them feel safe, and that is structure.” – Abby “Routines need to be relational and brain aligned.” – Mia
Relationships as the Infrastructure of Safety	Participants agreed that connection precedes compliance; relationships became the foundation of structure.	Mia embedded daily greetings and “neuro-language.” Sami built community through restorative conversations and individualized support. Abby used 2×10 connections and modeled vulnerability	TIPs: Peer Support & Collaboration AEN: Pillar 3 (Touchpoints), Pillar 4 (Teaching Neuroanatomy) TLT: Phases 7–8 (new roles & competence building)	“Structure without relationships is just control.” – Sami “If I make a mistake, I’ll own it in front of them.” – Abby

Cross-Case Theme	Shared Understandings Across Participants	Distinct Applications	Theoretical Alignment (TIPs / AEN / TLT)	Illustrative Evidence (Quotes or Actions)
Different Entry Points into Transformation	Each participant's disorienting dilemma was unique yet led toward the same relational vision of structure.	Mia was moved by neuroscience and systems logic. Sami was moved by empathy and fairness after Removed. Abby was moved by emotional insight and behaviorism's limits.	TIPs: Empowerment & Voice AEN: Pillar 1 (Self-Regulation of Educator) TLT: Phases 1–3 (disorienting dilemma to self-examination)	"Fair doesn't mean the same anymore." – Sami "You can't argue with science." – Mia
Personalized Designs for Safety and Belonging	All three developed trauma-informed classroom blueprints, each reflecting a personal interpretation of structure and care	Mia = predictable systems. Sami = emotional tone and flexibility. Abby = relational presence and vulnerability.	TIPs: Collaboration & Mutuality AEN: Integration of all Four Pillars TLT: Phases 9–10 (reintegration into teaching identity).	"I still believe in structure, but now it means showing up consistently for my students." – Mia

Note. This table synthesizes cross-case findings for RQ 2, illustrating how the three participants (Mia, Sami, and Abby) collectively redefined classroom structure through TIPs and AEN concepts.

Each participant's progression reflects Mezirow's (1991, 2009) phases of TLT and demonstrates that safety, predictability, and relationships serve as the foundation of a positive, emotionally attuned learning environment. Together, these patterns highlight how reflection and regulation guided participants' transformation from viewing students as a means of control to understanding them as a connection.

As summarized in Table 4.9, participants collectively reframed classroom structure as an expression of regulation and relationship rather than control, demonstrating how TIPs and AEN concepts translate theory into the design of safe and predictable learning ecosystems.

RQ3: Cross-Case Comparison of Mia, Sami, and Abby

Together, the experiences of Mia, Sami, and Abby reveal a shared truth: engagement is not something teachers demand; it is something they co-create. Each preservice teacher entered the course with traditional beliefs about compliance and motivation but emerged with a relational and neurobiological understanding of engagement as safety, belonging, and trust. The following cross-case synthesis (Table 4.12) illustrates these shared transformations and nuanced differences across the three participants, connecting their journeys through the lens of TLT and the concepts of TIPs and AEN.

Significant Similarities

The first shared understanding was a shift from compliance to connection. All three participants began the course with traditional notions of engagement, seeing it as students who followed directions, raised their hands, or participated visually. However, as they encountered the neuroscience of engagement, including brain-body states and co-regulation, each participant redefined engagement as an internal state dependent on emotional safety. Mia described this shift clearly: “If their brain isn’t ready, I can’t expect engagement. I have to notice this first.” Similarly, Sami reflected that “Engagement starts with connection. It does not always start with a raised hand.” Abby echoed this, realizing that “Some students might not follow every direction, but I realize they could be communicating a need.” This shared evolution aligns closely with SAMHSA’s (2014) principles of trust and safety and Mezirow’s (1991) Phase Seven: acquiring new knowledge to implement transformed beliefs.

The participants’ second similarity was the recognition that emotional safety must precede cognitive engagement. Each participant expressed this in slightly different terms, but all acknowledged that students can’t learn unless they feel regulated, connected, and seen. Mia

designed her classroom around what she called “emotional anchors.” Sami intentionally created daily check-ins and touchpoints to assess student readiness. Abby built regulation spaces and trust-building rituals. Across all three, the concept of relationship before rigor became a guiding principle, reaffirming Immordino-Yang’s (2016) research that emotional states are not separate from learning; they are its foundation.

Significant Differences

Despite these shared values, the participants’ transformative journeys diverged in three intentional ways, shaped by their initial assumptions, their unique entry points into the course, and their personal identities as future educators.

The first difference emerged in how each participant initially conceptualized student engagement. Mia entered the course believing that engagement was synonymous with compliance. Her image of an engaged student was one who sat quietly, followed directions, and stayed on task. However, as she encountered content on brain-body states, that definition was challenged. The neuroscience lens disrupted her previous beliefs, becoming the catalyst for transformation. In contrast, Sami’s starting point was grounded in a strong sense of fairness and equality. She believed that treating students the same was the foundation of a well-run classroom. After viewing the *Removed* documentary and hearing from a rural educator who emphasized student belonging over behavior, Sami began to realize that fairness does not always mean sameness. Her evolving belief became rooted in equity, meeting students where they are based on individual needs. Abby, meanwhile, came into the course with a nurturing disposition and a genuine desire to support students, but her strategies leaned heavily on external motivators such as sticker charts. It was through emotional literacy, particularly the realization that trauma

often renders traditional motivators ineffective, that she began to shift her perspective. Trust emerged as the true foundation of engagement in her new vision.

The second difference concerned the strategies each participant developed to foster engagement. Mia designed her classroom around co-regulation and predictable routines, embedding daily check-ins, calm corners, and consistent transitions. Her plan emphasized noticing her students' nervous system states and creating a rhythm of emotional safety. Sami, in contrast, prioritized emotional tone and a sense of belonging. She implemented strategies such as personal greetings, restorative conversations, and flexible expectations, enabling her to respond to individual student needs. Abby leaned into student voice and shared vulnerability. She moved away from token systems and instead embraced methods like the 2x10 relationship-building strategy and think-aloud modeling of emotional resilience. For Abby, engagement was built through modeling authenticity and inviting students to do the same.

The final difference was in how each participant defined success in engagement. Mia saw success as a student, feeling emotionally safe and regulated enough to participate, even if that participation was quiet. Her redefinition of engagement was grounded in presence and readiness rather than performance. For Sami, success meant that students felt they belonged. Her focus was especially sharp on students who had previously withdrawn or masked their disengagement. If they felt seen and emotionally safe, engagement would follow. Abby, meanwhile, reimagined success as students feeling empowered to express their needs, take academic risks, and show up authentically in the classroom. A student asking for a break or admitting frustration, in Abby's view, became evidence of engagement rather than avoidance.

