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When Trauma Disrupts Learning: A Neuroeducation-Informed Professional Learning Experience

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Professional Learning Experience

by

Cara Megan Wright

A dissertation submitted in partial fulfillment of the requirements for the degree of

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in
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When Trauma Disrupts Learning:
A Neuroeducation Informed Professional Learning Experience

by

Cara Megan Wright

This dissertation is completed as a partial requirement for the Doctor of Education (EdD) degree at the University of Portland in Portland, Oregon.

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Abstract

This action research study analyzed the creation and implementation of a professional development about trauma, informed by Arwood's Neuro-semantic Language Learning Theory and Noddings' ethic of care. The purpose of this study was two-fold. The first was to create a professional learning experience for teachers on trauma to include perspectives from neuroscience, psychology, and language research. The second purpose was to determine if participation in that professional learning experience shifted educators' beliefs about trauma and learning.

I completed two cycles of action research to address each purpose. In the first cycle, I collected qualitative data from five expert panelists' evaluations on content and process of the professional development presentation. Findings from this cycle indicated that expert panelists from the fields of neuroeducation, trauma, and professional development saw this experience as effective. Using content analysis, I determined changes the expert panelists recommended making to refine the presentation.

In the second action research cycle, I refined the professional development and implemented it with 13 participants (6 preservice and 7 inservice educators) over three one-time sessions. Data came from participants' responses on a needs assessment, case studies, a belief survey, transcribed audio recordings, silent conversations, reflective journals, an evaluation of the experience, and a follow-up survey. Data were analyzed

using values, attribute, and magnitude coding to determine categories associated with research questions. Though participants' beliefs did not change, educators' attitudes about students with trauma extended to include content information from a neuroeducation lens. Second, at the beginning of the study, most participants had incomplete understandings of the learning process that expanded over the course of the study through the introduction of neuroscience, psychology, and language concepts. Lastly, the participants found the professional development experience met their goals. This study begins to bridge a gap in the burgeoning neuroeducation literature. It also contributes to a new line of work examining professional development as a way to teach educators how to care for students with trauma in the classroom.

Key words: neuroeducation, neuroscience, psychology, language, trauma, learning, education, children, adolescents, professional development, professional learning experience, trauma-informed care, adverse childhood experiences

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Dedication

For my mother Pearl

Table of Contents

List of Tables

List of Figures

Chapter 1: Significance

In the ten years I served as a counselor, parents and educators asked me about students' responses to stressful events, particularly trauma. These adults wondered what was happening to these students that led them to act out in the classroom or could be not able to complete assignments or follow directions. Frequently, adults labeled students with trauma as having psychological issues; therefore, these students' issues were the responsibility of the school counselors or school psychologist. Students would spend hours in my office because it was quiet and undemanding, but that meant they were not in the classroom accessing content. There were few options for supporting these students; far too frequently, the main option was a referral for special education services because an individual was not making adequate academic progress. One teacher asked me to "fix" a student who was off-task and not producing work in the classroom. While I do not see students as broken objects, these concerns about students enduring exceptional circumstances was the impetus for continuing my own education in a doctoral program focused on how learning occurs. I believed they had to be experiencing trauma that was fundamentally altering something within students for them to change behaviors or need such substantial adult support. Specifically, I wanted to know the science behind the learning process to add to my psychological understandings that I drew upon in my school counseling. Though this need to understand the impact of trauma began as a personal learning goal, it evolved into a strong desire to support students by educating the adults in their lives about the learning process and how trauma affects it. Several questions focused my research exploration: Why can a student struggle academically and socially in school when a

traumatic event happens at home? What do educators need to know about trauma and learning in order to support a student with trauma in the classroom? Why should we study educators' understanding of the impact trauma has on students' learning? Through initial readings in the areas of neuroscience, cognitive psychology, trauma, and adult learning, it was clear that expanding research on trauma could contribute to teachers' resources.

Several factors about trauma increase the complexity of the daily challenges faced by teachers, so I argue four major topics must be addressed to improve practice and care for this population of students,

- The need to learn background information of trauma;

- The current approaches to integrating information about trauma and the learning process in teacher preparation programs;

- The needs of adult learners to improve professional practice to address the needs of students with trauma;

- And the importance of understanding the neuronal and cognitive learning process to better understand the effect of trauma on student learning.

These potential domains are not integrated into present teacher preparation programs (Cohen, 2013; Green-Derry, 2014). To address the need for trauma-focused resources for educators, I used the lens of neuroeducation, a burgeoning field that integrates neuroscience, cognitive psychology, and language into education, to create a short-term professional learning experience. To create a resource that addressed gaps in knowledge about learning and trauma, this action research study explored both my process in developing this professional development experience and documented

participants' responses to the experience, especially their beliefs about learning and trauma.

To convey the significance of this issue, this chapter will highlight the lack of teacher preparation to address the needs of students with trauma, the prevalence of trauma to show the likelihood of teachers interacting with students who have trauma, and the impact trauma has on the learning process. The end of the chapter provides a summary of future chapters covering literature review, methodology, results, and discussion.

Teacher Preparation for Responding to Students with Trauma

Teacher preparation programs are dissimilar to those programs for training school counselors (Council for Accreditation of Counseling and Related Educational Programs, 2015), school psychologists (National Association of School Psychologists, 2015), and school nurses (Ondeck, Combe, Feeser, & King, 2014) in that these professions include in their preparation standards specific language around understanding development in light of their roles in crises, such as trauma. Teachers take human development courses in preservice training but may not have the opportunity to effectively incorporate that information into daily teaching practice, creating a gap in understanding and utilizing the information adequately (Snyder & Lit, 2010). General knowledge of human development is insufficient to prepare teachers about trauma specifically, which is particularly salient for teachers because educators are the largest source of child abuse reports compared to all other groups of people (Crozier & Barth, 2005; Department of Health and Human Service, 2017). In 2013, around 60% of reports of alleged child abuse or neglect were made by

mandatory reporters; of those reports, the most were made by education personnel at 18.4%, amounting to over 334,000 cases (Child Welfare Information Gateway, 2015; Department of Health and Human Service, 2017). Those were the reported cases, but I argue this could be an underrepresentation if educators were aware of the full range of indicators of students' responses to trauma. Presenting with physical symptoms, like bruises, is obvious, but internal responses, such as anxiety, are not as attributable to abuse.

In addition to the need for teachers to be well-informed in order to serve effectively as a primary source for reporting maltreatment, the importance of understanding the influence of trauma on student academic learning and social interactions is especially relevant for educators because they interact with students for a significant portion of the day (Child Welfare Information Gateway, 2015). Classroom staff and teachers are increasingly aware of the ubiquitous role that trauma and chronic stress play in children's learning and development but feel uncertain about how to provide optimal support and struggle with distinguishing their role in the healing process (Alisic, 2012). After all, these educators were prepared to teach content, not trained in mental health services as counselors and psychologists were. What can teachers do in the classroom to assist students so they can resume academic learning and get along with peers? To respond more effectively to students, educators could benefit by first understanding how learning occurs in the brain (Carrasco, Serrano, García, 2015; Sousa, 2011) and then apply this knowledge to meet students' needs of relationships, autonomy, competence, and relevance (Acevedo & Hernandez-Wolfe, 2014; Pianta, Hitz, & West, 2010).

I chose a neuroeducation-informed andragogical approach to deliver information about learning and trauma to educators. Adult learners have unique learning capacities different from students but the same desire for information to be engaging and applicable to meet their needs (Knowles, 1990). Neuroeducation is a triangulation of research from the fields of neuroscience, cognitive psychology, and language as they inform education. As such, neuroeducation is an appropriate approach to infuse into teacher preparation programs and professional development for inservice teachers because it provides the multifaceted approach to development and learning essential for understanding the complex phenomena of trauma. Teachers and administrators need access to the scientifically research-based knowledge of development to optimize students' ability to engage with and learn from the curriculum (NICHD, 2007). A short-term professional development created for inservice and preservice educators can deepen content knowledge and skills through evidence-based research to prepare them to create safe and supportive learning environments in which foster positive and lasting change in students' learning (Hirsh, 2006). This study, therefore, aims to bridge educators' understanding about the learning process and the impact of trauma through a professional learning experience using evidence-based research of adult learning and professional development to meet the needs of the participating educators.

Prevalence of Trauma

One of the first elements that educators need to be aware of is trauma is pervasive in society, directly and indirectly impacting youth in holistic ways. Educators should be aware of the prevalence and influence of trauma on their students

because these children and adolescents are in every classroom; trauma exists

regardless of gender, socioeconomic status, or ethnicity. Usually students are tagged

for the supports they need, such as special education, 504, English language learners,

occupational or speech therapy, but a strong argument could be made for there to be a

unique status labeled *trauma* because of the number of students who have been

documented to have been experiencing adverse events. Trauma Informed Oregon

defines trauma as "a physical injury or an emotional state of profound and prolonged

distress in response to an overwhelmingly terrifying or unstable experience" (2015,

para. 1). Many statistics demonstrate the degree and variability of the impact of

traumatic events. To give some perspective on the numbers, children ages 0-17 made

up 23%, or 73.6 million, of Americans in both 2013 and 2014 (Federal Interagency

Forum on Child and Family Statistics, 2015). In 2013, 9.8 of every 1,000 children

ages 0-17 were estimated to experience abuse or neglect (Federal Interagency Forum

on Child and Family Statistics, 2015); that equates to over 7.2 million children

nationwide. In the same year, over 2.2 million men and women divorced and 1.5

million lost spouses (US Census Bureau, 2013) affecting students within those

families, though the exact number of children involved is unknown (Comfort Zone

Camp, 2010). Further, one in five students under the age of 18 endure chronic illness

at some point in their school career that significantly interferes with their capacities for

studies and socialization (Canter & Roberts, 2012; Sexson & Madan-Swain, 1995). In

2014, 5% of adults ages 26-44, the typical age range of parents of children, had a

serious mental illness (SAMHA, 2014). Homeless families including at least one child

numbered over 15,000 at one point in 2014; at that same time over 6,000

unaccompanied children under age 18 were homeless (US Department of Housing and Urban Development, 2014). Those experiencing one or more of these adverse events endure over time a range of deleterious consequences from trauma; negative effects increase exponentially as the number of adverse experiences accumulates (Dong et al., 2004).

According to the Children's Bureau, there is a variety of outcomes dependent on a combination of factors:

- The child's age and developmental status when the abuse or neglect occurred

- The type of maltreatment (physical abuse, neglect, sexual abuse, etc.)

- The frequency, duration, and severity of the maltreatment

- The relationship between the child and the perpetrator. (2013, p.3)

Adverse childhood experiences significantly affect student achievement outcomes and lifelong health problems (Felitti et al., 1998). The Adverse Childhood Experiences (ACE) study linked stress from childhood trauma and adult psychological and behavioral outcomes (Centers for Disease Control and Prevention [CDC], 2016). This retrospective study by the CDC and Kaiser Permanente healthcare compared patients' medical statuses with their histories of 10 types of trauma in the three areas of abuse, neglect, and household dysfunction. Findings included 24% of the 9,508 questionnaire respondents experienced household substance use, over 20% had parents who separated or divorced, and 15% had household mental illness. Approximately two-thirds of participants had a least one childhood ACE, which exponentially increased their chances of developing adulthood physical and mental health issues such as depression, obesity, diabetes, and cardiac disease (Trauma Informed Oregon, 2015).

This literature demonstrates the broad spectrum of types of trauma and their prevalence in the K-12 population. Educators should also understand how the stress of trauma interferes with their students' learning processes in terms of neuroscience, cognitive psychology, and language to set accurate and conceivable academic and behavioral expectations.

Impact of Trauma on the Learning Process

As stated earlier, teachers may receive a course on human development in their preparation programs, but to what level of detail, if at all, did that class include relevant research from neuroscience, cognitive psychology, and language as they inform education? Were teachers informed about the ill effects of trauma on the development of learning? What do teachers need to know to be prepared for this population of students that might require extra attention in the classroom? These are important questions to answer in order for me to support teachers as they care for students. Students who have at least one adverse childhood experience (ACE) could be less available to learn in school (Crozier & Barth, 2005; Child Welfare Information Gateway, 2015), which directly influences teachers' use of time and resources in the classroom. In the classroom, teachers may witness students' responses to trauma covering a broad range of behaviors, from negative self-isolation and disengagement to aggressive and risky behaviors, that lead to a breakdown in academic achievement and social interactions (Child Welfare Information Gateway, 2013; Leiter, 2007). Being familiar with typical development and the consequences of trauma on children's academic and social-emotional learning could help increase (a) teachers' use of the limited time they have with students, and (b) teachers' comfort level addressing

students' needs in the classroom instead of sending them to the office. In a search of frequently purchased human development college textbooks (e.g. Crandell, Crandell, & Vander Zanden, 2011; Feldman, 2016; Kail & Cavanaugh, 2016; Sigelman & Rider, 2014), content covers cognitive, physical, and social-emotional development throughout life stages but makes no mention of trauma. Consequently, unless the teacher preparation instructor independently adds trauma into the conversation, teacher candidates do not receive that information in their coursework.

Teachers who know biological and cognitive developmental domains can match students' strengths, interests, and needs with learning goals (The National Institute for Child Health and Human Development [NICHD], 2007). Knowing their students well enables them to spot when progress slows and then provides an avenue to give necessary support (Pianta et al., 2010). Current research points to the fact that aspects of development—neural, cognitive, social, psychological, physical, and ethical—have far reaching effects on children's ability to learn (e.g. South, Haynie, & Bose, 2007; Thornberry, Ireland, & Smith, 2001; Thompson & Whimper, 2010; van der Kolk, 2003). The inter-related domains of physical, cognitive, linguistic, social, psychological, and ethical do not develop at the same rate for all children (NICHD, 2007). Kolb (1984) and Synder and Lit (2010) discussed the importance of considering development within individuals' contexts to determine measurable change in their development. More specifically, Thompson and Whimper (2010) noted how important it is to take into account contexts of school and home environments in order to understand the outcomes of maltreated children. Influencing environmental stimuli that impair cognitive function epigenetically include alcohol/drugs in utero and in the

home; parental cognitive functioning, such as hyperactivity, can be inherited and affect parenting skills; and dysfunction through inadequate neural development due to violence and poverty, such as lack of nutrition and stimulation (Crozier & Barth, 2005). Experiencing toxic stress from strong, frequent, and prolonged activation of the body's stress response system due to trauma negatively alters development. In turn, there can be adverse consequences to learning and behavioral, social, and emotional functioning (Child Welfare Information Gateway, 2015). Trauma may significantly affect children's neurological (Tyrka, Burgers, Philip, Price, & Carpenter, 2013), psychological (ACE Interface, 2014), and language processes (Arwood, 2011; Luke, 2016), though some children are able to adapt to adverse situations without experiencing trauma (Condly, 2006). Structural changes in brain development can trigger mental and physical health concerns resulting in negative behavioral responses (e.g. executive functioning, anxiety, depression, attendance issues, drug use, acting out, self-harm, insufficient sleep) (Luke, 2016; Mitchell, 2014). Students' physical responses to stress caused by trauma can appreciably reduce their academic achievement and social-emotional responses. Educators should be equipped to address those behaviors in the classroom in order to provide appropriate supports.

Statement of the Problem

The field of cognitive psychology contributes significantly to the way in which educators teach and understand students, such as work by Piaget, Vygotsky, and Kolb. However, there is little evidence to suggest that the results of neuroscience studies on brain development and learning affected by trauma are informing educators' practice and roles in caring for their students experiencing trauma (Alisic, 2012; Alisic, Bus,

Dulack, Pennings, & Splinter, 2012). As those on the frontline working with children who are maltreated, educators should be aware of what detrimental factors exist in children's lives because of the impact on children's education (Crozier & Barth, 2005) and the impact their support makes on the engagement of students in school (Leiter, 2007). The burgeoning field of neuroeducation can raise educators' awareness of students' learning as impacted by trauma by providing the context of the learning process and stress response.

Purpose of the Research

This action research study has two aims. The first part speaks to the creation and refinement of a professional development workshop through the feedback of an expert panel. The second examines the participants' experience in the professional development experience to document how participation influences educators' content knowledge and beliefs about student learning and the ways trauma affects academic and social-emotional development.

The two parts of the study are guided by four research questions.

(a) When invited to review the content and process of a neuroeducation-informed professional learning experience on trauma, what input did experts provide in the fields of neuroeducation, trauma, and professional development?

(b) How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?

(c) How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?

(d) In what ways, if any, do educators report that a professional development

address their needs as they care for students experiencing trauma?

Key Definitions

There are key definitions that will be used throughout the study. I operationalized

them as:

Trauma. Trauma Informed Oregon (2015) defines trauma as "a physical

injury or an emotional state of profound and prolonged distress in response to an

overwhelmingly terrifying or unstable experience" (p. 7). Similarly, in the Diagnostic

Statistical Manual IV-TR, the opening criteria for the diagnosis posttraumatic stress

disorder regards a person exposed to a traumatic event:

 (1) The person experienced, witnessed, or was confronted with an event or

events that involved actual or threatened death or serious injury, or a threat to

the physical integrity of self or others.

(2) The person's response involved intense fear, helplessness, or horror. Note:

In children, this may be expressed instead by disorganized or agitated

behavior. (American Psychological Association, 2000, p. 927)

Learning. Learning is "any process that in living organisms leads to

permanent capacity change and which is not solely due to biological maturation or

ageing" (Illeris, 2009, p. 7).