These differences are not contradictions; they reflect the inherently personal nature of trauma-informed teaching. While guided by shared neuroscience and trauma principles, the

application of these frameworks is shaped by the teacher’s evolving identity and worldview. As Vaughn et al. (2021) explained, visioning is mediated by context, identity, and history. Mia’s vision was shaped by a cognitive understanding of the brain. Sami’s was rooted in fairness, belonging, and emotional connection. Abby’s transformation was born of a commitment to humanizing the student experience. Together, their individual shifts clarified the layered, relational nature of engagement in trauma-informed classrooms, as engagement that is not delivered by the teacher but co-created with students, grounded in safety, trust, and presence.

Table 5.3. *Cross-Case Synthesis for Research Question 3: Engagement Through Safety, Trust, and Connection*

Cross Case Themes	Shared Understandings Across Participants	Distinct Applications	Theoretical Alignment (TIPs/AEN/TLT)	Illustrative Evidence (Quote or Action)
Engagement Shifts from Compliance to Connection	All three redefined engagement as emotional readiness and relational presence rather than compliance or performance.	Mia – Focused on neurological readiness and co-regulation. Sami – Emphasized equitable belonging over equal treatment. Abby – Centered on trust and student voice.	TIPs: Safety & Trustworthiness. AEN: Pillar 1 (Educator brain / body state). TLT: Disorienting Dilemma and Critical Reflection.	“You can’t argue with brain science.” – Mia “Engagement starts with connection.” – Sami “They belong, and that’s when engagement comes.” – Abby
Emotional Safety as the Prerequisite for Engagement	Participants agreed that cognitive learning cannot occur until students feel safe, regulated, and seen.	Mia – Emotional anchors and predictable routines. Sami – Daily check-ins and greetings. Abby – Trust-based spaces and emotional-literacy lessons	TIPs: Safety, Peer Support. AEN: Pillars 2 (Co-regulation) & 3 (Touchpoints). TLT: Reflection and Planning Action.	“Sometimes quiet is safety-seeking.” – Mia “Relationships will increase engagement.” – Sami “A sticker chart would not have helped.” – Abby

Cross Case Themes	Shared Understandings Across Participants	Distinct Applications	Theoretical Alignment (TIPs/AEN/TLT)	Illustrative Evidence (Quote or Action)
Redefining the Teacher's Role as a Co-Regulator and Relational Guide	All recognized engagement must be co-created through teacher attunement, vulnerability, and trust.	Mia – Teacher awareness precedes instruction. Sami – Fairness = equity and flexibility. Abby – Models humanity and shared mistakes.	TIPs: Empowerment & Choice; Cultural Awareness. AEN: Pillar 4 (Teaching brain states). TLT: Exploring New Roles and Reintegration.	“If their brain isn’t ready, I can’t expect engagement.” – Mia “I’ll greet them daily—it tells them I care.” – Sami “If I make a mistake, I’ll own it.” – Abby

The cross-case synthesis revealed that, while each participant’s journey was unique, all three experienced profound shifts in their understanding of the purpose and practice of teaching. These shifts began with a reexamination of long-held assumptions about behavior and control, beliefs shaped by their own schooling and early classroom experiences. The first major theme, A Shift from Behavior Management to Relational Engagement, captures how preservice teachers transitioned from compliance-driven approaches to relational, brain-aligned strategies that prioritize safety, trust, and connection. This transformation marked the starting point of their professional and personal growth, where traditional notions of discipline gave way to co-regulation, empathy, and emotional attunement as the foundation for student learning.

A Shift from Behavior Management to Relational Engagement

This study began with the recognition that trauma-informed practices (TIPs) and applied educational neuroscience (AEN) hold the potential to redefine what it means to teach, learn, and connect in classrooms shaped by adversity. Through Mezirow’s Transformative Learning Theory

(TLT), this research explored how three preservice teachers, Mia, Sami, and Abby, shifted from viewing teaching as a process of control to embracing it as an act of relational engagement.

Initially, each participant entered the course with traditional assumptions about behavior and compliance, equating engagement with order and rule-following. However, as they engaged in reflective journaling, neuroscience lessons, and trauma-informed simulations, these assumptions were challenged. Their “disorienting dilemmas” (Mezirow, 1991) emerged when they recognized that behavior was not defiance but communication, a signal of underlying dysregulation.

For Mia, the shift began when she realized that engagement could not be demanded. “If their brain isn’t ready, I can’t expect engagement,” she explained. Sami echoed this transformation, describing that “engagement starts with connection; it doesn’t always start with a raised hand.” Abby, in turn, reframed her own teaching as less about compliance and more about belonging and emotional safety: “Engagement comes from students feeling like they matter, that they belong, and that the person teaching them sees and hears them.”

These shifts reflected the relational principles of SAMHSA’s (2014) trauma-informed framework and the AEN Pillars (Desautels, 2020): educator brain-body state, co-regulation, touchpoints, and teaching students’ brain and body states. Collectively, they began to understand engagement as co-created through trust, regulation, and presence. Their transformations affirmed that teaching is not simply instructional; it is relational, grounded in the nervous system’s need for safety and connection before cognition can occur (Perry & Winfrey, 2021; Immordino-Yang, 2016).

A Reconceptualization of Classroom Environments as Emotional Ecosystems

Across the participants' experiences, the classroom evolved from a physical space into what Perry (2006) described as a "relational architecture." Each preservice teacher began designing their classroom environment not only for order but also for belonging, connection, and predictability, conditions that promote emotional regulation and neuroplasticity.

Mia used structure and safety as emotional anchors, designing predictable transitions and calm corners. Sami fostered a sense of belonging through restorative routines and individualized touchpoints, ensuring that each student felt seen and valued. Abby reimagined classroom rules as relational agreements, embedding choice and vulnerability into classroom culture.

These environmental shifts mirrored Desautels' (2020) AEN pillars, emphasizing the idea that "regulated adults create regulated environments." When teachers intentionally model regulation, they co-regulate with students, building trust and emotional safety. This shift represents Mezirow's (1991) middle phases of transformation, critical reflection, and exploration of new roles, where teachers begin to act on new perspectives in their practice.

By reconceptualizing the classroom as an emotional ecosystem rather than a behavioral system, the three participants demonstrated that trauma-informed, neuroscience-aligned teaching moves beyond compliance. It becomes an intentional process of designing for safety, belonging, and relational repair, in which learning is both academic and emotional.

The Reframing Motivation and Engagement through the Lens of Safety, Trust, and Identity

The final theme centered on how participants redefined motivation and engagement, seeing them as relational processes rather than behavioral outcomes. All three preservice

teachers came to understand that motivation begins not with external rewards but with internal safety and trust.