Professional development. Professional development deepens educators'

content knowledge and skills through evidence-based research to prepare them to

create safe and supportive learning environments in which foster positive and lasting

change in students' learning (Hirsh, 2006). In this study, I will refer to it often as

professional learning experience to highlight participants' active engagement with the material. As well, my professional development is short-term, not embedded in daily practice, to shift attitude and expand content knowledge (Kalnin, Dimeo-Edigner, & Sahnow, 2015; Kalnin, Morrell, & Sahnow, 2013).

Neuroeducation. Neuroeducation is a translational field designed to understand learning by integrating neurology, cognitive psychology, language, and education (Arwood, 2011). Neuroscience is the study of the neurological system, namely the development and functioning of the brain. Cognitive psychology describes the output processes of brain functions; language gives meaning to those process outcomes. The roles these fields play in learning will be made explicit in the literature review.

Trauma

Abuse, neglect, and household dysfunction are broad categories that encompass many forms of trauma. The range of types of trauma is enormous and, therefore, cannot be covered completely here. To narrow the focus in this research, only the most five categories will be included: household substance abuse, household mental illness, loss of parent to divorce or death, frequent moving or homelessness, and chronic illness or physical injury. Other topics that could be included are natural disasters (Jacobs & Harville, 2015), bullying (Carney, 2008), fleeing oppression or war (Fazel, Reed, Panter-Brick, & Stein, 2011), and exposure to violence in the community (Federal Interagency Forum on Child and Family Statistics, 2015). As well, factors like poverty can layer on stressful life events and deepen trauma

(McLaughlin et al., 2011). They are not being included because they were beyond the scope of this research period.

Study Scope

I focused on conducting an action research study in order to create and refine a professional learning experience for K-12 educators that drew on neuroscience, cognitive psychology, and language research to increase awareness and content knowledge of the impact of trauma on learning. There are different ways of understanding neuroeducation. Four of the five expert panelists that provided feedback on the presentation were part of a neuroeducation program developed by Dr. Ellyn Arwood at the University of Portland; the trauma expert was not associated with this program. I implemented the short-term experience with interested preservice and inservice educators and systematically examined their responses to the content presented. Thus, data and analysis are limited to changing the professional development and data created during that implementation. Study of the application of the content or strategies in classroom practice was beyond the scope of this study.

Overview

In Chapter One, I argued the need for educators to understand the prevalence and possible outcomes of various types of trauma for their students. I acknowledged educators' gap in understanding how learning occurs in the brain that would aid in their ability to identify incongruities in students possibly due to trauma. In Chapter Two, I review the literature covering trauma, learning, adult learners, and professional development. I begin with what influences how educators define their roles in school, such as preservice programs, and how they see themselves as learners in professional

development. Analyses of educators' identities and roles encompass educational effectiveness in the classroom, relationships with students, and personal growth. Professional development can be an effective method to scaffold new information on prior knowledge if it is meaningful, useful, and practical for participants. Next, I define trauma and expounds on the extent it occurs in the US. Then I explore the impact of trauma on brain development in terms of structure and function as they relate to learning. In Chapter Three, I explain the research methodology including participants, context, and analyses. Chapter Four covers the results of the study, addressing each research question in light of data collected from each phase of the study. Lastly, discussion in Chapter Five answers my questions as they influence professional practice, limitations of the study, and future research.

Chapter 2: Literature Review

The purpose of this qualitative study is two-fold. First, the purpose is to translate the literature of neuroeducation into a practical example of adult professional development. The second function is to examine how engagement in that professional learning experience aligned with neuroeducation research affects educators' content knowledge and influences beliefs about student learning and the ways trauma affects students' academic and social-emotional development.

Caring for students is at the heart of educators' work and identity (Nias, 1989; O'Connor, 2008; Pollard, 1985). Two ways to demonstrate care for students can be first to understand how the learning process occurs in the brain and second to know what happens when a traumatic event disrupts that process. Educators can acquire the knowledge about these two topics through a neuroeducation-informed professional development. To provide a foundation for the development of a professional learning experience, this literature review examines factors that would strengthen a facilitator's effectiveness when transmitting learning and trauma content. First, facilitators should consider both adult learning (Knowles, 1980; Knowles, 1990; Schön, 1987) and best practices regarding use of resources, design of the presentation, accessibility to content, and alignment with participants' needs (Cook, Tankersley, & Landrum, 2013).

This chapter covers the theoretical underpinnings and empirical evidence for the study. Due to the prevalence of trauma and its influence on learning, Noddings' (2005) ethic of care will be presented as a framework for educators to view students with trauma histories. The needs of adult learners will be explained in terms of

preservice and inservice development, notably of content knowledge, beliefs, and attitudes. Following adult learning and the role professional development comes defining trauma in terms of types and prevalence. Next, there will be a survey of the effects of trauma on children and adolescents, particularly looking at the timing, types, and indicators thereof. How trauma affects the structures and functions of the brain involved in learning will include neuroeducation in order to understand students' needs and responses to trauma. A summary of the chapter will highlight the specifics focused on in this study.

Care

I chose Noddings' ethic of care as a way to attend to students' academic and social-emotional needs. This theory addresses teachers' responses to students as individuals and teachers' beliefs about students with trauma histories. Noddings (2013) defined care as being prepared to be engrossed in another's life for whatever duration and intensity by removing one's own needs from the equation in order to further the other's goal. A caring relation is "a connection or encounter between two human beings" (Noddings, 2005, p. 15). Noddings uses the terms *one-caring* and *ones-cared for* to denote the two sides of the relationship. Specifically the connection is reflexive, meaning both the giver of care and the receiver of care engage in the meeting. The carer, or one-caring, is fully attentive toward the one-cared for and his project, forsaking her own thoughts, feelings, and needs. To complete the encounter, the ones-cared for must receive the effort and recognize the care. The length of time or number of encounters does not matter, nor are there set behaviors associated with caring. Educators are typically the one-caring and students the ones-cared for.

Noddings argues though that teachers are responsible for building up students' capacity to care, as well. Deeply caring for students means they feel they are known individuals who belong somewhere and are believed in. For this to happen, teachers must listen purposefully and without judgment. When a student experiences trauma, another layer adds to her experience in the classroom that reverberates throughout her learning and relationships. In particular, her teacher may need to be more aware and present in the student's daily life to buoy her throughout the day in her academic work and social interactions with peers.

This caring-as-relation moral education has four components: modeling, dialogue, practice, and confirmation (Noddings, 2005). Modeling is a vital component to expand students' capacity to care by increasing their experience with care and showing them how to care for others. Dialogue involves open-ended talking without expectations; "as parents and teachers, we cannot enter into dialogue with children when we know that our decision is already made" (Noddings, 2005, p. 23). This aids in the one-caring and the ones-cared for finding empathy and understanding with one another. The one-caring allows space for the ones-cared for to ask questions so that together they can make decisions. By sharing meaning through conversations, educators will be able to care for students because they will know students' needs. Practice engages students and teachers in opportunities to expand their capacities to care and attitude toward caring. As both sides of a caring relationship increase, they transform their environment. Lastly, confirmation is based on a continuous relationship, affirming the best in the other based on knowledge of their goals and attributes that the one-caring believes are worth developing.

One study in particular reflected the idea of caring-as-relationship. Valenzuela (1999) conducted a 3-year ethnographic study of large school district in Houston, TX on caring for students in the context of culture and politics ignoring students' personal cultures and languages and only acknowledging the mainstream dominant society. Valenzuela conducted interviews with students and supplemented her findings with quantitative data through record reviews, school data, and surveys. She found that teachers perceived students as not caring about school, whereas students perceived teachers as not caring for them. Valenzuela stated that "an obvious limit to caring exists when teachers ask all students to care about school while many students ask to be cared for *before* they care about" (p. 24, 1999). Referencing Nodding, Valenzuela noted that a connectedness between teachers and students develops "a sense of competence and mastery over worldly tasks" (p. 62, 1999); otherwise, teachers objectify students and so may deter students from learning necessary skills.

This objectification is created when schools enforce dominant Eurocentric, middle-class cultural belief systems via curricula (Valenzuela, 1999). School culture reflects teachers' backgrounds even if students' backgrounds are the more prevalent among the population. Bureaucratic aesthetic caring is meaningless and degrading when students' identities are denied in the process and relationships do not exist. Valenzuela found schools focused on aesthetic (superficial) caring—things and ideas—more than student learning through valuing relationships and acknowledging subjective realities. Students want authentic caring, but teachers give aesthetic caring of ideas and practices. Authentic caring looks like teachers exploring students' lives

through reciprocal dialogue to understand the complexity of their worlds (Valenzuela, 1999).

There are overt and covert ways adults demonstrate contempt for students, such as holding low expectations for student achievement based on misperception of students' lack of care about school. Students' emotional and intellectual states are not always reflected in their attire or public identity. Solidarity within a group and self-representation do not always equate to mainstream values. Consequently, behavior can be a self-fulfilling prophecy: students seem uncaring about school, so teachers scrutinize behavior. Students may then act out further to save face or feel indignant. They may feel powerless and alienated, which can present as opposition and uncaring. A deficit culture is one in which students are to blame for their underachievement although their problems are overwhelming to them and school will not address their concerns.

Teachers feel incapable of dealing with kids holistically and their barriers to learning, so teachers tend to blame students for academic deficiencies instead of shifting the school culture to meet students' needs.

> When real-life concerns are thrust into the classroom, many teachers find themselves in uncomfortable and disorienting positions. They may be called on not only to impart their expert knowledge, but also to deal with barrier to student learning of which they may not be fully aware or trained to recognize. If and when they do become aware of these contingencies, time and skill constraints remain. (Valenzuela, 1999, p. 74)

Ones-caring and ones-cared for. Though wanting to be a caring teacher is admirable, several authors commented on Noddings' care as being a weak ethic. Hoagland (1990) challenged Noddings' definition of care because the receptivity as acknowledgement of caring is insufficient for the relationship that is inherently unequal in power between teachers and students. The idea that students will reciprocate care to the teacher may be difficult since they may not know what the teachers' needs. As well, critics of Noddings' work stated that the theory ignores the larger social, political, and economic dynamics at work in people's lives by focusing on proximate relationships instead of contributing to broad changes in inequality (Hoagland, 1990; Sander-Staudt, 2011). Pettersen (2012) voiced concerns that females who empty themselves of their own goals to care for others—something females are already inclined to do—can lose themselves and reinforce gender inequality. Antrop-González and De Jesús (2006) researched caring amongst Latino youth using difference theory of care that acknowledges social, racial, class, and gender groups. They contrasted this theory with Noddings' theory of care based on White feminism and found that viewing minority students through the dominant lens can lead to pity and reduced expectations. Sitler (2008) and Noam (2013) advocated for educators to increase their awareness of students' contexts as a way to teach with care in mind. This way all students are included in getting needs met, not just those experiencing trauma. Arwood's (2011) Neuro-Semantic Language Learning Theory exemplifies this point by highlighting the uniqueness of students' brains, learning systems, and environments that influence development.

Three ways to care in the classroom. Based heavily on Noddings' work, Nias

(1999) set forward six ways care can be shown in the classroom: affectivity;

responsibility for learners; responsibility for relationships throughout the school;

altruism, self-sacrifice, and obedience; over-conscientiousness; and commitment and

identity. These ways are held in constant tension within teachers because they are not

always in accord and require a great deal of time and energy. In relation to this study,

care as affectivity, responsibility for learners, and commitment and identity speak to

the impact of trauma as it shapes teachers' roles as ones-caring (Noddings, 2013).

Care as affectivity. Care as affectivity includes connected relationships,

empathetic behavior, trust, receptivity, collaboration to promote well-being of all, and

prevention of conflict (Nias, 1999). Acevedo and Hernandez-Wolfe (2014) also found

affect regulation to be a relational activity if both teacher and student are willing to

share and hear each other's stories in an open and compassionate manner. As stated

earlier, Nodding defines a caring relationship as reciprocal, involving one offering to

be engrossed in another's goals and the other recognizing the effort. In Acevedo and

Hernandez-Wolfe's research (2014), students who mirrored their teachers' emotional

regulation were then able to model for others. The positive reinforcing cycle increased

their thresholds to handle stronger emotions and strengthened attachments. Nias noted

that deep caring for children may meet individual needs and demonstrate values "of

making children feel secure, happy, and cared for" (1999, p. 68). Therefore, even with

extra curricular and administrative duties, teachers' affection should not decrease for

both the sake of students and teachers (Nias, 1999).

In one example of affectivity, Gatti (2014) used a qualitative experiential study to explore how an efficiency framework demonstrates normative assumptions about urban kids. She communicated the experience of Genesis, one African American novice teacher in an urban area paired with experienced White teacher Emily in a low socioeconomic status school serving primarily African American students. Emily's provided compassion, giving, and understanding in classroom management to build relationships with students but did not provide intellectual challenge. Genesis, on the other hand, came from that neighborhood; she acknowledged the excuses for the bad behavior but did not accept them. Instead, Genesis taught resiliency through teaching powerful African and African American historical characters in literature. From this example, one could see how teachers and students bring personal experiences into the classroom, bringing into tension intellectual, interpersonal, and ideological frameworks. A "no excuses" frame is predicated on the idea that urban students can succeed if they comply with the rules without questioning or internalizing the information, but it strips students of agency, creativity, critical thinking, self-discipline, and decision-making. Instruction becomes skill-based instead of opportunities for learning and rejects need for the teacher-student relationship. By engaging students through relationship, teachers foster students' agency to determine what information is salient to their own learning. There is a difference between students joining teachers in the learning process and being vessels into which teachers pour facts. In the former, teachers focus on students as capable people with their own knowledge from which the teachers can learn; in the latter case, teachers center classes around themselves regardless of students' potential contributions.

Care as responsibility for learners. Caring for students is a type of personal relationship and a professional duty in which teachers are resources for students to learn and develop (Nias, 1999). Teaching is emotional because of personal connections that are expected to be part of students' learning: physical presence married with emotional control (Nias, 1996). How adults respond to students can make a difference in students' participation and achievement, potentially recreating school as a safe haven from maltreatment (Leiter, 2007). Providing positive and supportive relationships for students is critical to helping students achieve academically and develop personally (Coohey et al., 2011; Synder & Lit, 2010). Classrooms are the sites of personal and professional self-esteem because teachers invest so much of their persons: they determine the quality of learning of their subjects in their rooms (Nias, 1996). As teachers become further professionally competent the more they feel responsible to care for their students (Nias, 1999). They can attend to the students' needs, ideas, priorities, and experiences—in effect, the whole child. Teachers have accepted the overwhelming and impossible task of supporting the whole child in all subjects, in large classrooms, with various academic, behavioral, and emotional needs (Hargreaves, 1998).

Teachers feel obliged to support students' growth—physical, social, emotional, moral, and most importantly academic—but that can be at odds with a school system's requirements. Hargreaves' (1998) review of literature highlighted school reform restricting the language used around teachers' emotions towards their work. Instead of the passionate people who actively engage with their pupils and materials stimulated by extreme emotions, like excitement and frustration, they can feel subdued by

mandatory actions and initiatives. Such personal investment in their work can lead to burn out when politicians and administrators do not acknowledge the strained environment. Educational initiatives involve a change in teachers' knowledge and skill, as well as affecting peer and student relationships. However, Hargreaves (1998) found that outcomes-driven standardized education muted teachers' passionate feelings and emotional engagement. More recently, Rawolle (2013) discussed how emotions are increasingly evident in education policy as an area of reform through social contracts. Contract-like mechanisms, such as curriculum planning documents and professional standards, explicitly delineate expectations between teachers and students around informed consent, points of renegotiation, and mutual accountability. These types of contracts can lead to meeting individuals learning needs and could go as far as addressing students' emotional needs in the classroom. However, like Hargreaves (1998) found, Rawolle (2013) noted there could be conflict when classroom practice does not match with broader social contracts, such as preparing for standardized tests. Teachers can experience positive self-esteem if they feel they act consistently with beliefs and values that define their priorities and norms; they feel frustration when administrative parts of their jobs get in the way of doing the real work (Nias, 1996). Nias (1996) found most anger, hostility, and intense emotions to be aimed at those colleagues, superiors or outside policies that took teachers away from their work physically or mentally. Relationships are paramount to teachers, so loss of any relational contact due to reforms undermines their ideals and autonomy (Nias, 1996).

Hargreaves (1998) explored the emotional practice of teaching and qualities of teachers regarding their perception of and response to changes in curriculum and assessment. In particular, he compared their perceptions to prior experiences in teaching, how they dealt with change, and how these changes affected life outside of school. In his qualitative interpretive study, he interviewed 32 seventh and eighth grade teachers, each for 1-2 hours, located in four districts near Toronto, Canada. He found all teachers were committed to change in curriculum; none were suspicious or resistant. They viewed structural changes within the district as positive ways to benefit students and teachers' relationships with them. The biggest struggle was letting go of old thinking patterns, practices, and routines.