Mia recognized that “students need to feel seen before they can learn.” Sami discovered that belonging and fairness were not endpoints but the very conditions for engagement. Abby reframed engagement through student voice and authenticity, writing, “Sometimes engagement looks like showing up tired and giving what you can or asking to take a break when frustration is building.”

Through reflection and experience, all three demonstrated the later phases of transformative learning: acquiring new knowledge, planning new actions, and reintegrating transformed beliefs (Mezirow, 1991). Mia, Sami, and Abby moved from a transactional understanding of teaching toward a relational, human-centered practice aligned with SAMHSA’s (2014) principles of trust, safety, and empowerment.

Their transformations show a core truth: engagement cannot be coerced; it must be co-created. When students feel emotionally safe, they access the cognitive and motivational resources necessary for learning (Desautels, 2020; Brunzell et al., 2016; Immordino-Yang, 2007). When teachers regulate themselves and lead with empathy, they invite engagement rather than demand it.

Table 5.4. *Summary of Cross-Question Findings, Themes, and Implications*

Research Question	Major Theme(s)	Transformations Observed	Theoretical Alignment (TLT/TIPs/AEN)	Implications
RQ 1: How do applied educational neuroscience and trauma-informed coursework	Theme 1 – A Shift from Behavior Management to Relational Engagement	Preservice teachers reframed behavior as communication rather than defiance; co-	TLT: Disorienting dilemmas, critical reflection. TIPs: Safety & trustworthiness.	Embed TIPs/AEN across coursework to build reflective, relationship-

Research Question	Major Theme(s)	Transformations Observed	Theoretical Alignment (TLT/TIPs/AEN)	Implications
influence preservice teachers' practices in elementary education?		regulation replaced control.	AEN: Educator brain-body state, co-regulation.	centered teaching identities.
RQ 2: In what ways do applied educational neuroscience and trauma-informed coursework affect preservice teachers' strategies for creating a positive and structured classroom environment?	Theme 2 – A Reconceptualization of Classroom Environments as Emotional Ecosystems	Classrooms redesigned as safe, predictable, and relational spaces that support regulation and belonging.	TLT: Exploration of new roles. TIPs: Empowerment & collaboration. AEN: Touchpoints, teaching brain-body states.	Model emotionally attuned classroom design in teacher-prep practicums and fieldwork.
RQ 3: How do applied educational neuroscience and trauma-informed training enhance preservice teachers' ability to engage and motivate students impacted by trauma?	Theme 3 – The Reframing of Motivation and Engagement Through Safety, Trust, and Identity	Engagement redefined as co-created through safety, trust, and emotional accessibility rather than compliance.	TLT: Reintegration of new perspective. TIPs: Peer support, cultural awareness. AEN: Integration of all four pillars.	Redesign professional development to foster educator self-regulation and relationship-driven engagement strategies

Research Question	Major Theme(s)	Transformations Observed	Theoretical Alignment (TLT/TIPs/AEN)	Implications
Cross-Case Synthesis		Teaching transformed from procedural management to reflective, relational, and neuroscience-aligned practice.	Integrates TLT's transformational phases with TIPs and AEN.	Supports systemic adoption of TIPs/AEN within teacher education and ongoing professional learning.

Note. This table summarizes how each research question aligns with the study's major themes, transformative processes, and theoretical frameworks. It illustrates the developmental progression of preservice teachers as they integrate trauma-informed and neuroscience-aligned practices into their professional identities.

Together, these findings affirm that the transformation in teacher preparation is not a single event but a layered process, one that begins with self-awareness, expands through relational understanding, and culminates in new professional identities. The following section explores how these findings inform teacher education, professional development, and future research.

Implications

The findings from this study extend beyond the individual transformations of Mia, Sami, and Abby; they show what is possible when teacher education programs intentionally integrate trauma-informed practices (TIPs) and applied educational neuroscience (AEN) through the lens of Transformative Learning Theory (TLT). Each preservice teacher's journey demonstrated that meaningful change begins within, through reflection, awareness, and relational understanding, and then radiates outward into classroom design, student interactions, and contributions to school culture.

The implications of these findings reach across four key areas: teacher preparation programs, in-service professional development, educational leadership and systems change, and future research. Collectively, they offer a roadmap for cultivating educators who teach not merely for academic achievement but for connection, healing, and human growth.

Implications for Teacher Preparation Programs

Teacher preparation programs represent the most powerful entry point for cultivating trauma-informed and neuroscience-aligned teachers. The experiences of Mia, Sami, and Abby show that transformation occurs when preservice teachers are invited to critically reflect on their beliefs, connect theory to lived classroom experience, and engage in relational, experiential learning. Teacher education programs should embed trauma-informed and neuroscience-based content across coursework rather than isolating it in single modules. Reflection and experiential practice, such as journaling, microteaching, and observation, should be integrated throughout methods courses to create sustained learning. The journeys of Mia, Sami, and Abby indicate how transformation occurs when preservice teachers are guided to question assumptions, connect neuroscience to lived experience, and apply learning in authentic contexts.

Implications for In-Service Professional Development

Professional learning for practicing teachers must move beyond compliance-based workshops. Educators need spaces that model the very regulation and reflection they are expected to foster in students. Training that emphasizes adult brain-body regulation, co-regulation, and relational repair supports not only student well-being but also teacher resilience and retention. Trauma-informed professional development should be sustained, collaborative, and rooted in shared inquiry rather than one-time training.

Implications for Educational Leadership and Systems Change

Systemic transformation depends on leadership that models relational trust and emotional safety. Administrators and policymakers play a pivotal role in creating structures that support teacher reflection, emotional regulation, and community. Policies that prioritize staff wellness, collaborative planning, and restorative approaches signal to teachers that trauma-informed principles are not optional; they are cultural foundations.

Implications for Research and Scholarship

This study contributes to the intersection of TLT, TIPs, and AEN. It demonstrates how adult learning theory provides a conceptual bridge for understanding how teachers integrate relational neuroscience into their practice. Future research should continue to expand this bridge, ensuring that trauma-informed education is grounded in both evidence and empathy.

Trauma-informed teaching is not a fixed end state; it is an evolving process of reflection, connection, and re-humanization. As preservice teachers grow in self-awareness and regulatory capacity, they not only change their classrooms but also change the conditions for learning itself.

Recommendations for Future Research

While this study provided valuable insights into preservice teacher transformation, it also revealed areas for further exploration.

Longitudinal Studies on Sustained Transformation

Following preservice teachers into their early years of teaching could reveal whether the reflective and relational shifts observed here persist amid the pressures of full-time teaching. Longitudinal studies could show how trauma-informed and AEN-aligned practices evolve over time.