Hargreaves (1998) coded for words denoting emotions and created themes, such as caring relationships, caring environments, obstacles to caring, and changing contexts that creates a need to care. Students were repeatedly at the heart of teaching and integral to the job. For example, teachers wanted to create a safe and comfortable environment for their pupils. Teachers reported that supporting students' ranges of needs was technically and emotionally challenging work, especially if the teachers felt unprepared. They used a wide array of teaching strategies to make lessons interesting and effective for students based on students' emotional and intellectual needs. Emotions, such as humor and enjoyment, added to creativity for both students and teachers. As well, they noted that they gained personally and professionally by including other cultures and ways of thinking from students. Emotional rewards affected teaching practices involving personal interactions. The teachers focused on more than academic cognitive instruction by incorporating emotional relationships

with and connections to students to build them up to be citizens, tolerant and inclusive of others because they have developed the necessary social skills and morals, such as equity and social justice. Teachers reported that the implementation of multiple strategies induced in students feelings of happiness and sense of safety to explore and question, enabling them to achieve goals and eliminate powerlessness. Teachers found value in engaging emotionally if pedagogy developed and changed because students' outcomes improved. This particularly happened, Hargreaves found, if teachers felt free and practiced improvisation to plan and brainstorm with colleagues.

Hargreaves (1998) argued that teachers know their subject intellectually and are passionate interpersonal beings. They are intuitively aware of students' needs and care (such as defined by Noddings) in accord with personal and practical knowledge. Teaching is a form of emotional labor; and teachers' emotions are inseparable from their moral purposes and their ability to achieve those purposes. Teachers can feel shame when they feel they have failed morally or happy when they feel they have fulfilled purpose. However, they lose their sense of identity if they cannot reach goals based on purposes of schooling (Hargreaves, 1998).

Farouk (2012) discovered similar findings regarding teachers' guilt related to failed goal attainment. She conducted a phenomenological study involving the ethical care of primary students by teachers. She interviewed primary teachers to determine the discrepancy between the moral objectives in caring for students and their ability to meet those goals. Framing the study in cognitive appraisal theory, teachers evaluated their own conduct as have fallen short of internalized moral codes and standards when they acted unjustly or compromised the well being of others. The result was that

teachers experienced guilt when they perceived themselves as responsible for a negative moral outcome (e.g. making students feel upset), this finding was especially high in inner city schools. Farouk remarked that guilt demonstrates care and engagement as complete human beings but acknowledged that caring does not happen perfectly. Teachers cannot always achieve their high standards of care for their students. She found that they felt guilty when they caused pain, but did not blame themselves for acting in their roles to do what needed to be done for students' learning. For those students who experience trauma, then caring could mean accepting students' situations but not defining them by those situations. Providing information about learning and trauma could raise educators' awareness about how students present at school (e.g. passive, aggressive, preoccupied) due to their circumstances and that, at the same time, these students are more than victims. Learning standards can remain high through ongoing support of the students and can provide them with a sense of worth by working off their strengths (Sitler, 2008).

Care as commitment and identity. A debate over the sense in which teaching should be seen as a caring profession is urgently needed because the conditions under which practitioners work are at odds with both their belief in education as an interpersonal process and their willingness to take on fresh burdens (Farouk, 2012; Hargreaves, 1998; Nias, 1996; Nias, 1999). Teaching involves personal investment to the point of binding self-esteem to students' failure or success. As a result, teachers' moral and professional identities are vulnerable to being embedded in their jobs (Nias, 1996).

Teacher commitment. Nias (1999) discussed how teachers' commitment level is only a concern if it gets in the way of meeting the common goals of the community. Two consequences follow for teachers from this conflict. First, as previously discussed, there can be guilt and tension due to taking on personal relationships and additional burdens. Since a moral responsibility within the profession is wide-ranging, diffuse, lacking in definition, and its limits are left to the individual conscience—rather than arising from open discussion or negotiation—the possibilities for self-blame become endless. Second, there seems no limit to the expansion of teachers' workload and to the sense of professional inadequacy that results (Nias, 1999). Hargreaves (1994) argued that teachers' chronic sense of guilt arises from the fact that they are caught between four forces: job-intensification and increased accountability; the open-ended nature of the job; a commitment to the 'goal of care and nurturance;' and a self-imposed desire for perfectionism.

When teachers' natural desire to care is restricted by outside factors, they can harm teachers' commitment to teach. Teacher attrition in the first five years is 30-50%, especially in schools serving students of color and English language learners; Schutz and Lee (2014) argued this might be due to the high emotional load related to these populations for which teachers are unprepared. Teacher attrition can hurt students and communities, lead to loss of revenue because of costly professional development for new teachers, and slow education reforms (Schutz & Lee, 2014). O'Connor found one mean by which teachers remained committed to the profession was that "the ethical and humanistic dimensions of teachers' work frequently act as a source of intrinsic motivation for individual teachers" (2008, p. 118). She interviewed

three teachers, each twice for 1-2 hours, about how individual teachers use and manage emotions to care for and about students professionally in New South Wales, AU. Displayed emotions by interviewees varied between professional behavior and unrehearsed response based on individuals' philosophies and personal boundaries. As one participant stated, "you can't really care because your headmaster tells you to" (O'Connor, 2008, p.121). The teachers frequently mentioned that lived experiences were incongruent with policy discourse. Based on these interviews, O'Connor concluded emotions were constrained by role requirements to reach pedagogical goals, manage and maintain relationships with students in a professional manner, and maintain personal ethics. She highlighted individual identity—in which teachers reflexively and emotionally negotiate their own subjectivity—contrasted with professional roles based on a social construct of commonly held expectations.

Teacher identity. Social, cultural, and institutional expectations define teachers' roles (Gatti, 2014; O'Connor, 2008; Olsen, 2014) and specify students' learning goals (Rawolle, 2013). O'Connor (2008) found self-reflection, personal beliefs about their roles, personal values, and political interests are key pieces that form teachers' professional identities. Teachers are "both sociocultural products and free-acting agents" (Olsen, 2014, p. 81) whose roles are shaped by "social histories, cultural productions, and educational institutions" (Olsen, 2014, p. 81). For my study, understanding teachers' beliefs and values around their roles with students who have experienced trauma underlines the importance of a professional development addressing teachers' perceived roles and capacities to care for this population.

Roles are different from identities but not mutually exclusive of them (O'Connor, 2008). Teachers' identities and roles dynamically interact, so who they are shapes their teaching practices that then informs who they are (Olsen, 2014; Nias, 1996; Schutz & Lee, 2014). Biography, pre-service preparation, professional and personal goals, and perception of current work influence future career decisions (Olsen, 2014). In their review of literature focusing on teachers' emotion, emotional labor, and teacher identity, Schutz and Lee (2014) found self-knowledge and perception of the profession are key factors in teachers' actions and emotions that evolve through experiences. Similarly, Hargreaves (1998) found that personal backgrounds and experiences colored how a teacher views students' behaviors and attitudes, at times inaccurately.

O'Connor (2014) distinguished between role and identity in her study of teachers engaging reflectively in caring behavior with students. She characterized identity as internal reflexivity requiring the self to negotiate emotions catalyzed by experiences. Jenlink's work (2014) agreed with the idea that teacher identity reflects the context and choices teachers make when responding to students. While caring was not part of the job description, O'Connor (2014) established it was an integral part of their professional identity. O'Connor found that teachers considered it their moral duty to care because emotions are enmeshed with their reflective selves. Teachers use personal goals and values to primarily appraise success in the classroom, isolated from outside norms and students' goals. Negative emotions emerge if students miss the targeted goal perceived by the teacher as important (Schutz & Lee, 2014). They are successful if effective (bringing about emotions of joy, excitement, satisfaction) and

failures if not (feeling guilty, anxious, frustrated, afraid) (Nias, 1996). Autonomy and

problem efficacy are secondary appraisals, after first reflecting on outcomes, and can

also lead to positive or negative emotional episodes. "Emotional labor is the work or

effort teachers use to present various roles or identities during school related

transactions" (Schutz & Lee, 2014, p. 172) depending on the needs.

Though O'Connor (2008) found caring for students as motivation for teacher

commitment, teachers' motivation to teach can be determined through analysis of

teacher identity formation rooted in socio-historical and political contexts (Nevin,

Bradshaw, Cardelle-Elawar, & Diaz-Greenberg, 2014). For instance, Breen (2014)

noted that historically teachers transmit values of society via their jobs and their

persons, thus reinforcing the relationship between role and identity. Values translate

into roles featuring morality, *in loco parentis*, democracy, and work preparedness. The

people teachers are expected to be and who students need them to be thus can be very

different and may need to be reconciled. For instance, when mandates require teachers

to produce specific student outcomes but administrators do not acknowledge the

challenges teachers face in the classroom on a daily basis, teachers feel burnt out,

resentful, and judged. As well, teachers feel emotionally drained when they try to care

but get no response or acceptance from students (Schutz & Lee, 2014). This

knowledge of self changes from the first year of teaching onward through reflection

and new experiences. These permutations of professional self guide learning and

development to construct educational meaning. In teacher preparation programs, Olsen

(2014) recommended that teacher educators should highlight this transformation to

support novice teachers through the process. As well, teacher educators should prevent

stagnation and formation of biases through questioning and constructing new knowledge. Olsen (2014) suggested that, because reflection is individual and egocentric, outside information to challenge beliefs is not efficacious. Instead, presenters should approach teacher learners as holistic beings and agents of their own deliberate formation. In my study, taking into account teachers' agency and acknowledging how their experiences contribute to their personal beliefs and values is necessary in order to facilitate self-reflection to consider how the new information on trauma and learning fits or contradicts with their identities as teachers.

Giroux (1988) discussed critical pedagogy as a cultural practice engaging in personal assumptions, beliefs, and predispositions influenced by the environment.

However, as the recognition of identities has become more authentic and realistic, there is a need for a new epistemology of identity because the former, positivist notions of identity called for rational ordering and patterning. Rational ordering and patterning fit the socially constructed segregated norms the school systems established. These rational orders and patterns do not accommodate the diversity of identities for those who possess seemingly contradictory identities under the previous 'homogenized' and 'normalized' paradigms. (Breen, 2014, p. 29)

Nevin et al. (2014) commented that Giroux's critical pedagogy is an interactive educational practice that impacts the connection between the self, the classroom, and society. By supporting the members of a school community through empowered language and supporting clear communication, they are better able to discuss seemingly contradictory truths. The interactive relationship between teacher and

student begins in the classroom but exists in layers of contexts, enabling the relationship to influence the development of both identities and traits, such as resilience (Acevedo & Hernandez-Wolfe, 2014).

If teachers value the meaning of identity for themselves, they could bring that value to their view of students (Jenlink, 2014). Breen (2014) wrote that inter-subjective experiences between teachers, students, parents, and community shape understanding of *Self* and *Other*, and Self in relation to Other. Instead of relying on established labels and paradigms—better used for group cohesion than for authority of identity—a more authentic identity forms. She stated, "a constant reflexive and reflective dialogue is necessary for understanding of self and other to begin to be achieved" (Breen, 2014, p. 32). By assuming Self or Other is complete, one objectifies that person. Teachers must first consider their own identities and the power they have to influence student identity formation. Then teachers can actively help students form their own identities instead of placing labels on them (Breen, 2014). This leads to an awareness of self in the world as it contributes to the experience of the praxis action-reflection-new action (Nevin et al., 2014).

Educators put so much of who they are into their work that to improve their practice they must improve their own understanding and shift beliefs (Nevin et al., 2014). Caring interactions with students can lead to personal growth experiences for teachers (Acevedo & Hernandez-Wolfe, 2014) when they take the time to reflect on personal beliefs in lights of what they practice (Olsen, 2014). To focus that growth on increasing capacity to care and improve teaching practices regarding students with trauma, educators must engage in their own learning to know what is trauma and how

trauma affects the learning process. Therefore, providing a professional development to increase content knowledge on these topics may help teachers become more aware of the importance of understanding learning and trauma and so reflect on their values that could lead to a change in classroom practice.

Adults as Learners

Motivation to become a teacher has been discussed in terms of commitment and identity, but also could be considered for how teachers can relate to or teach those dissimilar to themselves (Nias, 1998). Why people choose to teach influences their desires to learn about whom they are teaching and their willingness to learn about ways to improved their work. Andragogy is the "the art and sciences of helping adults learn" (Knowles, 1990, p. 54). In his theory of adult learners, Knowles (1980, 1990) made assumptions that adults learn best when motivated by personal needs and interests in real-life tasks that build readiness to engage. Adult learners prefer to be independent, to share in self-directed mutual inquiry, to use experience-based resources that increase with age, and to use current knowledge to build upon new competencies. Individuals' learning responds to the pace of the information given, the style in which information is provided, the timeframe of the lesson, and even where the lesson takes place.

Learning is an internal process controlled by the learners involving their whole beings using experiences constructed through interactions with their environment (Knowles, 1980). Professional knowledge and embedded social and institutionally structured contexts informs knowing (Schön, 1987). Andragogy depicts the learners as active participants in the learning process, in contrast with pedagogy that Knowles

defines as "the art and sciences of teaching children" (Knowles, 1990, p. 54). Pedagogy is teacher-directed. The teachers decides how, when, and what will be learned, and the child is submissive and dependent on the teacher. Motivation is external because the teacher judges whether the work product that has been completed is acceptable. In contrast, a self-directed learner cannot be dependent solely on the teacher because such dependence creates a conflict psychologically; he or she must have self-efficacy around learning and being a student (Knowles, 1990). This looks like the goal of adult education is "to help individuals satisfy their needs and achieve their goals" (Knowles, 1980, p. 27).

Therefore, there are implications for educators of adult learners regarding qualities of learning experiences. Knowles stated, "The important thing is that the objectives have meaning to the learners and provide them with directional guidance in their learning" (1980, p. 234). Educators should state clearly the learning objectives to help students achieve changes in behavior that participants personalize. They need to define what they want to do with the knowledge once gained (Schön, 1987). Educators can revise objectives as they introduce new content to participants and as participants share their needs. The educators should provide the adult learners a way to assess their current competencies compared to expected competencies to highlight their learning path. Concrete assessment of personal goals versus present knowledge level allows for realistic educational needs and augments motivation to lean. Internal motivation is more powerful than an externally diagnosed need, and motivation increases when institutional goals are in parallel with personal goals (Knowles, 1980). Self-evaluation means they provide themselves evidence of growth; also, they evaluate the program in

terms of positive and negative leaning so they can re-diagnose their learning needs.

(Knowles, 1980)

Learning does not end in terminal behaviors but is ever changing with new

information. To take content from knowledge and transform it into understanding and

valuing requires active participation; Knowles (1980) recommended such means as

Socratic discussion, case discussion, debate, or experience-sharing discussion. The

facilitator should make the environment comfortable for learning, physically and

psychologically, to foster mutual trust and respect, helpfulness, physical comfort,

freedom of expression, and acceptance of differences. Establishing a climate of mutual

inquiry permits a "dialogue of reciprocal reflection-in-action between coach and

student" (Schön, 1987, p. 303). A part of this dialogue should be designed and

conducted in concert with participants. Learners are rich resources for learning events,

such as professional development sessions, because they have various amounts and

types of experiences.

Though participant contribution adds richness and depth to trainings, adult

educators must be prepared and flexible to meet the needs and objectives. Uncertainty,

unique cases, and value conflict are in the grey areas of practice that are not directly

informed by technical knowledge but, instead, are handled with artistry, intuition, and

wisdom from experience. *Knowing-in-action* is spontaneous, skilled execution of

performance without making it verbally explicit. This type of action changes to

dynamic constructs when we try to explain it, thereby becoming *knowledge-in-action*

(Schön, 1987). For instance, in this study, I will ask participants to assess their

knowledge, beliefs, and goals for the session using a self-assessment. Though I will

ensure my preparation includes the technical knowledge they want, I will be open to providing examples from my own experiences as they interact with the new information and ask questions. It can be tricky for novices to design and conduct learning experiences that actually get them into the tension between knowing-in action and reflection on action. The facilitator's role is to model self-reflection through I-stories—how have I supported a student who experienced trauma?—and provide tools for the participants. The facilitator would connect participants' experiences as expert classroom teachers by eliciting their input for how to respond to students' experiences. As teachers share their own experiences with students, the facilitator identifies their competencies and compares them with those expected based on objectives.

Through this dialogue between the facilitator and adult learners, artistry and experimentation intertwines with tacit knowledge. Adults learn so much through experience that they are neither always aware of what they know nor how to explain it. Schön (1987) described that surprise occurs when there is a gap in knowledge what was known implicitly requires the need to describe what is known. One can reflect on unexpected outcomes (surprise) to figure out the change in pattern. Reflect-in-action provides a chance to change what we do while we do it if we attend to our actions and question assumptions (Schön, 1987). This dynamic reflection is the way that the tacit becomes part of our expressed knowledge base—looking at what we did in the moment and reframing it. In this study in particular, asking teachers to consider their beliefs about learning and trauma in relation to professional practice brings to light assumptions they might make about the learning process and this population of students. Once the facilitator makes known explicit information about these areas,

teachers can reflect through writing and discussions about past actions and current surprises. In order to make a change, the learner must be willing to suspend judgment until the collection of enough data to maintain or change position, increase tolerance for diverse answers, ability to apply generalizations, attitudes, and information to novel situations (Schön, 1987). Similarly, Kolb (1984) argued that increases in freedom from governing rules and creative response are noticeable in individual's adaptive flexibility. Change in behavior indicating reflecting-in-action can be measured by frequency and relevance of questions, challenging assertions made by others (people, sources) and the basis on which to make challenges (Knowles, 1980). If one has systemic variability in response to different environmental demands, then we can infer a high level of integrative development (Kolb, 1984). In the context of this study with voluntary participants who recognize they have a gap in knowledge around students with trauma, they contend with the new explicit information as it may conflict with what they know through their teaching experiences. Positioning themselves as ones-caring, thereby considering students' needs as ones-cared for, then teachers can reflect on the new information and reframe it in terms of their work with students. This is not to judge teachers for past responses to students but to apply the information to future work with students.