Broader and More Diverse Populations

Future research should examine trauma-informed and neuroscience-based teacher preparation across a variety of licensure areas, institutional contexts, and cultural settings. Including participants with diverse lived experiences and ACEs profiles could extend understanding of how personal history influences professional empathy and resilience.

Quantitative and Mixed-Methods Research

To complement qualitative research, mixed-methods research could measure outcomes such as teacher self-efficacy, regulation, and student engagement. Quantitative tools, such as physiological measures of stress or surveys of teacher well-being, could provide empirical grounding for trauma-informed approaches.

Implementation and Program Design

Further research should examine how teacher preparation programs can systematically embed TIPs and AEN across curricula and fieldwork. Studies might explore how faculty development and institutional culture influence the sustainability of trauma-informed education.

Student-Centered Outcomes

Finally, future studies should extend beyond teacher transformation to include student perspectives. Examining how students experience belonging, engagement, and emotional safety in trauma-informed classrooms would strengthen the evidence base connecting teacher transformation to student success.

Together, these recommendations extend the reach of this study and emphasize the importance of sustained, systemic commitment to teacher transformation

Conclusion

At its core, this study affirms that teaching is an act of human connection grounded in neuroscience, compassion, and reflection. Through the lens of Transformative Learning Theory,

the preservice teachers in this study redefined engagement, environment, and motivation in terms of safety, trust, and a sense of belonging.

Their transformations reflect not only the power of trauma-informed and neuroscience-aligned education but also the promise of teacher preparation grounded in empathy and reflection. When educators learn to regulate themselves, they model the safety their students need to thrive. When they teach from connection rather than control, they restore classrooms as spaces of both healing and learning.

In the words of one participant, “You can’t argue with brain science. If a student isn’t regulated, no learning will happen.” The same holds true for teachers. As educators learn to regulate, connect, and reflect, they create the very conditions that make education transformative, for themselves, their students, and the systems they serve.

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Appendix A - Informed Consent Form

Informed Consent Statement

Title of Study:

The Transformative Impact of Trauma-Informed Practices and Applied Educational Neuroscience Training on Elementary Preservice Teachers

Purpose of the Study

You are invited to participate in a study by Melissa Gerleman (mgerlema@ksu.edu) from the Department of Curriculum and Instruction at Kansas State University. This study explores the transformative impact of trauma-informed practices and applied educational neuroscience training on elementary pre-service teachers. Specifically, this research aims to understand how these approaches influence pre-service teachers' practices in elementary settings. This study's findings will inform future work in teacher education programs, particularly in trauma-informed pedagogical training and applied neuroscience coursework. Additionally, this study will contribute to a growing body of research to support teacher development and foster trauma-responsive learning environments.

Information about Participant Involvement in the Study

If you consent to participate in this study, there is no extra work outside EL 515 besides a pre- and post-semi-structured interview. These interviews will focus on how this training impacts your professional practices in elementary classrooms. Participation is voluntary, and you may withdraw without penalty, which will not affect your grade or cause you to fail the course. Your knowledge and experiences will help inform future teacher education programs and contribute to understanding trauma-informed and neuroscience-based educational practices.

If you agree to participate, you will be involved in the following activities:

- Completing two semi-structured interviews during the study (approximately 45–60 minutes each).
 - Maintaining seven reflective journals, one for each module in the course and teaching placements.
 - Analyzing a case study at the course's beginning and end to reflect on trauma-informed practices in the classroom.
- All data will be collected during the academic semester, and your participation will be during the spring semester of 2025.

Procedures:

If you agree to participate, you will be involved in the following activities:

- Completing two semi-structured interviews during the study (approximately 45–60 minutes each).
- Maintaining seven reflective journals, one for each module in the course and teaching placements.
- Analyzing a case study at the course's beginning and end to reflect on trauma-informed practices in the classroom.

All data will be collected during the academic semester, and your participation will be during the spring semester 2025.

Risks:

There are minimal risks associated with participating in this study. Some prompts or discussions may elicit emotional reflection regarding your personal experiences with teaching students and trauma-informed education. You may choose to pause or withdraw from participation if you feel discomfort at any point. Additionally, and not a focus of the study, some prompts may inadvertently elicit emotional reflection about your personal experiences with trauma. If you need support, there are resources on campus, such as the Student Wellness Center at 250 SE Morse Hall; the phone number is (620)341-5222.

Benefits:

While there is no direct compensation or guaranteed personal benefit, your participation may:

- Enhance your understanding of trauma-informed practices and applied educational neuroscience.
- Contribute to the development of more effective teacher preparation programs.
- Advance research on supporting trauma-impacted students in educational settings.

Participant Confidentiality:

Your privacy will be respected throughout this study.

- All data, including interview transcripts and journal entries, will be anonymized by assigning each participant a unique code.
- Your personal information will not be shared with anyone outside the dissertation committee.
- Data will be securely stored on password-protected devices and deleted after one year.
- The study's final report or publication will not include your name or identifying information.
- Even if identifiers are removed, the information collected in this research study **will not** be used or distributed for future research studies.

Questions About Participation:

If you have any questions about this study, you are encouraged to contact the researcher, Melissa Gerleman (mgerlema@emporia.edu).

Researcher Contact Information and Questions

I have read the information above and received a copy of this form. I have had the opportunity to ask questions regarding my participation in this study. By signing below, I consent to participate in this research.

Melissa Gerleman; 316-341-5716; mgerlema@emporia.edu

Dr. Michael Lawson; 818-620-5367; mlawson1@ksu.edu

Participant Agreement

- Print Participant's Name: _____

- Participant's Signature: _____

- Date: _____

If you have any questions about your rights as a participant, you may contact Kansas State University's Institutional Review Board Chair,

- Lisa Rubin, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, 785-532-3224.

Appendix B - Semi-Structured Interview Questions

Pre-Interview Questions

Introduction

- Welcome, and thank the participant for joining the interview.
- Explain the purpose of the interview:
 - “I’m”
- Confirm voluntary participation and provide the option to skip any question or stop the interview at anytime.
- Ensure the participant is ready for recording and begin.

Background Questions

- Please tell me a little about where you are in the teacher preparation program.
- What inspired you to become a teacher?
- Why did you choose to enroll in this particular course?

RQ1: Initial Perceptions of Classroom Environment Strategies

- When I say “classroom environment,” what do you think about?
- How do you think the classroom environment impacts student learning and behavior?
- How would you describe a “positive and structured classroom environment”?
- Let’s think about your role in cultivating the classroom environment. What strategies might you implement to maintain a positive and structured environment?
 - Follow-up:

- What might be challenging in managing this type of environment?
- What types of resources or support might help you maintain this environment?
- Let's think about disruptive behaviors in the classroom.
 - What disruptive behaviors might show up in your classroom?
 - Why do you think students might be disruptive in the classroom?
 - What might you do in response to disruptive behaviors in the classroom?