Considering the needs and motivations of teachers as adult learners should begin in preservice training programs and follow through professional development trainings. When teacher educators encourage reflection and flexibility early on in preservice students' teaching careers, that sets them up for explicitly understanding why they choose certain techniques and strategies in the classroom, thus knowledge-

in-action. Within professional development, experienced teachers define their needs as they reflect on gaps in knowledge highlighted in past classroom interactions and personal responses. The next two sections expand on the importance of and goals for preservice education and professional development.

Preservice Education

The first standard recommended by the Council for the Accreditation of Educator Preparation (CAEP) calls for teacher educators to demonstrate deep knowledge of "the learner and learning; content; instructional practice; and professional responsibility" (2015, p. 2). The end goal of teacher preparation is for candidates to be "able to use discipline-specific practices flexibly to advance the learning of all students toward attainment of college- and career-readiness standards" (CAEP, 2015, p. 2). Though CAEP states teachers should understand how learners grow and develop, CAEP does not recommend specifically that educator preparation programs inform candidates of either how the learning process in the brain occurs or the impact trauma has on learning. However, several nation- and state-wide programs exist with their own recommendations of what teachers can do in the classroom to serve these students. These programs will be explored below (Chapter 5) in relation to the implications for professional practice.

One way of understanding teacher education is learning about teaching as a system of social practices that informs professional identity formation. The professional identity of a teacher integrates social and cultural forces into internal aspects of understanding oneself, like feelings and narratives, and external aspects of identity, such as through professional activities, learning experiences, and

relationships with colleagues and students (Timoštšuk & Ugaste, 2012). Therefore, professional relationships and social interactions have a direct influence on how preservice teachers develop their professional identity. In particular, Hochschild's (1983) work concentrated on the influence of institutional rules and customs on self-perception. Educators' roles are comprised, in part, of expected feelings to a series of events, like the daily classroom. People recognize rules through introspection of feelings and others' assessments thereof, and so people become aware of what is expected or appropriate. As roles change, so do rules for how to feel and interpret events. Before people act on a feeling, Hochschild (1983) found people get the sense of what is culturally appropriate—*feeling rule*—to determine if they need to govern their emotions and initiate deep acting. Emotive dissonance occurs when feelings are feigned for too long, posing a challenge to sense of self that can lead to emotional numbness, burnout, and loss of access to feelings that help people interpret the world. Surface acting is portraying an unfelt emotion to cover the suppressed emotions and leads to cognitive dissonance. However, over-utilizing suppression can affect working memory and is exhausting. Another response to reduce cognitive load is deep acting, forcing emotions to align with what the situation requires; ultimately one can negotiate emotions until they are truly felt (Hochschild, 1983). In terms of Noddings's (2013) ethic of care, ones-caring must look for the feeling rule to fully care for the ones-cared for, which might results in deep acting. In sum, teachers have to balance their own emotional energy with their perceived feelings of others within the specific school culture. Caring for others can be exhausting work, so understanding oneself can focus their use of energy to combat burnout.

There are several cognitive and emotional factors that could benefit preservice educators as they prepare for their roles as teachers: self-reflection, self-efficacy, and self-regulation. Self-reflection allows teachers to better understand their own strengths and weaknesses in teaching (Nevin et al., 2014). Metacognition of self as a reflective thinker brings "awareness of their own cognitive, emotional, and historical motivations to teach, anchoring their awareness to the world(s) in which they and their students live today" (Nevin et al., 2014, p. 79). From this definition, self-reflection can be a tool for teachers to address gaps in their understanding of content knowledge, pedagogy, and emotional responses to students. Examining one's own beliefs could begin as early as teacher education programs to encourage flexibility through experience (de Vries, van de Grift, & Jansen 2014).

Nevin et al. (2014) analysis of 200 interviews of 200 diverse teacher candidates showed that self-efficacy and self-regulation affect motivation as seen in how, what, and why to teach. Candidates mentioned influence from former teachers, parents, social situations (e.g. Columbine High School shooting), and pop culture (e.g. teaching depicted in movies). Gustshall (2014) found preservice teachers' expression of self-efficacy regarding their dominant role in students' successes or connecting their coursework with actual student interactions may have led to an increase in beliefs about growth mindsets. Dweck's (2014) work on mindset identified fixed versus growth mindsets depending on how one frames an event as either a roadblock or an opportunity to grow. In agreement with Nevin et al.'s (2014) finding about influencing what is taught, Gutshall stated "beliefs about mindset play a role in the amount of instructional support teachers offer students, which in turn is likely to have

implications for student learning" (2014, p. 789). Preservice teachers were given hypothetical student scenarios before and after practical experience (student teaching) to survey their mindset beliefs. Gutshall (2014) found that involving students—real or hypothetical—seemed to alter mindset beliefs from initially fixed or neutral to a growth mindset. Over the course of the study, an average of 73% of preservice teachers held predominantly growth mindset beliefs regarding the malleability of intelligence. None of the 18% of those preservice teachers holding fixed mindset beliefs at the start of their program ended with the same beliefs after their clinical experience.

Self-regulation focuses educators' instructional strategies to align with personal interests and achieve goals, such as commitment to students, ethic of caring, and overcoming personal obstacles (e.g. family issues, religion, and language) (Nevin et al., 2014). Newberry's work (2013) expands the definition of self-regulation by providing two additional viewpoints. First, self-regulation provides protection of oneself and a means to act appropriately based on social norms, similar to Hochschild's (1983) feeling rule. Second, emotional regulation lessens the cognitive load around feelings and refocuses the energy elsewhere; this is done by suppressing the negative emotion until there is time to cognitively process the instigating experience.

Timoštšuk and Ugaste (2012) predicated their study on the idea that better understanding of teachers' emotions and emotional processes could improve preservice teacher education programs and prevent attrition and burnout. Timoštšuk & Ugaste (2012) conducted a qualitative interpretive study using semi-structured

interviews of 45 students in initial stages of teacher education program in Estonia after their first professional placement. They focused on the role of emotions in student teachers' professional identity; which emotions are significant for identity shaping; and what are the influential emotional factors for student teachers. One outcome determined was that pupils created the most positive emotions, more so than supervisors or administration, and particularly when overcoming obstacles to achieve a positive atmosphere and respects of pupils. Negative emotions in relation to personal activity, experiences, or thoughts stemmed from interactions with preservice professors and school teachers. Disappointment, especially related to outside criticism, was most mentioned in interviews; preservice teachers spoke of anxiety and insecurity about subject knowledge and pedagogical methodology. As well, they perceived negatively supervisors that demonstrated poor teacher ethics. Based on their findings, Timoštšuk and Ugaste (2012) recommended that feedback for preservice teachers needs to be detailed and balanced with positive and negative critiques about pedagogy, subject knowledge, and psychological aspects of teaching. Cooperation between university professors and school teachers is necessary to provide support to preservice teachers through consistent opinions about teaching and learning. School leaders should welcome preservice teachers, clarify teaching roles, and help balance social expectations with remuneration and recognition. These recommendations suggest that negative emotions have a strong influence on teacher identity formation. Positive emotions stimulate thinking and problem solving through being objective and creative with teaching strategies (Timoštšuk & Ugaste, 2012). Therefore, preservice education should help students attend to recall and analyze positive moments. As well, teacher

education programs should provide contextual approaches because one teaching method or practice could be translated differently across schools.

As stated earlier, preservice education is the start of self-reflection and motivation to teach. Professional development for experienced teachers provides space and time for them to redefine their needs as they reflect on gaps in knowledge highlighted in past classroom interactions and personal responses.

Professional Development

This study particularly looks at meeting the need for content knowledge in the practice continuum ending in knowledge-in-action. Work by Hargreaves (1998) and Nias (1996) shows the need for teachers to be prepared to support a range of students' needs to feel successful, particularly when their goals align with school policy (Olsen, 2014). Since teacher change is indispensable for successful school reform, schools should provide activities that evolve knowledge and skills that alter thinking and classroom behavior (Tam, 2015). Professional development is an effective method of sharing best current evidence-based knowledge and practice (Foster, 2014) and is necessary for educators' progress and growth (Guskey 2009). In particular, short-term professional development, not embedded in daily practice, is useful to shift attitude and expand content knowledge (Kalnin, et al., 2015; Kalnin, et al., 2013). Professional development deepens educators' content knowledge and skills through evidence-based research to prepare them to create safe and supportive learning environments in which foster positive and lasting change in students' learning (de Vries et al., 2014; Hirsh, 2006). Collaborating with others can be supportive, improve confidence, reduce stress, shape the learning environment, and potentially affect student learning (de Vries et al.,

2014). However, trustworthy and scientifically valid evidence of professional development that enhances student learning is scarce (Cook et al., 2013; Guskey, 2009).

Foster (2014) and Cook, Tankersley, and Landrum (2013) wrote specifically about evidence-based practices that are "shown by sound research to meaningfully and positively impact student outcomes" (Cook et al., 2013, p. 2). Foster (2014) suggested factors to consider when evaluating the management of evidence-based practice: school characteristics, readiness for program, advocates, alignment with school philosophy and vision, fits routines and systems, robust staff participation, and cost-effectiveness of money, time, and resources needed. Support at district, building, and classroom levels is needed to partner in research efforts (Guskey, 2009). Barriers to evidence-based practice include teacher mistrust of research (e.g. disconnect with practice and personal experience, limiting instructional freedom), time restraints, ineffective professional development, and type of training (Foster, 2014). As a whole, educators would benefit from better research and the knowledge of how to assess and evaluate the outcomes of that research (Guskey, 2009; Guskey & Yoon, 2009).

Effective professional development. Guskey and Yoon (2009) reviewed a comprehensive analysis of what makes professional development effective in terms of outcomes translating into student achievement. Of the 1,343 studies, only nine met standards of credible evidence set by the What Works Clearinghouse of the US Department of Education. From these nine studies, six factors stood out as contributing to the effectiveness of professional development: workshops, outside experts, time, follow-up, activities and content. Workshops entail participants being

active learners with opportunities to implement the new practices (Guskey & Yoon, 2009). Providers should focus on learning and the learners; be mindful of time, resources, and available leadership (Foster, 2014; Guskey, & Yoon, 2009). In particular, providers should directly present the ideas to participants and help facilitate the implementation of them. Outside experts best provide these new practices (Guskey & Yoon, 2009) but should know the depth of the research backing their strategies (Guskey, 2009). External professional development is salient for those schools lacking internal expertise to facilitate transformative teaching (Kose & Lim, 2010). The amount of time the presenters are with the participants averaged 30 hours or more; and the time must be organized well to purposely share content in context. That content should reflect what teachers teach and the activities mimic how to best teach that content. They should develop professional development with defining goals, what evidence determines if goals are met, and how can that evidence be collected for analysis (Guskey & Yoon, 2009). Foster (2014), likewise recommended succinct presentation of materials in in context with practical translation and adaptation for target groups. As well, the presenters should provide feedback and coaching and be accessible to problem solve obstacles to implementing evidence-based practice. For this study, the facilitator should thoroughly prepare a presentation with participants' needs at the heart of the objectives, designing materials and providing enough time for participants to question and wrestle with the new information as it applies to students with trauma. Assessing participants' understanding through the discussions and with formal tools can illuminate gaps in understanding. Lastly, the facilitator provides tools for supporting students that can be implemented in the classroom.

Participants' beliefs about professional development. As the literature shows, teachers' motivations to care for students influence their professional identities and adult learning needs. Implicit practical knowledge expands with practice, but theoretical knowledge requires constant, intentional updating (de Vries et al., 2014). Importantly, classes and workshops jumpstart learning that is sustained and job-embedded in school contexts (Kose & Lim, 2012), which aligns with Foster (2014) and Guskey and Yoon (2009). Therefore, engagement in short-term professional development is a way to introduce new theoretic information to participants in order to shift understanding (Kalnin, et al., 2015; Kalnin, et al., 2013), and, with implementation, the praxis action-reflection-new action (Nevin et al., 2014). Reflection is a key action to review tacit knowledge and beliefs to gain control of routine actions and so make changes in classroom practices (de Vries et al., 2014).

> Belief is a proposition which may be consciously or unconsciously held, is evaluative in that it is accepted as true by the individual, and is therefore imbued with emotive commitment; further, it serves as a guide to thought and behaviour. (Borg, 2001, p. 186)

Teacher beliefs—particularly implicit assumptions about students—are paramount in teaching practices, more so than policy and resources (Tam, 2015). Teachers' beliefs indicate decisions made, guide thought and behavior, and strongly influence working and learning practices (de Vries et al., 2014), so one recommendation for facilitators is to scaffold teacher learning by first understanding their belief systems, ideologies, experiences related to diversity (Kose & Lim, 2010). Guskey (2009) reviewed literature regarding evidence to validate beliefs about effective professional

development. His findings suggest that the evidence gap occurs due to implementation of many innovations at once, making it hard to determine the effect size of each; poor planning without reliable evidence or evaluations; and an unwillingness by professional development providers to be scrutinized for the effectiveness of their work (Guskey, 2009). These findings are important because teacher beliefs influence classroom pedagogy and content, so they are critical of professional development of classroom practice (Arce, Bodner, & Hutchinson, 2014).

A study by Kose and Lim (2010) exemplifies the importance of teacher beliefs as they influence pedagogy. They surveyed 330 K-5 teachers in 25 diverse elementary schools to provided guidelines for effective transformative professional development pointed at understanding and addressing the needs of all students and align class content to prepare students for civic engagement. They suggested teachers should utilize transformative professional development to work against negative beliefs of students (e.g. deficit thinking, blaming, problem, negative stereotypes, minimizing, and overlooking), and take "responsibility for all students' success or failure, seeing students as individuals and simultaneously valuing the complexity and affirmation of student diversity" (Kose & Lim, 2010, p. 395). Kose and Lim (2010) recommended intentional implementation by designing activities and assessments that reflect desired outcomes and avoid unintended consequences.

Educators need to buy-in to the professional development for it to be effective, regardless of how well-prepared the facilitator is. Trivette, Raab, and Dunst (2014) used an experimental mixed methods study to determine the factors associated with staff participation in professional development at Head Start, which served as

predictors of perceived benefits: Evidence-based professional development in early childhood education focused on work climate (social ecology); personal motivation and responsibility to attend; and perceived benefits of new practices of focus of that practice. Trivette, et al. (2014) used their own Participatory Adult Learning Strategy (PALS) program, including one-on-one coaching with the 36 participants once a week for four months. Training related measures (receptiveness and social validity) and one personal belief measure (career aspiration) were significantly related to staff judgment of value and benefits of training. The implications of this study include several recommendations for increasing buy-in from teachers. In agreement with Schön's (1987) work, Trivette, et al. (2014) suggested facilitators involve practitioners in all phases of training, starting with determining and including people's goals of what they hope to learn from participating. As Knowles (1980) pointed out, adults are motivated leaners who know what they want to learn. Trivette, et al. (2014) advised taking the time to describe, illustrate, and demonstrate key characteristics of a practice and benefits to increase participants' beliefs about the value of the practice. Value and usefulness of practice influence the likelihood that staff will show commitment to intervention practice. They will more likely seek out and participate in professional development if that training is trustworthy; and then they tend to use the intervention practice faithfully (Trivette, et al., 2014).

  Engagement in professional development that changes beliefs about student learning. Effective professional development is foundational for intentionally aiming at building knowledge and influencing beliefs. In particular, teachers' knowledge and interpretations about something complex and individualized, like the impact of trauma

on students' learning, is not just about adopting a specific practice. Engaging in professional development can help teachers see different sides of their students by first updating content knowledge (Tam, 2015). Arce et al. (2014) used a qualitative ethnographic lens to determine if participating in a professional development on creating K-12 science inquiry-based constructivist curriculum changed teachers' beliefs about best practices. Through semi-structured interviews of seventh and eighth grade teachers in Puerto Rico, they found a difference in pedagogy between constructivist and traditional teachers. Constructivist teachers believed students learn better through discovery and inquiry in a student-centered environment where the teacher provides a learning environment. Student-centered classrooms can be a community of trust and common interests that fosters discussion but teachers could not always find the solution. Traditional teachers were the control group; they believed students learn when teachers give clear explanations. Traditional classrooms were answer-focused in which students could ask questions but without the goal to gain depth of understanding. Arce et al. (2014) found that traditional teachers did not reflect on students' learning processes or teacher-student interaction. These findings were somewhat different from those from de Vries et al. (2014). In their survey of 260 Dutch teachers, teachers' statements on their beliefs about learning and teaching tended to reflect both subject matter-oriented and student-oriented beliefs, suggesting they are two dimensions of the same view instead of opposing views. Participants held two beliefs: (a) the teacher's role was the transmission of information, thereby treating the class as collective student, and (b) for student construction of information based on individual interests and social interactions, teachers need strong conceptual

understanding. The Dutch teachers considered student learning in a more multi-faceted way than those in the Arce et al. (2014) study; there were no survey results suggesting any shift in beliefs.