RQ2: Initial Understanding of Engagement and Motivation

- What do you think about engagement and motivation?
- How do engagement and motivation impact learning and behavior in the elementary classroom?
- What strategies do you know of that would keep students motivated and engaged in the elementary classroom?
 - Follow-up:
 - How would you support motivation and engagement in the classroom?
 - How would you measure engagement and motivation?

Trauma & AEN Preparation

- So, as you might know, we will talk about things like students who have experienced trauma. We'll also talk about applied educational neuroscience and how these concepts play out in the classroom. The next questions I'll ask will help me understand where you're starting with these concepts. Are you ready?

RQ3: Initial Understanding of AEN

- When I say, “applied educational neuroscience” what do you think about?
 - Follow-up:
 - Can you tell me a little about how you think understanding applied educational neuroscience might help you support students?

RQ4: Initial Understanding of Trauma

- When I say “trauma” and “students who have experienced or are experiencing trauma in your classroom,” what do you think about?
- Would trauma impact students' behavior and ability to learn in your classroom?
 - Yes
 - How might trauma impact students’ behavior and ability to learn in your classroom?
 - How might you go about supporting students who have experienced or are experiencing trauma in the classroom? What strategies might you employ?
- How confident do you feel in your ability to support students who might have experienced trauma?
- Earlier we talked about disruptive behaviors and motivation and engagement. Let's think about those ideas and consider students who have experienced trauma.
 - Would strategies for motivation and engagement look different for students with trauma?
 - Do you believe engaging and motivating students impacted by trauma will be challenging?

- Yes:
 - Why? What might the challenges be?
- No:
 - Why not?

Closing:

1. Watch the time and stay within the time allotted.
2. Stop the recorder.
3. Schedule follow-up sessions.
4. Thank the participant for their time.

Post-Interview Questions

Introduction

- Welcome back the participant and thank them for their continued participation.
- Explain the purpose of the post-interview:
 - “I’d like to talk about your experiences during the course and whether your thoughts and understanding about creating positive classroom environments, supporting students impacted by trauma, and engaging students have evolved.”
- Confirm voluntary participation and readiness to record.

RQ1: Classroom Environment Strategies

- In the first interview, you mentioned that a positive and structured classroom environment looks like _____. After completing this course, is there anything you would add or change about your perspective?

- Are there any new strategies that you now feel prepared to implement to maintain a positive, structured classroom environment?
 - Can you describe a specific strategy or idea from the course that you plan to try in your classroom?
- What challenges might you face in maintaining a positive and structured classroom environment?
 - How will you address these challenges?
- Has coursework changed how you think about managing disruptive behaviors?
 - Yes
 - Can you explain?
 - No
 - Did the coursework support what you already knew?

RQ2: Engagement and Motivation

- Has this course changed the way you think about keeping students engaged and motivated in the classroom?
 - Yes
 - Can you explain?
 - No
 - Did the course support what you already knew?
- Do you feel more confident in your ability to motivate students?
 - Why or why not?
- What challenges do you still encounter in keeping students engaged?
 - How might you address these challenges?

RQ3: Understanding of AEN

- Has your knowledge of applied educational neuroscience evolved over the course?
 - Yes
 - How has your knowledge of applied educational neuroscience evolved during the course?
 - No
 - Did the course support what you already knew?
- Can you explain the four pillars of applied educational neuroscience in your own words?
- Do you plan to implement any strategies from the four pillars in your future classroom?
 - Yes
 - What strategies do you plan to implement?
 - No
 - Did the course teach you about strategies you already knew about?
- Do you see benefits in using applied educational neuroscience to support students?
 - Yes
 - What benefits do you see?

RQ4: Understanding of Trauma

- In your first interview, your understanding of trauma and its impact on students' behavior and learning was _____. Has your understanding changed or remained the same?
 - Can you explain?
- Have you learned about any new strategies or approaches for supporting students who might have experienced trauma?
 - Yes
 - What strategies have you learned about?
 - Do you plan to implement these strategies in your classroom?
 - No
 - Did you learn about strategies you were already familiar with?
- In the first interview, you shared that you would use _____ to engage and motivate students impacted by trauma. After completing this course, have you discovered any new strategies you would feel confident implementing?
 - Yes
 - What engagement and/or motivational strategies did you learn about?
 - No
 - Did you learn about engagement/motivational strategies you were already familiar with?
- Will you use different strategies to motivate students with trauma?
 - Yes
 - Can you explain why?
 - No
 - Can you explain why not?
- Do you feel more confident in your ability to motivate students with trauma?
 - Why or why not?
- In the first interview, you said that engaging and motivating students impacted by trauma would/would not be challenging. Now that you have completed the course, do you believe engaging and motivating students impacted by trauma will be challenging?
 - Yes:
 - Why? What might the challenges be?
 - No:
 - Why not?

Reflection on Coursework & Transformative Learning

- Thinking back to the start of the course, do you think you have grown or changed in your understanding about teaching?
 - Yes.
 - How would you describe your overall growth or changes in understanding about teaching?
 - What is the most significant shift in how you think about teaching since starting this course?
 - No.
 - Did you learn about anything in the course that you already knew?
- Were there any specific moments or topics during the course that really challenged how you think about students or teaching?

- Yes
 - Can you describe one?
- Will the coursework you completed influence your teaching in the future?
 - Yes
 - How?

Closing:

1. Watch the time and stay within the time allotted.
2. Stop the recorder.
3. Thank the participant for their time.

Appendix C - Reflective Journal Prompts

Reflective Journal Prompts:

Course Work:

Module 1: The Basics of Trauma (ACES – Prevalence, Statistics, Definition)

Focus:

- Understanding the prevalence and impact of trauma on students.
- Initial self-examination and disorienting dilemmas.

Journal Prompts:

1. Did anything surprise you when we looked at the statistics about trauma and adverse childhood experiences among students? Have these statistics changed your perception of what your future classroom might look like? If so, how? (TLT Phase 1: Disorienting Dilemma; RQ1)
2. Reflect on your understanding of trauma and its potential impact on student behavior and learning. Reflect on your current knowledge of how trauma can impact students' behavior and learning. What do you feel is the impact of trauma in your future classroom? (TLT Phase 2: Self-Examination; RQ1)
3. Think about a specific student profile or scenario discussed in this module. How might you begin to approach supporting this student in your classroom? (TLT Phase 5: Exploration; RQ1)

Module 2: What Trauma Looks Like in the Classroom (Learning and Behaviors)

Focus:

- Identifying how trauma manifests in behaviors and learning challenges.
- Building awareness and critically assessing assumptions about student behavior.

Journal Prompts:

1. Reflect on a behavior or learning challenge commonly associated with trauma that was discussed in this module. Has your understanding of such behaviors changed? If so, how? (TLT Phase 3: Critical Assessment; RQ2)
2. What changes might you need to make in your teaching practices to address trauma-related behaviors? (TLT Phase 5: Exploration; RQ1 & RQ2)
3. In this module, you learned strategies for recognizing and addressing trauma-related behaviors. List the strategies you learned, then explain which strategies you feel the most confident about and why. (TLT Phase 7: Acquisition of Knowledge; RQ1 & RQ2)

Module 3: Trauma and the Brain (Changes, Neuroplasticity)

Focus:

- Understanding the physiological and neurological impacts of trauma.
- Building foundational knowledge for applied educational neuroscience.

Journal Prompts:

1. Reflect on what you learned about neuroplasticity and how trauma changes the brain.
Does this influence how you view student potential? If so, how? How would you engage and motivate them due to the changes in the brain? (TLT Phase 7: Acquisition of Knowledge; RQ1)
2. Would understanding trauma's effects on the brain help you respond to students' emotional and behavioral needs in the classroom? If so, how? (TLT Phase 5: Exploration; RQ2)
3. Do you anticipate any challenges in applying this knowledge to your teaching? If so, what are they? How might you address them? (TLT Phase 6: Planning of Action; RQ1 & RQ2)

Module 4: Applied Educational Neuroscience (Four Pillars)

Focus:

- Exploring the four pillars (educator brain/body state, co-regulation, touchpoints, neuroanatomy).
- Practicing intentional regulation and interaction strategies.

Journal Prompts:

1. Pillar 1 (Educator Brain and Body State): What is emotional regulation? How might it affect a teacher's ability to support students and manage a classroom effectively? (TLT Phase 2: Self-Examination; RQ1)

2. Pillar 2 (Co-Regulation): What is co-regulation? How might a teacher use co-regulation to help a student regulate their emotions? (TLT Phase 8: Provisional Trying of Roles; RQ1 & RQ2)
3. Pillar 3 (Touchpoints): What are touchpoints? Would they help a teacher to establish a positive, structured classroom environment? If so, how? (TLT Phase 5: Exploration; RQ2)
4. Pillar 4 (Neuroanatomy): What brain and body states could help students to better understand and manage their emotions? Explain. (TLT Phase 6: Planning of Action; RQ3)

Module 5: Trauma-Informed Strategies & Classroom Management

Focus:

- Developing specific trauma-informed teaching strategies and classroom management approaches.

Journal Prompts:

1. List trauma-informed strategies you learned in this module. Which strategies, if any, would you incorporate into your teaching to create a positive, structured classroom environment? Explain. (TLT Phase 6: Planning of Action; RQ2)
2. Do you anticipate any challenges in managing a classroom with trauma-impacted students? Why or why not? If you anticipate challenges, how would you address them? (TLT Phase 5: Exploration; RQ2)

3. What is your understanding of “disruptive behavior?” Has it evolved? Will your understanding of this idea change the way you approach classroom management? If so, how? (TLT Phase 3: Critical Assessment; RQ2)

Module 6: Trauma-Informed Strategies & Classroom Engagement

Focus:

- Supporting academic and emotional resilience in trauma-impacted students.
- Reintegration of new knowledge and reflection on transformative growth.

Journal Prompts:

1. What are some strategies for building emotional resilience in students? Do any of these strategies resonate with you? Which of these strategies, if any, might you apply in your teaching? (TLT Phase 6: Planning of Action; RQ3)
2. Throughout this course, have any of your beliefs or assumptions about teaching changed? If so, what has changed the most significantly? (TLT Phase 10: Reintegration; RQ1 & RQ2)
3. Do you feel that any of the strategies or concepts you’ve learned in this course will have an impact on your ability to engage and motivate students? If so, which concepts or strategies do you feel will have the most significant impact? Why? (TLT Phase 9: Building Competence and Confidence; RQ3)

Micro-Teaching Journal Prompts

Preparation and Planning

- How did you prepare for this lesson? Did any strategies from the course influence your planning? If so, which ones? (TLT Phase 6: Planning of Action; RQ1 & RQ2)
- Did you consider any specific strategies to create a positive, structured classroom environment during your planning? If so, what were they? (TLT Phase 6: Planning of Action; RQ2)

Execution and Reflection on Classroom Environment

- How did you create a positive and structured environment during your lesson? Were there specific routines, rules, or strategies that helped? (TLT Phase 8: Provisional Trying of Roles; RQ2)
- Did you feel regulated in your brain and body state (Pillar One) before and during the lesson? If not, what factors affected your regulation? (TLT Phase 2: Self-Examination; RQ1)
- Did you need to co-regulate with any students during the lesson (Pillar Two)? If so, what strategies did you use? How effective were they, and what might you adjust next time? (TLT Phase 8: Provisional Trying of Roles; RQ1 & RQ2)

Reflection on Engagement and Motivation

- What strategies, if any, did you use to keep students engaged and motivated during this lesson?
 - Were these strategies effective for all students?
 - Did you need to adjust your approach for any students? If so, what changes did you make? (TLT Phase 5: Exploration; RQ3)

- Did you notice any students who seemed disengaged or struggled to participate? If so, how did you respond? Would you do anything differently in the future? Explain (TLT Phase 3: Critical Assessment; RQ3)

Application of Pillars

- Did you create intentional connections (touchpoints, Pillar Three) with students before beginning your instruction? If so, did these connections affect their engagement and behavior? How? (TLT Phase 8: Provisional Trying of Roles; RQ3)

Overall Reflection

- Were there any moments in this lesson when you applied a trauma-informed strategy? If so, what was the outcome? (TLT Phase 9: Building Competence and Confidence; RQ1 & RQ3)
- Reflect on teaching the lesson. What are your takeaways about managing the classroom environment or engaging students? Will this experience influence your future teaching? If so, how?

Appendix D - Scenario Analyses

Scenario Analyses for Dissertation: Transformative Learning in TIP and AEN

Case Scenario: Monday Morning in the Fourth-Grade Classroom

It is 7:45 a.m. on a cloudy Monday morning at Lincoln Elementary School, a Title I school serving a diverse student population, many of whom experience high levels of adversity outside the classroom. You, as a preservice teacher, are entering your second month of teaching in your Block One placement. This morning, you have prepared a day packed with engaging activities: a math lesson using manipulatives, an interactive social studies project, and an art-based exploration of ecosystems for your science block. However, as the students arrive, you quickly realize that the day is not going to unfold as planned.