The teacher-student relationship is not unidirectional in terms of influence; students can impact teachers' practice and identity, as well. Acevedo and Hernandez-Wolfe (2014) showed in their work that Colombian elementary teachers could improve as education practitioners and personally as individuals when they interacted in the classroom with students experiencing adversity. Acevedo and Hernandez-Wolfe (2014) discovered that teachers, like therapists, enhance their own persons by teaching students in crises and build vicarious resilience. They interviewed Colombian teachers who worked with underserved students who were delayed two years in learning. Ten personal and professional dimensions of teachers emerged in the interviews that teachers improved as practitioners and individuals via interactions with students and reflection:

> Affect regulation as a relational activity, expansion of relational skills, resonance with own adversities, changes in interpersonal relationships, reassessment of one's problems, recognizing the impact of trauma and constructivist learning strategies, perspective-taking and flexibility, recognition and affirmation of racial and gender identity diversity, raising critical consciousness and advocacy, and compassion fatigue. (Acevedo & Hernandez-Wolfe, 2014, p. 479)

Using the terms of Arwood's (2011) Neuro-semantic Language Learning theory, these teachers used formal metacognitive thinking as they reflected on caring for students;

in turn, this increased their own learning and resilience. Instead of only seeing the patterns, they used language to name their thinking about what students' dealt with outside of school and how those challenges affected comprehension. Flexibility led to application of new ideas on old practices to scaffold new approaches to caring for their students (Acevedo & Hernandez-Wolfe, 2014).

The research by Acevedo and Hernandez-Wolfe (2014) particularly reflected salient elements of my study: teachers' beliefs about the way students facing adverse circumstances learn and how teachers can care for this population. Shifting how teachers think about learning and how trauma impacts it is the primary learning goal of the study, so the idea of building concepts from which to inform a practice is key for transformative learning (Mezirow, 2003). Teachers who address their own assumptions and beliefs about students with trauma can be more available for open dialogue with these students to care for them (Breen, 2014; Giroux, 1988; Nevin et al. (2014).

According to Mezirow (2003), transformative learning involves an altering of one's epistemological view of something. For educators, this could look like changing how they understand students' ability to learn. Teacher change is "the provision of activities designed to advance the knowledge, skills, and understanding of teachers in ways that lead to changes in their thinking and classroom behaviour" (Fenstermacher & Berliner, 1983. p.4, as cited in Tam, 2015). Change depends on teachers' beliefs, as well as time to reflect and question them. Beliefs guide thoughts and behaviors, and influence working and learning practices (de Vries et al., 2014). As well, beliefs are key to effective practice as they reflect implicit personal knowledge of students,

learning, and classrooms learned over time through personal experiences (de Vries, et al., 2014; Tam, 2015). Teachers' willingness to change beliefs is affected by risks and rewards associated with practices, knowledge and expertise of material, motivation, and interactions with teacher community (Tam, 2015). In the case of recognizing and addressing oppression of a group or culture, such as those students living in poverty or with disabilities, Kose and Lim (2010) posited that there are beliefs that can help or hinder this transformation. Words like deficit thinking, blame, problem, minimize, overlook, negative stereotypes are associated with negative beliefs and thinking about those unlike oneself. These beliefs affect the way in which students are seen as learners and approached as humans. However, unless there is a willingness to learn about diversity, evidence of change in attitudes and practice may be scarce (Kose & Lim, 2010).

Shifting beliefs could lead to a change in practice. If adults are willing to be open to learning and flexible in their thinking, they tend to frame experiences more positively than those who are obstinate and unwilling to acknowledge another's point of view (Dweck, 2014; Kolb, 1984). Bangura (2005) wrote about Western education failing to reach Africans because the Eurocentric mindset fragmented the components of people's lives instead of accepting the Africans' integrated worldview in which all of life is a learning process. The Western mindset is narrow and limits learning by African standards and in terms of how the brain actually works. As I stated at the start of the section on adult learners, the learning process applies to teachers' own learning in professional development. One of the primary differences between teachers and their students is that adults have patterns to build on to create concepts (Arwood,

2011). When developing a professional development, drawing on the multiple lenses of neuroeducation—neuroscience, cognitive psychology, and language—create multiple access points to engage teachers in the new information provided to add to concepts already developed in their minds. The learning process will be further described in detail later in this literature, but the basic elements are worth mentioning to better understand how professional development adds to teachers' beliefs and conceptual understanding of students with trauma.

Bangura's (2005) work aligns with Peirce's (1978) idea that "the whole is greater than the sum of its parts." Through a neuroscience lens, the Western viewpoint of learning consists of the brain taking in sensory stimuli through receptors; when that stimuli is meaningful enough to cells, neurons potentiate and information is passed on to connected cells; patterns form as the stimuli overlap to create pathways (Baars & Gage, 2010). This creates an input-output, lower order thinking in which the brain works like a computer. However, brains—and, therefore, people—are more complex than that and function as sums greater than their parts. As those patterns overlap, connections form across neural synapses to create circuits that layer onto networks that become meaningful when language is applied through discussion, writing, reading, problem solving, and calculation (Arwood, 2011).

Looking through a neuroscience lens at Illeris' definition of learning, adults' capacity increases as the brain makes more connections between new stimuli and established perceptual pathways; thinking is raised when language scaffolds concepts at the circuit level to create networks (Arwood, 2011). Adults have more language to access formal concepts than children do, so they can be more efficient at learning and

using language to share their thinking. This means seeing adults as capable learners who can take in new information, integrated it into current knowledge, and create new thoughts, opinions, and actions (Arwood, 2011). In the case of this study, applying new information to old notions of learning and students with trauma forms new concepts if the information is discussed as is done in a professional development designed for adult learners.

Adults have experienced many events and encounters in their lives upon which to draw when they interact others. As stated earlier, those past experiences change their brains; as they apply language to reflect and change their understanding, their thinking changes and so does behavior. For instance, when teachers have former students with trauma, those teachers view their current students with trauma through a lens colored by those past interactions; they reflect on what practices to care for students with trauma worked well or failed and act accordingly. One such behavior is communication. Adults communicate as either passively, aggressively, or assertively (Kolb & Stevens Griffith, 2009). Passive individuals put the role of decision-maker on others, thereby allowing others to make decisions for them. This lack of self-respect leads to reinforcing learned helplessness and inhibits learning from occurring because the adults do not necessarily get what they need. In the case of a teacher interacting with a student with trauma, the teacher assumes the student will tell the teacher what he needs, putting the student in an impossible position because he is unable to describe his needs. Those who communicate aggressively discount the rights and needs of others to get what they want. This could potentially close doors to learning opportunities because others may not want to work with them and the aggressors may

not be open to hearing from others a different way of thinking. Should a teacher be aggressive with a student with trauma the teacher is objectifying the study and denying him agency to act, the same way trauma does. Therefore, Kolb and Stevens Griffith (2009) suggest that only assertive communication that is honest and confident will ultimately get people what they want while retaining the dignity and respect of others. By speaking for their needs and offering suggestions, adults neither confuse who they are for what they do nor make judgments about others (Arwood, 2011). When a teacher provides safe and appropriate options to a student dealing with trauma, both have say in the situation and there is no power struggle between the one-caring and the one-cared for.

Everyone retains dignity and choices if their behavior matches more logical rather than emotional thinking. Noddings theory (2013) is about caring for others, however, that does not mean only emotions are included in interactions. Talking relation means both people contribute to the encounter. If one is passive or aggressive, than only one side contributes. Engrossing oneself in the other's needs and goals entails logically concluding them to be whole people with their own minds and so aligns with Noddings's definition of care (2005). Language contributes to theory of mind by displacing abstract concepts, such as others' feelings and ideas (Arwood, 2011). Being able to critically think about how one understands the world through self-reflection requires language to carry out formal thinking (Illeris, 2009) and is key to changing practice in the classroom (de Vries et al., 2014; Tam, 2015). Similarly, Mezirow's (2003) transformative learning begins with communicative learning during which both parties voluntarily understand each other's frame of reference to find

common ground. This type of discourse opens up learners to accept or reject frames of reference that are based on their cultures and languages, as well as their pasts and presents. Through the exchange of ideas and knowledge, information becomes more meaningful to adults and they learn.

Throughout this section on adult learners is the assumption that learning occurs. As Piaget said, "The ideal of education is not to teach the maximum, to maximize the results, but above all to learn to learn, to learn to develop, and to learn to continue to develop after leaving school" (1973, p. 30). Piaget's sentiment highlights the need to understand how learning occurs so that one can continue pursuing it throughout one's lifetime. This is particularly true for teachers in general and essential for those teaching students affected by trauma. By understanding the typical learning process, teachers can identify where learning breaks down, particularly when the stress of trauma interferes and disrupts it. This professional development experience designed for study aims to provide this information to help educators become more aware of shifts in their students' thinking and behavior that may illuminate the potential of trauma. Reviewing the literature on precisely how learning occurs neurologically, cognitively, and linguistically provides the foundation for developing teachers' learning experiences. Traditional and emerging views of learning that would inform teacher development to respond to students with trauma will be fleshed out in the following section.

Learning

Kolb (1984) stated that over the course of a lifetime, performance is short-term adaptation to the immediate context, learning is longer-term mastery of broader scope, and development envelops lifetime adaptation to one's life situation. Learning is the major, holistic process of human adaptation to the world, the "integrated functioning of the total organism—thinking, feeling, perceiving, and behaving" (Kolb, 1984, p. 31). The process of experiential learning, based on work by such researchers as Dewey, Lewin, and Piaget, combines experience, perception, cognition, and behavior; "it is the process of learning from experience that shapes and actualizes developmental potentialities" (Kolb, 1984, p. 133). Learning is a process, not a series of behavioral outcomes (Bruner, 1974; Kolb, 1984), so education can stimulate inquiry and skill to acquire knowledge.

Neuroscience, cognitive psychology, and language are three areas that make the world meaningful through their roles in the learning process. When these disciplines are applied to the field of education, the term neuroeducation is used. The majority of learning theories encompass cognitive psychology and, with increasing interest and research on the brain, neuroscience (Tokuhama-Espinosa, 2010). Arwood (2011) combines these with language into a triumvirate of fields that can inform education in her Neuro-Semantic Language Learning Theory. Her model expands on the popularly used, but she determined inadequate, two-tiered behavior model focusing on sensory input and patterns. This typical Western psychology model equates who people are with what they do (e.g. "I am anxious"), instead of people who happen to act in particular ways, hold certain beliefs, or have things (e.g. "I have anxiety"). This traditional mindset pigeonholes learning into what people can

reproduce instead of maintaining their identities apart from their product (Arwood, 2011).

To increase understanding of the learning process requires knowledge of how the individual develops neurologically, as well as through social interactions. A primary function of the brain is to manage a person's response to the environment. How people respond outwardly to the environment depends on neurological and mental functions mediated by social context, such as acceptable behaviors or appropriate speech. However, these contextualized responses are adapted individually to mark possibilities and limits of how one responds (Carrasco et al., 2015). Piaget noted, "the maturation of the nervous system can do no more than determine totality of possibilities and impossibilities at a given stage" (1976, p. 60). Heredity of traits passed down through generations drive internal maturation but are neither isolated nor act alone (Piaget, 1973; LeDoux, 2002; Luke, 2016). In addition to genetics, the course of human development progresses in relation to several factors that parallel those contributing to learning. First, the physical experience of acting on objects and affecting them (Piaget, 1973; LeDoux, 2002; Luke 2016), which corresponds in learning to internalizing outside information and seeing how one can act on that information. Second, the equilibrium, or cognitive compensation in reaction to outer disturbances to achieve balance (Piaget, 1973); in learning, this means outside information may conflict with already held knowledge or beliefs and so the brain assimilates, accommodates, or rejects that information. Finally, social transmission of knowledge, assimilating education from others into spontaneous learning (Kolb, 1984; Piaget, 1973) leads to the new information blended in with what one already knew and

can be passed on or demonstrated to others through writing, drawing, discussion, and calculation (Cooper & Kiger, 2009). These elements are salient to understanding how students with trauma struggle to learn as they take in adverse experience that upset their senses of trust and safety, and hinder their ability to explain their conceptual thinking with language. In this section, I will explain the neuroscience and cognitive psychology of learning. To address Arwood's contribution of language to neuroeducation, I describe it in the later section of ways to counteract damage associated with trauma because words are the predominant means by which teachers and students communicate in the classroom to address concerns about responding to trauma.

Neuroscience. The body and mind work optimally at equilibrium. Brains develop bottom up and back to front with primary sensory cortices maturing in the hindbrain to the limbic midbrain before higher cognitive functions in the forebrain, such as critical thinking and language. Cells in the brain and spinal cord, called neurons, relay messages within and between areas. Pathways develop when the brain perceives external signals (e.g. light photons or sound waves) causing neurons to fire repeatedly in the same pattern (Arwood, 2011; Baars & Gage, 2010). Hearing and seeing are the primary sources of information for students in the classroom. These senses allow people to receive input at a distance: acoustic sound waves enter the ears and light photons enter the eyes (Arwood, 2011). The receiving organ processes meaningful input and bundles the messages along the cranial nerves to the midbrain. These packets of information are the base layer by which all other learning comes to be (LeDoux, 2002).

A signal is considered meaningful and will be passed on if there is enough electrical input from surrounding neurons. The resting potential of a neuron is around -70 millivolts (mV); when it receives electrical input from one or multiple cells via dendrites and the inside of the cell's soma reaches a threshold potential of -55 mV, the neuron fires at the axon hillock, down the axon to the terminal where it dumps neurotransmitters (chemicals) into the synapse. The neurotransmitter message passes through a chemical synapse where the neighboring cell can pick it up if it has the appropriate receptors, much like a lock and key (Baars & Gage, 2010; LeDoux, 2002; Luke, 2016). Hebbian law dictates that action potential must occur for neurons to fire the signal in order to integrate with other neurons (Baars & Gage, 2010; Hebb, 1958; Luke 2016). New synapses form with dendritic growth, and neurons are born, called neurogenesis, in the midst of connecting to new experiences. These processes demonstrate the neuroplasticity, or malleability, of the brain (LeDoux, 2002). However, inhibition of the signal can occur. One reason would be if the receiving neuron does not have the appropriate receptors and sends the active neuron a chemical signal to cease. Alternately, if the same path is taken repeatedly, the signal languishes in strength and the neuron cannot fire. Input from new neurons or stronger input from the original upstream input will allow a signal to fire down the path once again (Baars & Gage, 2010). More neurons are created than necessary; the active ones stay and increase in complexity as they connect to preexisting connections, whereas the ones unused are eliminated, or pruned (LeDoux, 2002; Simpkins & Simpkins, 2013).

The combinations of connections and messages created through experiences make humans unique. This interconnectedness of function and structure might begin

building with neurons but experience and genetics—the old nature versus nurture debate—shapes the path and strength of those connections (LeDoux, 2002; Luke, 2016). "An innate capacity for synapses to record and store information is what allows systems to encode experiences" (LeDoux, 2002, p. 9). As pathways between neurons strengthen with use and growth, they overlap with other pathways and form circuits (Baars & Gage, 2010). These patterns overlap onto prior concepts, thereby organizing stimuli in a meaningful way (i.e. perception of forms, objects, sounds, shapes) (Arwood, 2011; Baars & Gage, 2010). Arwood (2011) references how neurons track previously and currently received messages in perceptual patterns. Overlapping acoustic patterns only leads to imitation without the potential for conceptual meaning. However, layering visual patterns creates visual concepts, and layering visual-acoustic patterns creates auditory concepts (Arwood, 2011). Regulation of these patterns happen through such mechanisms as integration, which help the learner incorporate new information to enrich what they already know, and inhibition, which implicitly negates other patterns from forming (Baars & Gage, 2010).

Conceptualizations emerge when perceptual patterns layer onto circuits located in the cerebral cortex, the outermost layer of the brain that supports language and higher order thinking (LeDoux, 2002). Cognitive processing speed and efficiency escalates as myelination of neurons increase and inefficient neurons are pruned. This process leads to improved complex thinking and working memory (Simpkins & Simpkins, 2013). The cerebral cortex is dynamic throughout childhood and adolescence as it interacts with the environment, epigenetically determining the observable characteristics of genes, called phenotypes (Schmitt et al., 2014). Genetic

factors dominate variance of measures of brain structures (e.g. cortical thickness of

frontal lobe and language centers) throughout the lifespan, whereas environmental

variance in the frontal and parietal cortices decreases from early to middle childhood

(Schmitt et al, 2014). Genetics predominantly mediates cortical thickness in the first

dozen years of (Schmitt et al, 2014), after which the use of language in thought alters

the cortex. The process takes time and occurs in each child's system in accord with

personal experiences. The learning system is unique to the child because each child's

system organizes according to personal experiences (Arwood, 2011).

Psychology. The brain and the mind are intertwined, though if one and the

same or two systems has been long studied and debated partly because of the question

about what thought is and how it comes to be in the mind. Philosopher and scientist

Charles Peirce theorized that people know a thing in parts through sensory inputs but

that cognition involves inferences made about the whole of the thing *as* itself (Peirce,

1978; Runick, 1991). This idea is often quoted as, "the whole is greater than the sum

of its parts" (e.g. Luke, 2016; Piaget, 1973). In Peirce's semeiotic model of the mind,

thinking is communicative and conveys social signs (Peirce, 1868; Skagestad, 2004).

Cognition is manipulating signs and typically done unconsciously, with the exception

of reasoning (Skagestad, 2004). Vygotsky discussed conceptual formation as the

combination of mental functions "guided by the use of words as the means of actively

centering attention, of abstracting certain traits, synthesizing them, and symbolizing

them by a sign" (Vygotsky, 1962, p. 81). Piaget (1977) hypothesized an active process

in which knowledge is constructed and constantly developed. The mind will reach

equilibrium when new information assimilates into prior knowledge (particularly

when similar in nature) and, thereby, gives it meaning. What is known is challenged and either maintained or accommodated, transforming into new schema. Intellectual adaptation occurs when assimilation and accommodation are in balance. Many little changes may not alter significantly the overarching schema because "in any cognitive system the laws governing the whole override the changing characteristics of the components" (Piaget, 1977, p. 23). However, a significant event could shift the core scheme of someone (Pajares, 1992).