At 7:50 a.m., Sam arrives early, escorted by the school counselor. The counselor informs you that Sam, a student who has been in and out of foster care, had a tough weekend. He was moved to a new foster home and hasn't eaten since Saturday. He refuses to make eye contact and isolates himself in a corner of the classroom, gripping his backpack tightly.

At 8:00 a.m., another student, Maya, rushes into the room visibly upset. Maya's family recently experienced a house fire, forcing them to move into temporary housing. She struggles to concentrate and is hypervigilant, reacting strongly to sudden noises in the classroom. You also notice that she refuses to sit near the door and asks to keep her backpack next to her at all times.

Shortly afterward, you hear a commotion by the cubbies. Malik, a typically well-behaved student, accuses his classmate Alex of stealing his snack. Malik's voice escalates as he shouts,

“You’re always trying to take what’s mine!” Alex, whose father has been incarcerated since he was a toddler, yells back, “You don’t even need it!” The verbal altercation quickly spirals into Malik shoving Alex, prompting tears and chaos among the surrounding students.

Amid this, you notice Ella sitting quietly at her desk with her head down. Ella has a history of selective mutism and rarely participates in classroom activities. Today, however, she is uncharacteristically fidgety, biting her nails and avoiding your attempts to connect. As you approach her desk, she whispers, “My dad didn’t come home this weekend. He promised he would come back, but he didn’t.”

By 8:15 a.m., the bell rings, signaling the start of the school day. You now have 28 students seated in front of you, each with their own unique needs, challenges, and histories. As the class begins, you notice Jonathan, whose mother recently fled an abusive relationship, looking distracted and repeatedly tapping his pencil against the desk. Meanwhile, Mary, a student who recently lost her grandfather, is visibly upset when her classmates begin sharing their weekend adventures during the morning circle. She bursts out, “Why do you all get to have fun while my life is terrible?”

You feel your stress levels rising as you try to manage your students' emotional needs while maintaining the classroom structure. The interactive math lesson you planned feels almost impossible to implement amidst the palpable tension. You wonder how to balance meeting your students' needs while delivering the curriculum.

Pre-Case Study Questions

1. What strategies could you use to identify and address the immediate emotional and behavioral needs of students like James, Emily, Liam, and Olivia? (RQ 1&2; TLT 3&5; AEN Pillar 2 & 3)
2. How would you maintain your sense of calm and focus when the classroom environment becomes emotionally charged? (RQ 1&2; TLT 2&9; AEN Pillar)
3. What adjustments would you consider making to your planned activities to support the classroom dynamics in this situation? (RQ 1&2; TLT 6&8; AEN 4)
4. How might small, intentional interactions—such as greetings, acknowledgments, or affirmations—help individual students re-engage with classroom activities? (RQ 2&3; TLT 5&8; AEN 3)
5. What role do you see emotional regulation play for yourself and your students during challenging moments? (RQ 2&3; TLT 2&9; AEN 1&2)

Post-Case Study for Dissertation: Transformative Learning in TIP and AEN

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You feel your stress levels rising as you try to manage your students' emotional needs while maintaining the classroom structure. The interactive math lesson you planned feels almost impossible to implement amidst the palpable tension. You wonder how to balance meeting your students' needs while delivering the curriculum.

Post-Scenario Case Study Questions

1. What strategies did you use to identify and address the immediate emotional and behavioral needs of students like James, Emily, Liam, and Olivia? (RQ 1&2; TLT 3&5; AEN Pillar 2 & 3)
2. How did you maintain your sense of calm and focus when the classroom environment became emotionally charged? (RQ 1&2; TLT 2&9; AEN Pillar)
3. What adjustments did you make to your planned activities to support the classroom dynamics in this situation? (RQ 1&2; TLT 6&8; AEN 4)
4. How did small, intentional interactions—such as greetings, acknowledgments, or affirmations—help individual students re-engage with classroom activities? (RQ 2&3; TLT 5&8; AEN 3)
5. How did emotional regulation affect you and your students during challenging moments? (RQ 2&3; TLT 2&9; AEN 1&2)

Appendix E - Trauma-Informed and Neuroscience-Aligned Classroom Lab

Purpose: Your classroom design sends messages to the nervous system long before you speak.

In this lab, you'll redesign your classroom space to create an environment that helps you and your students feel calm, safe, and ready to learn.

You'll apply what you've learned about Trauma-Informed Practices (TIP) and the Four Pillars of Applied Educational Neuroscience (AEN) to design a layout that supports co-regulation and brain-aligned learning.

Through this lab, I need you to demonstrate how theoretical knowledge of regulation, safety, and belonging translates into practical classroom arrangements and instructional decision-making.

Learning Goals

By completing this lab, you will:

- Apply AEN and TIP concepts to a real classroom design.
- Identify how space, routines, and visuals promote calm and safety.
- Plan ways to teach students about their brain states (brainstem, amygdala, prefrontal cortex).
- Reflect on how your physical environment can foster connection and regulation.

Step-by-Step Directions

Step 1 – Sketch It Out

Start with a blank classroom outline, include major features like desks or tables, a door, windows, and a whiteboard.

- Arrange the room to promote calm, connection, and movement.
- Label main areas (teaching zone, small-group space, calm corner).
- Think about how your layout influences the *energy* and *flow* of the room.

AEN Link: A calm, organized space helps you stay regulated (Pillar 1: Educator Brain & Body State). Your calm body helps students borrow your calm.

Step 2 – Add Calm & Connection Zones

Design intentional spaces that help everyone downshift and re-center.

- **Arrival Area:** a friendly greeting spot with visuals or check-in cards.
- **Reset Area:** a cozy corner with sensory tools, breathing visuals, or “feeling” cards.
- **Traffic Flow:** wide walkways and predictable paths for smooth transitions.
- **Visual Climate:** soft lighting, nature tones, and displays that show growth, not perfection.

AEN Link: These features reflect Pillars 2 & 3: Co-Regulation and TouchPoints; predictable, caring interactions that build safety through repetition.

Step 3 – Design for Brain-State Awareness

Teach students about their three brain regions and how they affect learning:

- Brainstem – “Survival brain” (fight, flight, freeze).
- Amygdala – “Emotion brain” (alarm system).
- Prefrontal Cortex – “Thinking brain” (focus, decision-making).

Add visuals and routines that help students recognize where they are and what helps them return to their thinking brain:

- Post a “Which brain are you in?” chart with strategies.
- Label your Reset Area with language like “Tools to get back to my upstairs brain.”
- Model self-talk: “My amygdala feels loud right now, I’m going to breathe.”

AEN Link: This connects to Pillar 4: Teaching Neuroanatomy, helping students understand that their brains build regulation, empathy, and agency.