Putting together the neuroscience and cognitive psychology of learning creates the cognitive processes involved in learning. Look at the example of memory in the classroom, which also incorporates the need for language. A student is using her working memory to keep a series of numbers (4, 6, 9, 1) in her head to calculate their average. She adds the numbers together, retrieving from long-term memory in the hippocampus how to add the numerator (20) and divide by the denominator (4) to get the answer (5). By retrieving the mathematical functions and then using them for this problem, her related synapses fire repeatedly and so strengthen the connection as dictated by Hebbian law (1958). Implicitly, she uses her language to talk her way through the problem, thereby making the process more meaningful to her. She has now made more connections to the perceptual patterns by connecting them to her neocortex where language networks. However, though she understands how she got to her answer, children may believe they understand the concept of a task but then cannot verbally explain it. They do not necessarily analyze what they perceive and so do not make the concept their own (Piaget, 1973). Once the student can describe what, why, and how she averaged the numbers, she makes the concept part of her system.

Trauma

As described by Arwood's (2011) model, learning is not linear or stair-step. The neurotypical development of children's brains over time depends on external support from caring adults. Ideally, students gain cognitive and linguistic abilities as their brains grow and become more complex through experiences. However, not all children have the chance to be healthy due to circumstances outside their control, such as trauma. This section delineates definitions and types of trauma, specifically those focused on for this study and presented to the participants in the professional development.

Types of trauma. Until the mid-90s, the majority of articles and books on trauma dealt with physical injuries and wounds (e.g. Ehrlich, 1982; Ladebauche, 1997; Litaker, 1996). One study greatly expanded the conversation to include a larger array of trauma. Kaiser Permanente and the Centers for Disease Control and Prevention (CDC) carried out the Adverse Childhood Experience (ACE) Study in 1995-1997. Originally an obesity study, Kaiser Permanente questioned participating members living in San Diego, CA to determine which of the 9,508 respondants experienced abuse, neglect, or household dysfunction during childhood. The results transformed how practitioners addressed those experiencing the fallout of trauma:

> The ACE Study findings suggest that certain experiences are major risk factors for the leading causes of illness and death as well as poor quality of life in the United States. It is critical to understand how some of the worst health and social problems in our nation can arise as a consequence of adverse childhood

experiences. Realizing these connections is likely to improve efforts towards

prevention and recovery. (CDC, 2016)

The prevalence of adverse childhood experiences in participants is shown in Table 1.

The highest reported percentages were males who experienced physical abuse at

29.9%, and 29.5% of women who lived with household substance abuse. Both men

and women who had a member of their household incarcerated reported the lowest

rates of all ACEs, 4.1% and 5.2% respectively. Over a fifth of all participants had

parents who separated or divorced; a similar percent experience household mental

illness. About a quarter of all respondents reported experiencing household substance

abuse.

In tandem with members' physical examinations, Kaiser Permanente found a

variety of adult health issues associated with ACEs: mental health (e.g. depression),

substance abuse, physical health (e.g. cardiac disease and diabetes), and intimate

partner violence (Trauma Informed Oregon, 2016). The percentage of participants and

the number of ACEs experienced are displayed in Table 2. As well, those with higher

ACE scores—measured by the number of experiences—had increased chances of

health issues.

Table 1

Prevalence of Adverse Childhood Experiences for Study Participants

	% Total Experienced	% Female	% Male
Abuse			
Emotional	10.6	13.1	7.6
Physical	28.3	27.0	29.9
Sexual	20.7	24.7	16.0
Neglect			
Emotional	14.8	16.7	12.4
Physical	9.9	9.2	10.7
Household dysfunction			
Mother treated violently	12.7	12.7	11.5
Household substance abuse	26.9	29.5	23.8
Household mental illness	19.4	23.3	14.8
Parental Separation or Divorce	23.3	24.5	21.8
Incarcerated household member	4.7	5.2	4.1

Note. Adapted from Centers for Disease Control and Prevention, National Center for Injury

Prevention and Control, Division of Violence Prevention (2016). Retrieved from

http://www.cdc.gov/violenceprevention/acestudy/

Table 2

Childhood Experiences of Multiple ACEs

	% Total	% Female	% Male
0 ACEs	36.1	34.5	38.0
1 ACE	26.0	24.5	27.9
2 ACEs	15.9	15.5	16.4
3 ACEs	9.5	10.3	8.6
≥ 4 ACEs	12.5	15.2	9.2

Note. Adapted from Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Violence Prevention. 2014. Retrieved from http://www.cdc.gov/violenceprevention/acestudy/

While more than a third of participants did not experience adversity, or chose not to share it, approximately two-thirds had at least one ACE. A total of 2,472 people (26%) had one ACE; 1,521 (16%) had two; 855 (9%) had three; and 1,141 (12%) people had four or more. Though these findings cannot be generalized, it is interesting to point out that the participants' characteristics were not what some would assume based on stereotypes: those with reported instances were predominantly White, middle to middle-high class, and college educated.

The ACE module was added to the Behavioral Risk Factor Surveillance System (BRFSS) in 2009 and piloted by five states. The BRFSS collects statewide demographic and health information, such as risk and prevention. (Wilcox, 2016). Currently 22 states use both the ACE module and BRFSS, including Oregon that added it in 2011. Due to the nature of the survey, the results cannot be disaggregated for a particular county or city. Many states and organizations are using the ACE study

as a guide for changing protocols. Oregon agencies and organizations are transforming how they are delivery care to children, primarily through the largest systems of health, education, and early childhood services. They are investing in prevention to reduce later healthcare costs for chronic health conditions. This begins by identifying early those most at risk for experiencing trauma and intervening beforehand by building resiliency in families. Though one screening tool has not yet been agreed upon, there has been agreement that those administering it should have at least trauma informed training, if not also resources to support those screened, as well as discussing resiliency with participants (Mandell, 2014).

Maltreatment. Child Protective Services investigates and assesses the number of cases of maltreatment across the US. They calculate rates of maltreatment (Appendix A) based on those children found to be victims of one or more types of maltreatment. Definitions of maltreatment, abuse, and neglect vary by state but typically include at least abuse and neglect. The rate of victimization for ages 12-15 decreased year-over-year from 2010 to 2013, whereas the rate for ages 8-11 dropped from 2010 to 2011, plateaued in 2012, and then dropped again in 2013. By far the highest percentage reported for both age groups is neglect, followed by physical and sexual abuse (Appendix B).

Current rates of substantiated neglect and physical maltreatment continue to be reported by states, as seen in the tables above. However, the Adverse Childhood Experiences Study (Felitti et al., 1998) included other types of trauma that were less well studied. Of the ten types of trauma, Felitti et al. categorized half into abuse and neglect; they characterized the other five types as household dysfunction. Of those

five, I chose three within the area of household function that are studied less frequently than abuse and neglect but are salient in the lives of students: divorce and death, household mental illness, and household substance abuse.

Divorce and death. Children who lose a parent to death or divorce are more than likely living in single-parent homes. The US Census Bureau (2016) found in the Current Population Survey that 24% of mothers and 6% of fathers parent alone. Half of marriages end in divorce and many of those families include children (American Academy of Child & Adolescent Psychiatry, 2013). The US Census Bureau (2013a) conducted the American Community Survey in 2013 and found that just over one million males and over 1.2 females divorced in the US; specifically, 14,393 men and 18,014 women divorced in Oregon. However, calculating the number of children in this category is challenging due to the nuances involved in parent relationships. The Current Population Survey found 41% of children are born out of wedlock but 4% of children live with cohabiting parents (US Census Bureau, 2013b). Fifteen percent of children live with two parents who are in a remarriage according to the American Community Survey. In a longitudinal study of 983 participants, children who grew up in nonintact families reported an appreciably broad range of poor health-related behaviors, like smoking, alcohol consumption, nutrition habits, and physical activity, though the association decreased over time and ceased by age 30 (Thuen, Breivik, Wold, & Ulveseter, 2015).

The rate at which children lose a parent to death is less clear in the literature. In coordination with Comfort Zone Camp, a national bereavement camp, market research firm Mathew Greenwald & Associates polled 1,006 adults over 25 years old and found

11%, or 110 people, had lost a parent by the age of 20 (Comfort Zone Camp, 2010).

Bereaved youth are at risk for a range of psychological problems, substance abuse, and

health risk behaviors (Brent, Melhem, Masten, Porta, & Walker Payne, 2012). A

longitudinal study of 126 youth were interviewed at 9, 21, 33, and 62 months after

their parents died. Compared to a control group, bereaved youth had lower

competence in the areas of work, career planning, peer attachment, and future

educational aspirations. Family cohesion and how children functioned before the death

mediated these competencies, but not the age at which children lost parents (Brent et

al., 2012). Cerel, Fristad, Verducci, Weller, and Weller (2006) studied the psychiatric

symptomology of parental bereavement in children who just lost their parents. They

conducted a two-year longitudinal study of a cohort of bereaved children and

surviving parents ($N = 360$) compared to a control group with diagnosed depression,

considered to have a similar level of impairment, and a community control with

neither loss nor depression. After interviewing each participant four times, researchers

found bereaved children to be most psychologically impaired than the community

control but less than depressed children. Socioeconomic status and surviving parental

level of depression played important roles as covariates, and cumulative family

stressors can also put children at further risk for developing clinical levels of

psychopathology (Cerel et al., 2006).

Household mental illness. "When parental mental-health problems result in

conflicting marital interactions and poor parenting practices, children's adjustment is

at risk, including school performance, peer relations, and psychological adjustment"

(Leinonen, Solantaus, & Punamäki, 2003, p. 227). In their longitudinal study of 12-

year-old children ($N = 1320$) and 527 parents, researchers found that different types of parental mental health problems may initiate specific paths between parental and child mental-health problems. For instance, parental depression was related to boys' depression, substance use, poor school performance and poor peer relations, and to girls' internalizing symptoms and poor school performance (Leinonen et al., 2003). Of the four million adults ages 26-44 diagnosed mental illness in 2014, 36.3% did not receive treatment and 63.7% did receive treatment (Appendix C). Adults 18 years and older who were uninsured, below the poverty level, and living in nonmetropolitan areas were more likely to experience serious mental illness in the past year.

Household substance use. Felitti et al. (1998) included the category of substance use in the ACE study to incorporate those study participants who were adversely affected by adults in the home who used drugs or alcohol. Asanbe, Hall, and Bolden (2013) studied preschool and elementary aged children in rural homes where parents produced methamphetamines. Compared to their peers from non-producing homes, 42% of preschoolers showed higher aggression symptoms and depression. School-aged students showed more anxiety and school maladjustment behaviors, such as negative attitudes toward teachers that may increase the risk for poor academic performance. In 2014, 8.4% of adults ages 26-44 abused alcohol and 3.1% used had an illicit drug dependence (Substance Abuse and Mental Health Services Administration, 2014). Of the 17 million individual ages 12 and over in 2014, 2.5% of those with an alcohol dependency or abused alcohol perceived a need for treatment but did not receive it. Nearly 90% did not perceive a need for treatment and did not seek it. There were 7.1 million individuals ages 12 and over with illicit drug dependence or abuse,

one million of whom sought treatment. Of those who were 26-44 years old, 18.1%

received treatment for drug dependence or abuse; 10.0% of adolescents ages 12-17

received treatment. Those without insurance, living in metropolitan areas, and had

income lower than 100% of the federal poverty level were more likely to abuse drugs

or alcohol (Appendix D).

The ACE study covers the majority of circumstances in which students

experience trauma. However, based on further studies and statistics, a few other

circumstances will be included in the scope of trauma and the effect on learning for

this research: homelessness or frequent moving, and chronic illness or injury. To be

most relevant and contemporary with current students I chose to use US data only

from 2010 to the present. Where possible, specific data for school-aged children,

especially in middle school, are given. Not all data for all years are available in which

case the most recent are shown.

Homelessness. Children with no stable place to call home are more likely to

attend multiple schools in a year and have higher rates of absenteeism. They are losing

time in the classroom as they transition between residencies and adjust to new schools,

which correlate with below grade level performance, grade retention, below average

achievement scores, and reduced future success (Murphy, 2011). National Health Care

for the Homeless Council (2016) defined one who is homeless as having no stable

residence and so lives on the streets in no shelter, temporary shelter, car, abandoned

building, or stays with different friends and relatives (i.e. *double up*). Based on the

point-in-time count by the U.S. Department of Housing and Urban Development,

Kristina Smock Consulting (2015) conducted a survey of people who were homeless

on January 28, 2015 in Multnomah County, Oregon. On the night of the count, 374 children under the age of 18 were identified as homeless, excluding doubling up; five were unaccompanied youth under age 18. These numbers do not include those who double up which would account for 1,661 more children for a total of 2,103; 4% of those counted were unaccounted for in terms of sleeping situation.

Of over a half million Americans without homes in 2014, 1% of those were unaccompanied minors caring for themselves (Appendix E). The number of unaccompanied homeless children living in shelters decreased over the years 2010-2014 but those unsheltered remained relatively flat for the same period. The total number of homeless persons in families—those with at least one parent and one child—decreased over the five years, but still included over 15,000 people. Those unsheltered halved from 2010 to 2014, but the number of persons in families living in shelters was essentially unchanged at 192,000. It is worth noting that these numbers are based on one point-in-time count and so does not necessarily include all those homeless. More minors could be homeless than are known.

Transiency. Children transfer in and out of schools for various reasons but those who frequently move are more at risk for dropping out of school, diminished academic performance, and lower levels of education attainment (South, Haynie, & Bose, 2007). Students' social capital diminishes as they move because they are less likely to connect socially and benefit from norms that guide academic behaviors. South et al. (2007) analyzed data from approximately 8500 respondents to the first two waves of the National Longitudinal Study of Adolescent Health. They found structure and composition of peer friendship networks best explains drop out rates. Mobile

students tended to be less engaged in the school community, have fewer friends, and be less central in their friend networks than non-mobile students. The friends mobile students do have tend to have weaker academic performance. The type and reasons for moving indicate that a change in housing type or change in family made up the majority of reasons for people moving homes (Appendix F). Family-related reasons include change in marital status, to establish own household or other family reasons. Work-related reasons include new job or job transfer, to look for work or lost job, to be closer to work or easier commute, retired, or other job related reason.

Injury and chronic illness. The final category of trauma focused on in this study relates to the physical health of students. Chronic illness affects approximately one in five students under the age of 18 at some point in their school career (Canter & Roberts, 2012; Sexson & Madan-Swain, 1995), such as allergies, attention deficit hyperactivity disorder, traumatic brain injury, and depression. Therefore, teachers and staff need to be aware of the impact chronic illness has on children's academic performance, attendance, and social-emotional response. The CDC tracks eight chronic health conditions through the NHIS: current asthma, attention deficit hyperactivity disorder (ADHD), food allergy, hay fever or respiratory allergy, asthma attack in the past 12 months, serious emotional or behavioral difficulties (SEBD), skin allergy, and three or more ear infections (Appendix G).

Serious emotional or behavioral difficulties might be less well known as chronic illnesses. However, more than 5% of children—or over 8 million—in the population deal with serious emotional or behavioral issues. In particular, higher proportions of SEBD are those children who identify as two or more races, American

Indian, or Alaska Native; are male; or are children below the poverty threshold. With the help of parents, school staff should anticipate the needs of these students by educating teachers and peers about the condition to the extent the ill students feel comfortable. Teachers and staff need to be aware of potential bullying and isolation by peers to safeguard these vulnerable populations. Reentry plans for those who are absent can ease fears and misconceptions on all sides.

The population of children ages 10-14 in each year 2010-2014 was approximately 20.6 million according to the US Census Bureau. In the same years in Oregon there were 240,000 children ages 10-14; Portland specifically had 111,504 under the age of 18. The city of Portland is located in Multnomah County. As the ACE study suggested, many adults end up having health problems later in life due to their childhood experiences. Of the adults in Multnomah County, Oregon with chronic illness in the years 2010-2013, 49.6% of adults had one or more chronic disease(s) (Appendix H).

As stated earlier, the definition of trauma includes physical injuries. The rate of emergency department visits due to injuries in the US is shown in table 13. The highest rates of injuries for children ages 5-14 of initial visits were due to falls (31.3 per 1,000 children) and being struck by/against an object or person; the least reported cause was due to poisoning (1.8 per 1,000 children). Ninety-two percent of all emergency department visits in this age group were initial visits.

The predominant categories of physical injuries in children ages 0-14 are falls and motor vehicle accidents (Appendix I); traumatic brain injuries (TBI; e.g. concussions) were chosen because they have become more prominent in recent

discussions about students. There were 1,568 children ages 0-14 in 2003-2012 that had a TBI in Advisory Board Region 1, including the city of Portland. Males tended to be injured 2:1 compared to females in all categories of injuries. Approximately 77% of all injuries were labeled as minor trauma, defined as a patient with an Injury Severity Score (ISS) of less than or equal to 15 and can be discharged from the hospital. Major trauma is defined as "injuries that result in death, intensive care admission, a major operation of the head, chest or abdomen, a hospital stay of three or more days, or an ISS of greater than 15" (Lehrfeld et al., 2014, p. 10).

Summary. Each year, thousands of students experience some form of trauma that substantially influences their daily lives. Based off the 1998 ACE study, approximately two-thirds of students will experience some sort of trauma by the time they graduate high school. Loss of parents, family members' mental illness or substance abuse, frequent moving or homelessness, and injury or illness has long-term affects on students' lives. Academic and social capacities tend to diminish along with an increase in negative behaviors often noticeable in the classroom. These reactions to trauma will be described in more detail in the follow section, along with mechanisms that underpin neurological and cognitive responses.

Impact of Trauma on Learning

The consequences of experiencing trauma are multifaceted. This section provides a brief review of what trauma is, and then discusses how trauma affects the neural circuitry and cognitive structures involved in learning. Specific impacts on well-being crucial for academic success will be reviewed, including physical and mental health, sleep, memory, emotions and feelings, and behaviors. Following that is

the timing of when and how long trauma occurs and its influence on outcomes. Finally, ways to counteract trauma will be reviewed.

Definitions of trauma and PTSD. As stated earlier, there are many definitions of trauma in the literature. The ones used in this study are from Trauma Informed Oregon (2015) and the first criterion of post-traumatic stress disorder (PTSD) in the DSM-IV-TR (American Psychological Association, 2000). Trauma Informed Oregon states trauma to be "A physical injury or an emotional state of profound and prolonged distress in response to an overwhelmingly terrifying or unstable experience." In the DSM-IV-TR, a person has been exposed to a traumatic event in which both of the following were present:

- The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.

- The person's response involved intense fear, helplessness, or horror. Note: In children, this may be expressed instead by disorganized or agitated behavior. (American Psychological Association, 2000, p. 927)

Those exposed to trauma tend to persistently re-experience the traumatic event (e.g. dreams, thoughts, perceptions, or sensations), avoid stimuli associated with the trauma and numbing of general responsiveness (e.g. feeling detached, reduced participation, effortful avoidance of thoughts or activities), and experience symptoms of increased arousal (e.g. inconsistent sleep, irritability or outbursts of anger, difficulty concentrating, hypervigilance, exaggerated startle response). To be diagnosed with

PTSD, one's reactions to a traumatic stressor extends beyond a month, and causes clinically significant distress or impairs daily functioning,

Shalev (1996) noted that in the literature an assumption about PTSD is that it is a normal reaction to an abnormal catastrophic event. However, he pointed out, many causes of stress are ordinary events, such as car accidents. Further, he argued that, if "normal" reactions to a stressful event fall within the limits of expected responses by the majority of people, then PTSD is an abnormal reaction because it develops upon failure to stop responding to mental traumatization. The diagnosis of PTSD involves a combination of hyperarousal, learned conditioning to trauma-related stimuli, shattered meaning of previous knowledge of the world, and social avoidance. Much like the physical response to stress (acute response, resistance, recovery or exhaustion), the psychological response entails pathogenic effects of controllability and predictability of the stressor, and the modulating effects of coping and appraisal. One's outcome depends on pre-trauma vulnerability (genetic and biological risk factors), magnitude of the stressor, preparedness for the event (e.g. training and warnings reduce uncertainty and increase sense of control), quality of short-term responses (behaviors, experiences, and mental functions) to adapt immediately, and posttraumatic assimilation mental processes (Shalev, 1996). As well, individual vulnerability and development of a range of disorders contribute to symptoms of PTSD. There is no one constellation of trauma symptoms uniquely associated with PTSD, and different types of traumas have different consequences (McFarlane & De Girolamo, 1996).

Beers and De Bellis (2002) reported that PTSD in children is not as well examined as in adults in terms of neuropsychological deficits. Their preliminary

empirical study compared 14 pediatric patients with maltreatment-related PTSD with 15 healthy peers with no maltreatment of similar socioeconomic status, age, race, and IQ. Attention, abstract reasoning, and executive function were significantly lower for children with PTSD than their healthy peers. Those with PTSD were more prone to distraction and acting on impulse and demonstrated deficits in hypothesis testing, problem solving, and semantic organization. There was no performance difference between groups on measures of language, memory and learning, visual-spatial abilities, and psychomotor skills. There was no comparison group that was maltreated but did not have PTSD, so results could be due to either the PTSD or co-morbid anxiety disorders.

Various fields have tackled the subject of the stressor trauma as it affects individuals and their relationship to their environment. In neuroscience, studies demonstrate the physiological effects of trauma on the brain. Past research has shown the impact of trauma on brain development, such as structures, neurotransmitters and hormones, myelination of neurons, and hypersensitivity (i.e. when the body reacts with an exaggerated immune response to a foreign agent) (Anda et al, 2006; Arnett, Pan, Doak, Cyr, Muglia, & Muglia, 2015; Petchel, Lyons-Ruth, Anderson, & Teicher, 2014). Hans Selye a pioneer in the stress field, labeled *stressor* as the causative agent and *stress* as the resulting condition (Selye, 1936). In this section, the basic stress circuitry and learning structures will be discussed to serve as the background for how trauma affects cognitive and emotional control.

Brief overview of stress circuitry. When the body is in homeostasis, it is maintaining a steady state despite changes in the surroundings (Selye, 1976). During

homeostasis, the brain is synchronous and works efficiently (LeDoux, 2002). The

brainstem and hypothalamus are primarily associated with maintaining internal

homeostasis, mediated by endocrine glands and their action on the immune system

(van der Kolk, 1996a). In this state, the brain has enough structures to support the

compatible functions, it requires less energy for higher order thinking (Essex et al,

2011). In contrast, the body uses more energy in the forms of sugars and proteins to

regulate a set change, or *allostasis*. Allostasis occurs when a body responds to an

event outside of homeostasis in order to regain stability (McEwen, 2006). An

allostasis framework establishes a stable hypothalamic–pituitary–adrenal axis (HPA)

that sustains function and maintenance through change (Essex et al., 2011). Stress

triggers a cascade effect of hormones activated by the HPA and sympathetic nervous

system (SNS) to prepare the body to fight, flee, or freeze. When there is a general

stress (e.g. fear, worry) almost every organ and chemical of the body is involved,

particularly the endocrine and nervous systems (Selye, 1976). Hormones needed for

physical survival (Luke, 2016), forces out thinking that requires language (Skagestad,

2004). The major stress hormones are epinephrine (i.e. adrenaline) and cortisol.

Epinephrine is released into the body to arouse it for action, such as increase blood

pressure, with the help of norepinephrine that increases attention. Cortisol (i.e.

hydrocortisone) is a glucocorticoid that mobilizes energy use to mediate the stress

response. Together, these responses enable the body to react to the stress with the goal

of regaining homeostasis (Simpkins & Simpkins**,** 2013; Society of Neuroscience,

2008).

Brief overview of learning structures. Learning is a complex process that, according to Illeris is "any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing" (2009, p. 7). The brain structures involved in this process primarily combine memory and language to making external stimuli meaningful. A main function of the hippocampus is to integrate external experiences with the internal persona. Typically, new sensory elements from experiences are integrated automatically into one's personal narrative. The typical communication pathway for stimuli is from amygdala to assign emotional significance, to the hippocampus for integration of stimuli into similar preexisting information, to the prefrontal cortex (PFC) to judge and plan in light of the input received (van der Kolk, 1996c). The PFC maintains relevant information in the working memory, supporting executive functions (e.g. selection, rehearsal, planning, decision making) in relation to other information (e.g. visual images, sounds, words, context of events) (Simpkins & Simpkins, 2013; Society of Neuroscience, 2008). That information is stored in the hippocampus, the hub of declarative memories. The hippocampus takes in new information from experiences, organizes it, and converts it from short-term into long-term memories. These long-term memories are retrieved later to compare with similar novel information through the connection with the cerebral cortex, the source of higher functions: cognition, language, speech memory, visual processing (Simpkins & Simpkins, 2013). There is a large network in the cerebral cortex that supports declarative memory, particularly in aspects of perception, movement, emotion, and cognition (Society for Neuroscience, 2008). Emotional memories involve other brain structures, particularly the amygdala, which attaches

significance to an event, as well as the hypothalamus and sympathetic nervous system (Simpkins & Simpkins, 2013). Broca's area is involved with language semantics, transforming subjective experience layered with emotional meaning into speech production (van der Kolk, 1996c).

How trauma affects brain structures involved in cognition and emotional control. The human body is complex and integrated. The brain and the mind cannot experience events separately; one completes the other (LeDoux, 2002). Each person reacts somewhat differently to stress depending on selective conditioning of inherited and acquired characteristics (Selye, 1976). Many people can arrive at the same outcome for multiple causes, and therefore developmental pathways. As well, one factor can produce various outcomes within a person (Reichenberg, Mill, & MacCabe, 2009; Roth, Lubin, Funk, & Sweatt, 2009; Thornberry, Ireland, & Smith, 2001; Tyrka, et al., 2013). Cicchetti, Toth, and Maughan noted that multifinality of experiencing maltreatment can result in many outcomes, depending on "the child's accomplishment of stage-salient tasks and influences within his or her own ecology" (2000, p. 713). This section presents what happens to people's bodies and brain structures when they experience stressors, such as traumatic events, that catalyzes a cascade of physical and psychological responses.

The Cascade Effect. Selye described stress as "the nonspecific response of the body to any demand" (1976, p. 1), which could be positive or negative. From homeostatic adaptive reactions to allostatic defense against stress to signs of physical damage, this continuum of changes is considered the stress syndrome. Initial response to a threat triggers stress, but individuals' responses are based out of their genetic

makeup and past positive and negative experiences that prime them for future events

(McEwen, 2006). Resistance and adaptation rely on the balance of the direct effect of

the stressor and allostasis, the internal defense response to stress (Selye, 1976).

Disrupting these mechanisms results in what McEwen (2006) termed *allostatic*

overload, the "wear and tear that results from either too much stress of from inefficient

management of allostasis" (p. 368) based on Selye's early work on stress diseases.

Stressors of daily life contribute to the breakdown: occupation, climate and

environment, sensory deprivation, boredom, loneliness, isolation, relocation, and

catastrophes (Selye, 1976).

Hypothalamic–pituitary–adrenal axis. Maltreatment is associated with

increased inflammation levels and chronic activation of the hypothalamic–pituitary–

adrenal axis (HPA) (Flaherty et al, 2013). Stress can modify neuroendocrine,

neurotrophic, and monoaminergic (e.g. dopamine and serotonin) systems enlisted in

the response to childhood adversity (Tyrka et al., 2013). Excessive or prolonged

stressors can alter basal and provoked HPA activity leading to a hyporeactive adrenal

gland that reduces production of the glucocorticoid cortisol. Early life stress influences

cortisol production, which is typically high in the mornings with drop off during the

day for modest stress and expected mental health development. Severe or chronic

stress leads to wider swings around basal functioning of HPA activity and increase

negative mental health symptoms (Essex et al., 2011). HPA dysfunction may precede

the onset of depression and post-traumatic stress disorder (PTSD). Decreased

connectivity within the default mode network, correlated with autobiographical

information, has been linked to early life stress and PTSD, showing a connection

between stress exposure and disrupted processing of internal experiences (Tyrka et al., 2013).

  Hippocampus, prefrontal cortex, and amygdala. The hippocampus is one of the more sensitive brain areas, therefore it adapts to protect its function in response to stress. (McEwen, 2006). The hippocampus, which normally evaluates the relationship between incoming stimuli and stored memories, is circumvented, thereby decreasing behavioral inhibition. Instead, a person immediately responds without first figuring out the meaning of the stimuli (van der Kolk, 1996a). The central nucleus of the amygdala plays a critical role in processing information regarding fear, sending messages to the brainstem to prepare for fight or flight response, as well as triggering the hypothalamus to release stress hormones (Mitchell, 2014). The release of neurotransmitters such as norepinephrine, serotonin, and dopamine increases arousal and vigilance towards external cues (Rodriguez, LeDoux, & Sapolsky, 2009). As these emotional memories are laid down in the amygdala instead of the hippocampus, so is a conditioned response to stimuli associated with trauma (van der Kolk, 1996a). Extended exposure to cortisol results in dendritic damage to hippocampus damaging the brain's ability to create long-term memories from working memory because synapses cannot fire out of the limbic system to connect to prior knowledge in the hippocampus or to language in the neocortex and Broca's area (LeDoux, 2002; Luke, 2016; Rodriguez, et al., 2009). The hippocampus and amygdala circuit is impaired, so the brain cannot pass along signals to the prefrontal cortex to make a judgment about what to do (Child Welfare Information Gateway, 2015; LeDoux, 2002; Luke, 2016).

Stress impacts neuronal growth and death in these structures, compromising the capacity to learn, remember, and make decisions according to animal models showing atrophy of neurons in the hippocampus and PFC (McEwen, 2006). Glucocorticoid deficiency leads to hyperactive inflammation and immune responses that may lead to telomere shortening and early cell death. Telomeres are the end caps to chromosomes to maintain stability and are programmed in early childhood development. Stress at this period can lead to telomere attrition (Tyrka et al., 2013) that costs the body additional energy to regulate alterations, contributing to wear and tear on the physical body (Essex et al, 2011).

McEwen (2006) found in the hippocampus that acute stress induces synaptogenesis but chronic stress decreases it. Both acute and chronic stress increases synaptogenesis in the amygdala and the orbitofrontal cortex. Moreover, chronic stress lasting 21 days or longer impairs hippocampal-dependent cognitive function (e.g. executive functioning) and suppresses neurogenesis and dendritic growth in the hippocampus and the medial prefrontal cortex. However, repeated stress produces dendritic growth in neurons in amygdala, enhancing amygdala-dependent unlearned fear and fear conditioning. In their review of the literature on fear circuitry, Rodriguez, et al. (2009) found chronic stress causes an increase in the dendritic branching and synaptic connectivity in the basolateral nuclei in the amygdala—associated with relaying visual and auditory information—but not the central nucleus that plays a critical role in processing information regarding fear and triggers the release of stress hormones (Mitchell, 2014). These results mean people take in more external stimuli but cannot process it as well, which supports the work of Petchel, Lyons-Ruth,

Anderson, and Teicher (2014). Petchel et al. found that overproduction of dendrites or inadequate pruning results in enlarged amygdala that may be caused by hormones stimulated by early life stress. Even after adversity stops, alteration of the amygdala persist and remain resistant to recovery. Another alteration in the structure of neurons occurs in the medial prefrontal cortex (mPFC), strongly associated with executive functioning. The neurons atrophy and spines reduce (Rodriguez, et al., 2009), influencing the capacity to do such things as plan and decide. However, stress-induced atrophy of hippocampal and mPFC neurons can reverse after stressors end, though the same is not true for the amygdala. Put together, the hippocampus, amygdala, and prefrontal cortex circuit is affected by stress, though each in different ways. The basolateral amygdala neurons become more sensitive and increases in firing rates with acute stressors, making them more efficient at long-term potentiation and so laying down emotional memories. On the other hand, chronic stress, particularly uncontrollable stress, suppresses hippocampal long-term potentiation, affecting the capacity to remember factual information. Neurons in the mPFC helps mediate the controllability of stress, encoding fast or slow depending on which phase of experiencing the stress (initiation, duration, termination). Stress reduces long-term potentiation induced in the PFC from the amygdala and hippocampus, so there is less connection to the part of the brain that helps regulate reaction (Rodriguez, et al., 2009).

Genetic and epigenetic contributions. Genetic factors and epigenetics play an appreciable role in how people respond to trauma. Genes are stretches of deoxyribonucleic acid (DNA) that make up proteins which carry out processes in cells

and so control cell behavior. As people reproduce, their genes make up inherited traits passed down generationally (Nestler, 2011), such as how to respond to stress. Expression of those genes, called phenotypes, can be switched on or off by neurotransmitters when people interact with their environments (Nestler, 2011). Epigenetics is the likelihood genes are expressed due to external events without changing the DNA itself (Tyrka et al., 2013) but instead changes genetic transcription through a biochemical process involving methylation (Vinkers et al., 2015). Simply put, methylation tags genes to be read by proteins that either suppress or stimulate transcription as regulated by environmental signals (Nestler, 2011; Zhang & Meaney, 2001).

The environmental regulation of the development of responses to stress in childhood leads to decreased fearfulness and more modest HPA responses to stress in adulthood (Meaney, 2001). Studying rats, Meaney (2001) analyzed the relevant features of mother-pup interactions, and how they influence neural development under normal conditions. He found that the maternal care received by pups encoded behavioral and neuroendocrine responses to stress in adulthood. These epigenetic effects change the expression of genes in brain regions that mediate responses to stress. In addition, female pups transmit genetically their reactions to stress to their offspring, so fearful mothers produce stress reactive offspring and vice versa. A related study conducted by Weaver et al. (2004) hypothesized that maternal care from rats would alter their pups' glucocorticoid DNA expression and HPA responses to stress. Through their studies with rats, they found mothers who licked and groomed pups produced stable alterations of DNA methylation and chromatin (packaged DNA)

structure. This change in structure imprinted dynamic environmental experience on the genome that alters the phenotype. Therefore, "maternal effects could result in the transmission of adaptive responses across generations (Weaver et al., 2004, p. 852). Epigenetic modifications prime genetically predisposed people with chronic stress to react with resilience or with unhealthy responses, such as substance abuse or depression (Nestler, 2011).

Specific work has been done regarding glucocorticoid receptors and brain-derived neurotrophic factor (BDNF). Vinkers et al. (2015) reviewed literature about traumatic stress and human DNA methylation during the prenatal period, early life environment, and adolescence and adulthood. They focused on studies analyzing glucocorticoid receptors, such as for cortisol, and serotonin transporters that regulate glucocorticoid receptors in hippocampal neurons. Though the studies were heterogeneous, there is evidence that traumatic stress is associated with either increased or decreased DNA methylation and may have an impact on disease phenotype. The majority of studies showed hypermethylation in glucocorticoid receptors, meaning people who experienced traumatic stress tended to have more stress hormones like cortisol that were not regulated by serotonin.