Step 4 – Reflect & Explain

After finishing your design, answer these prompts in 1–2 paragraphs or a short video reflection:

1. How does your layout communicate safety and predictability?
2. Where do students experience choice, connection, and belonging?
3. How can your design help students recognize and move between the brainstem, amygdala, and prefrontal cortex?
4. How does your blueprint represent what you’ve learned about the brain, trauma, and relationships?

What I’m Looking For

Focus Area	What It Looks Like	Alignment
Application of Theory	Evidence that AEN/TIP ideas shaped your design choices.	• Transformative Learning Theory = Perspective Shift

Co-Regulation Features	Zones, visuals, and routines that promote calm and relational safety.	• AEN Pillars 2 & 3
Brain-State Integration	Visuals or routines that help students name and regulate brain states.	• AEN Pillar 4
Reflection & Insight	Intentional explanation showing how design supports regulation.	• Transformative Learning Theory = Critical Reflection

Appendix F - Upstairs/Downstairs Brain Project

Teach the “Upstairs / Downstairs Brain”

(Aligned to Dissertation RQ1: How AEN/TIP shapes preservice teachers’ instructional practice)

Purpose: You’re about to design a tiny lesson that shows how relationships and regulation are the doorway to learning. In my dissertation (RQ1), I explore how preservice teachers translate Applied Educational Neuroscience (AEN) into actual teaching moves. This assignment invites you to do exactly that: teach the brain to help students use the brain.

Why these matters

- When students understand their brain states, they can name feelings, ask for help, and choose strategies that bring them back to learning.
- Trauma-informed classrooms don’t shame behavior; they explain it and support it.
- Your calm, predictable teaching is the first co-regulation strategy many students experience at school.

Your Task

Create a 10–12-minute, student-facing activity that teaches the “Upstairs / Downstairs Brain”

(Dan Siegel’s model) to the grade level of your choice. Your activity must:

1. Use **kid-friendly language** to explain upstairs (thinking) vs. downstairs (survival) brain.
2. Include at least **two regulation strategies** students can try immediately.
3. Model **co-regulation** (how a caring adult “lends calm”).

End with a **brief reflection or exit ticket** that students can do in 1–2 minutes.

Step-by-Step Directions

1) Plan

- Choose a **grade band** (K–2, 3–5, 6–8, 9–12).
- Decide your **format** (mini-lesson with demo, station activity, story + hand model, quick game, or art-based).
- Write your **kid-friendly script** for these three beats:
 - *“Sometimes our downstairs brain (alarm) takes over.”*
 - *“Our upstairs brain helps us think, plan, and be kind.”*
 - *“We can climb back upstairs with tools.”*

2) Teach the Model

- Use the **hand model** or a simple **two-story house** visual.
- Give **2–3 everyday examples** (recess conflict, hard math problem, test jitters) and ask:
 - “Is this an **upstairs** moment or a **downstairs** moment? How can we tell?”

3) Try the Tools (3–4 minutes)

- Let students **practice regulation** right away: pick any two:
 - **Breathe** (smell the flower, blow the pinwheel)
 - **Move** (push wall, cross-body taps)
 - **Ground** (5–4–3–2–1 senses)
 - **Connect** (peer high-five + “You’ve got this,” teacher co-regulation script)
- Use **trauma-sensitive language** (“Let’s try...”, “You may choose...”, “Notice what helps your body.”)

4) Make it Stick (2 minutes)

- Students create a **micro-artifact** to take or post:

- K–2: color a **brain house**; circle a favorite tool
- 3–5: **strategy bookmark** (two tools + when to use)
- 6–12: **wallet card** or **locker sticker** with a personal plan
- **Exit ticket** (one prompt):
 - “When I feel ____, I will try ____ to help my brain climb upstairs.”

Guardrails (Trauma-Informed Non-Negotiables)

- **No shaming** language (replace “bad choices” with “downstairs brain moments”).
- **Opt-in** participation; offer quiet alternatives.
- **Model repair**: “If I get dysregulated, I’ll pause and try again—that’s how brains learn.”

Turn in the Following:

- One-page lesson plan (goal, script bullets, materials, timing).
- Student artifact (template/bookmark/card you created).
- Teacher cue card (your 3–5 sentence regulation script).
- Reflection (your thoughts on implementing this in your FUTURE instruction)

Appendix G - Paper Tigers & The Brain Architecture Game

Paper Tigers & The Brain Architecture Experience

Connecting Relationships, Regulation, and Resilience

Purpose: In Paper Tigers, Principal Jim Sporleder transforms his school by shifting from “What’s wrong with you?” to “What happened to you?” This shift embodies the heart of Trauma-Informed Practices (TIP) and Applied Educational Neuroscience (AEN). This activity helps you experience, literally, how the brain is built through relationships, safety, and connection. You’ll build a physical model of the brain and reflect on how early experiences, stress, and support shape learning and behavior.

How to Play

Team Setup (3 per team):

- One person = Builder
- One person = Card Reader
- One person = Timekeeper & Note Taker

Step 1 – Build the Brain

Use pipe cleaners, straws, and connectors to create your “brain” structure.

- Early rounds = early childhood.
- Strong, supportive experiences = stable foundations.
- Adverse or unpredictable experiences = weaker or rushed construction.

Step 2 – Draw Experience Cards

Each round represents a life stage. Draw one card to determine what happens next:

- **Positive Experience:** add strong supports or extra connectors.
- **Adverse Experience (ACE):** remove or weaken parts of the structure.
- **Buffering Experience:** add one stabilizer (representing a caring adult or co-regulation moment).

Step 3 – Feel the Pressure

Some cards limit time or materials, simulating toxic stress and activating the brain’s survival responses (the brainstem and amygdala).

Step 4 – Watch the Brain Evolve

Over time, observe whether your structure stands tall or begins to wobble.

Notice when support and relationships make the brain more resilient.

Step 5 – Reflect

After the final round, compare your model to the stories in *Paper Tigers*. Discuss how connection and co-regulation influence development and learning readiness.

Reflection Prompts

1. Which experiences in the game most affected your brain's structure?
2. How did stress or adversity influence your group's ability to build or stay focused?
3. When did "buffering relationships" (supportive people) make a difference?
4. What parallels can you draw between this simulation, *Paper Tigers*, and what you've learned about the **brainstem, amygdala, and prefrontal cortex**?
5. How might a trauma-informed, co-regulating classroom environment (like your Calm Classroom Blueprint) help rebuild safety and stability for students whose "brains" have experienced strain?

Final Takeaway

Just as you built (or rebuilt) a brain with care, you will soon build learning environments that do the same. Every calm space, routine, and connection you design is a message to your students' nervous systems:

"You are safe. You belong. Your brain can learn here."