Roth et al. (2009) sought to understand the epigenetic influence of early life stress on brain-derived neurotrophic factor (BDNF) in rats. BDNF is a protein that helps with growth, differentiation, maintenance, and survival of neurons (Tyrka et al., 2013). They found that early life stress affects the neural plasticity of the prefrontal cortex and hippocampus mediated by BDNF, and possibly affects epigenetic modification of gene transcription (Roth et al., 2009). Infant maltreatment leads to

methylation of BDNF DNA into adulthood, reducing expression of BDNF in the prefrontal cortex. Even if the postnatal environment is positive and supportive, persistent maltreatment can alter DNA methylation patterns (Roth et al., 2009), as well as decrease expression of the glucocorticoid receptor gene in pups, thereby dysregulating pups' responses to stress (Tyrka et al., 2013). Offspring from maltreated mothers inherited this changed DNA. Maltreatment makes an indelible genetic mark, though not necessarily expressed (Roth et al., 2009).

How this disruption in cognitive circuits due to trauma impacts different facets of well-being crucial for academic success. While Selye's (1976) stress theory focused on self-conservation and resource allocation, long-term consequences of stress need to be addressed. McEwen termed allostatic load to be the event when the body switches from a typical response to a stressor to a maladaptive response that further harms the body (McEwen & Seeman, 2009). Van der Kolk (1996a) explained that when a body is chronically aroused, as in trauma, the brain fails to regulate autonomous reaction to stimuli that would typically alert the brain to attend and adapt to the environment.

Adaptive stress responses reflect integrated body and mind reactions to stressors for survival (Davidson, Inslicht, & Baum, 2000). There are fundamental differences in responses: distress that is more persistent and more long-term emotional consequences correlate to human-made trauma. For example, environmental disasters tend to be predictable, even though they result in destruction of property or can be physically harmful. Though, if they persistently occur, they can disrupt basic psychological assumptions and processes. Human-made trauma, such as parental drug

use, "can erode people's confidence in their ability to control and what should be under control" (Davidson et al., 2000, p. 727), shifting their worldview and feelings of invincibility. The levels of stress and dysfunction differ based on age and experience (Davidson et al., 2000). The response to stress will be described from the neuronal response to the behavioral response. When the brain evaluates stimuli as dangerous, it sets in motion a hormonal cascade effect. This then impacts physical and mental health, sleep, memory, emotions and feelings, and behaviors. Each of these will be addressed in turn to develop the broader picture of the impact of trauma on learning.

Physical and mental health. Stress is typically acute but can be chronic, and the body reacts to the level of stress via psychological and physiological responses, as exemplified by results in Felitti et al.'s (1998) ACE study. Other studies demonstrated the effect of stress from trauma on children's physical and mental health. Allostatic overload due to chronic stress and can lead to metabolic syndrome, cardiovascular disease, diabetes, fibromyalgia, and chronic fatigue; ACE and stressful experiences account for 45% of variance in childhood-onset psychopathology (Tyrka et al., 2013). An impaired hippocampus-amygdala circuit can lead to an increase in internalizing symptoms, such as depression and anxiety, because the child's signals are stuck in the limbic system instead of reaching the higher cortex for language and critical thinking. Overall, this leads to a challenge of dealing with episodic mental health challenges (Essex et al, 2011). Childhood maltreatment may impair frontal brain regions, especially the prefrontal cortex (PFC), especially with inhibition of limbic response (Tyrka et al., 2013). Impairment of the PFC, typically burgeoning in adolescence, reduces executive functioning (Child Welfare Information Gateway, 2015) that

controls impulses, inhibits inappropriate behavior, shifting, forming strategies and planning setting priorities among tasks and goals (Flaherty et al, 2013; McEwen, 2006). Increased cortisol concentration has been associated with diminished functional connectivity between the PFC and amygdala, decreasing the ability to accurately assess threat (Tyrka et al., 2013). Orbitofrontal cortex, anterior temporal lobes, including the amygdala are most susceptible to closed head injuries, especially if hit in the back of the head and brain shunts forward. This type of trauma can lead to memory problems and aggression, particularly related to activity in central amygdala nuclei which runs midbrain to spinal cord and brain stem, thus circumventing cortical (thinking) involvement (Mitchell, 2014).

Immunity. The immune system's job is to defend the body against infectious agents that invade healthy cells. However, Sapolsky (2004) pointed out that stress suppresses creation of new and sustenance of current lymphocytes (i.e. defensive cells), ultimately leading to inhibition of the immune response to sick areas of the body. When the body needs to divert energy to deal immediately with stress, it uses more energy to shut down other longer-term functions like immunity. Double dipping into energy reserves breaks down cells and tissues. Within the first thirty minutes of the onset of a stressor, immunity is enhanced in order to help deliver antibodies and lymphocytes to the injury. After an hour or so, sustained glucocorticoid and sympathetic activation suppresses immunity. If the injury ends at that time, immunity adapts and returns to baseline. If the injury is sustained for longer, chronic stress, then the immune system plummets in function (Sapolsky, 2004). For students with trauma, this translates into more illnesses, lethargy, and missed school days.

      Sleep. Sapolsky (2004) noted the importance of sleep, an area worth mentioning because it has a significant impact on students in the classroom. The brain is about three percent of body weight but requires nearly a quarter of the energy. The brain needs deep, or slow wave, sleep to restore energy, but a stressed brain infused with CRH decreases the deep sleep and keeps the brain in shallow sleep when it is more easily wakened. The sympathetic nervous system shuts down during sleep in favor of the parasympathetic system and glucocorticoid levels drop. The stress response is off until about an hour before waking when CRH, ACTH, and glucocorticoids begin to rise. However, when sleep deprived, the stress hormones do not decrease in levels but rise instead. These elevated levels lead to a break down some of the stored forms of energy in the brain, inhibiting frontal cortex activation. Prolonged stress damages the hippocampus and hippocampal-depended explicit memory that requires deep sleep. This is a particular issue since during sleep is the time when the brain consolidates memory, forms new memories, clears out toxins, and facilitates problem solving. In return, poor sleep can increase stress, thereby creating a dangerous loop of stress and poor quality or lack of sleep (Sapolsky, 2004). For students who experience trauma and cannot predict their mornings, their brains anticipate waking up, thereby raising the stress hormones the hour or so before waking and compromising the quality of sleep they get. Using the 2009 Behavioral Risk Factor Surveillance Survey, Chapman et al. (2013) looked specifically at insufficient sleep (i.e. not getting enough sleep in at least 14 of the past 30 days). They found 28.8% of the 25,810 adults reported having at lease one ACE and insufficient sleep. Those reporting five or more ACEs (8.7%) and had 2.5 times greater odds of

insufficient sleep than those reporting no ACEs.

Memory. Memory as a system is networks of related information; therefore, activation of one aspect of the network leads to the retrieval of associated memories. Declarative or explicit memory refers to conscious awareness of facts or events (Baars & Gage, 2011). Van der Kolk (1996c) described how this active and constructive process adds to current schema, not immutably, but changes based on associated experiences and emotional state at the time of recall. Implicit or procedural memory refers to emotional responses, skills and habits, and reflexive response. Accuracy of the memory depends on the emotional valence of the experience. Unlike most memories, memories of events that are both personal and emotional, such as those related to trauma, do not tend to distort over time. They remain clear and accurate each time when recalled. This could be due to a different encoding of these types of memories (van der Kolk, 1996c).

Encoding memories begins with sensory stimuli entering through the sensory organs, travelling to the thalamus for integration, and then going to the amygdala and PFC. Norepinephrine input to the amygdala determines how strongly the memory trace is laid down in the neurons (LeDoux, 1996). The amygdala evaluates the input for emotional valence and attaches emotional significance to the stimuli. The amygdala notifies the brainstem areas that control behavioral, autonomic, and neurohormonal responses. Now the sensory stimuli initiate an emotional response (that will be discussed later) prior to the conscious emotional experience. This means the body is hormonally primed to respond to trauma before the person even knows what is happening. Exposure to conditioned stimuli and high arousal can trigger the retrieval

of associated sensations, potentially causing the person to relieve the emotions and sensations of the trauma (van der Kolk, 1996c). For example, when a student is remembering his trauma in class—he might appear to be daydreaming—he can see it clearly in his mind. Therefore, he can also experience the physical and affective responses he had when it occurred, activating his stress response.

The amygdala assigns more meaning to high levels of emotional arousal, so the hippocampus will attend more to that input and the memory will be more strongly retained. However, due to this interaction being an inverted-U-shaped function, high levels of stimulation of the amygdala interrupt the proper functioning of the hippocampus, so the memory is not integrated wholly. Explicit memory may fail, so the person may be unable to establish a coherent narrative of the event. During incitement of traumatic memories, Broca's area, which is associated with transforming subjective experience into speech, decreases in activity. In turn, the person has sensory memories of trauma but no verbal, or explicit, component. On the other hand, areas in the right hemisphere processing intense emotions and visual images increase in activation. Bits and pieces of emotions and responses to stimuli are recorded in implicit memory but not threaded together with language to contextualize those pieces. They are dissociated from a greater narrative, accessible only through associated sensory stimuli (van der Kolk, 1996c). This is what Piaget (1962) discussed around semantic memory failure in traumatic events leading to the organization of memory on somatosensory or icon levels.

Over time, people with trauma memories try to make explicit sense of them through the use of language. However, that transcription leaves room for errors and

distortion. For children and teenagers who have fewer mental capacities for creating a coherent narrative out of traumatic event, they are more vulnerable to manipulation. As well, not knowing what is going on when experiencing a strong emotion brought on by trauma can be scary and confusing (van der Kolk, 1996c). For example, a student experiences trauma when his parent dies. At school, another student picks a fight with him, leading to a high level of arousal of memories and sensations. He hits the student, reacting based on intense responses associated with trauma. His hippocampus does not communicate with the prefrontal cortex to access language to judge the scenario. Therefore, he does not think before he acts. However, from an outside point of view such as by a nearby teacher, he may appear to know what he is doing.

Emotions and feelings. The term *feeling* refers to the experience or awareness of an emotional response, and the term *emotion* is the collection of responses when confronted with a salient stimulus (Johnston & Olsen, 2015). Damasio (1999) proposed the term *feeling* to represent the private mental experience of an emotion, whereas *emotion* is the public response to those feelings. He argued for a continuum in which it is possible to have a feeling in neural and mental patterns, as he calls a *state of emotion*, without knowing it exists, called a *state of feeling*, and being conscious of the emotion turns it into a *state of feeling made conscious.*

Emotions are a pattern of neural connections used to regulate the life of the organism by maintaining the body (Damasio, 1999). One becomes aware of only a limited amount of sensory information reaching the senses (Johnston & Olsen, 2015). Most sensory information is processed subconsciously; only novel, significant stimuli

are passed to the neocortex for review and instills with personal meaning (van der Kolk, 1996a). The biological mechanisms that produce emotions begins in the brainstem and moves up to the neocortex, automatically regulating homeostasis and representing body states for survival (Damasio, 1999).

A primary function of emotion is the regulation of attention (Öhman, 2005), so emotionally salient stimuli require attentional resources. Attention filters stimuli for awareness and processing based on their relevancy to an internally generated model (endogenous or top-down processing) or low-level features of the stimulus itself (exogenous or bottom-up processing) (Johnston & Olsen, 2015). For example, students with trauma histories attune to stimuli similar to that which they experienced with their trauma, therefore students with trauma whose parent drinks heavily is more acutely aware of anyone they see drinking. Vuilleumier and Huang (2009) reviewed a variety of experimental research that demonstrated how the brain selects for emotional stimuli, thereby giving it preattentional processing leading to primary use of attentional resources. They argued that (a) emotional stimuli activate the amygdala apart from frontoparietal attentional networks, and (b) the source of emotional attention regulation is distinct from exogenous or endogenous processing but modulates sensory processes in a similar way. Some research (e.g. Anderson, 2005; Anderson & Phelps, 2001) shows that this preference for emotional stimuli interferes with processing unemotional stimuli. If this is the case then students with trauma, an emotional experience, may tend to focus on intrusive thoughts from their trauma rather than the assignment in front of them.

Alongside emotional stimuli, preexisting affective states can alter the awareness and processing of sensory information, such as sound and sight (Johnston & Olsen, 2015). A sense of self is centered around the insula that processes subjective feelings which makes one aware of one's homeostatic state of the body—physically, emotionally, and cognitively—in concert with the external environment and neural activity in the neocortex (Craig, 2011). This metarepresentation over successive moments is how one feels at the present time, which Craig referred to as the *sentient self.* However, asking a student experiencing negative effects from trauma how he is feeling may not result in an answer because he is unable to evaluate or label how he is feeling due to lack of access to higher regions of his brain that manage language.

Gross' (2007) model depicts the creation of emotions as a dynamic process with multiple points for regulation. He determined four stages in the process: situation, attention, appraisal, and response. Each stage has its own regulation strategies focused on either antecedents or responses depending on which stage of emotional response formation the person is in. Emotional regulatory strategies can act on either how one feels or thinks about the experience, feels compelled to act in response, and bodily effects. Situation selection is the earliest group of strategies, employed before an emotional response is needed to avoid uncomfortable situations. If the situation cannot be avoided, it could be modified to reduce effortful regulation and emotional taxation. Attentional deployment is the third group of strategies and involves averting attention from emotional situations. This can take great effort to accomplish but can be helped by other attractive options. Cognitive change relies on the ability to change how one evaluates an emotion-provoking stimulus. Reframing a situation to think about it

differently can be highly effective at diminishing the emotionality of the image but requires more cognitive effort and use of language through reflection to alter one's interpretation. This strategy succeeds if working memory can hold the reframe while accessing semantic memory to select a good reappraisal strategy based on what worked in the past. Lastly, modulating and part of one's emotional response—behavioral, experiential, and physiological—can regulate one's emotions. The three components of the emotional response can be addressed through (a) direct suppression of behavioral responses (e.g. tone of voice, facial expression), (b) relaxation techniques to become more aware of feelings (e.g. visualization), and (c) deep breathing to activate the parasympathetic nervous system to counteract the sympathetic nervous system fight-or-flight response (Johnson, El, & Olsen, 2015).

Damasio's (1999) work furthers the idea that one cannot control the inducer of an emotion—it could be an internal chemical change or an environmental cue—but can control his attention towards that inducer and the expression of his emotions. Higher order thinking cannot control some spontaneous responses from the brain stem, such as a smile from genuine delight. Language is a major contributor to the high-level form of consciousness but is not required to maintain core consciousness, or sense of self and related images and thoughts. One can retain thought processes and conceptual understanding without language as seen through nonverbal signaling. Therefore, behavior can still represent concepts without language to describe them. This point is important because Broca's area in the brain processes and produces words is inhibited during stress, thereby disrupting someone's ability to correctly hear what others say and, in response, say what they mean (Society for Neuroscience, 2008).

Higher reasoning abilities enables one to plan a complex and flexible response, such as behavior, to images from sensory patterns of feelings. Consciousness of feelings is another form of regulation. However, those experiencing trauma cannot get out of the limbic system to access the neocortex in order to be conscious of or use language to define those feelings and create a reasoned response. They remain in the automatic response loop in which their body tells them to fight, flee, or freeze. Emotions occur either in response to new stimuli or in remembrance of objects or situations. There are not always emotional ties to stimuli but through conditional learning emotional responses can be linked. Development and culture have a lot to do with influencing the preset biological machinery: they shape external inducers of an emotion, shape the expression of an emotion, and they shape cognition and behavior following a response to an emotion (Damasio, 1999). Students who suffer a major injury while skiing may learn from the experience that going too fast makes them feel out of control and scared, therefore they prefer slower movement, such as driving.

Intrinsic and extrinsic behaviors. What children experience today serves as a prediction for tomorrow, thereby building their internal schemes. "*Predictability* makes stressors less stressful" (Sapolsky, 2004, p. 258). Van der Kolk (1996b) stated that knowing something stressful will happen leads to a much lower stress-response than if something unpredictable happens. These expectations are shattered with trauma, forcing a new schema to take root with skewed senses of trust, power, and safety. Traumatic stressors can shift how people perceive their own and others' actions and how people experience the world because they are not as capable of anticipating and protecting themselves (McFarlane & De Girolamo, 1996). Some victims are

unprepared for events that are time-limited and characterized by high intensity. Other events are sequential and cumulative, such as experienced by first responders; or long-lasting exposure to danger that affects attachment bonds and disrupts inner sense of security. How one interprets the traumatic event depends on his or her culture and its values around identity and independence (McFarlane & De Girolamo, 1996). People with trauma struggle to attribute responsibility properly, often attributing traumatic events to their own actions, leading to feelings of guilt and shame (van der Kolk, 1996b). This egocentric mindset means a loss of a valid internal locus of control because they are not truly at fault for their trauma. Traumatized people frequently relive emotions and memories of the event triggered by current stimuli, often unpredictably, and can induce desire for social isolation instead of explaining their emotions to others (van der Kolk, 1996b). Children struggle to attune to their environment and negotiate playtime, acting either shy or aggressive with peers. They do not learn how to appreciate various roles and outcomes of games, build theory of mind, or persevere in the face of obstacles. In short, they do not learn to derive comfort from the presence of other people, a critical quality to create meaning in life. Those hurt by people learn to watch others for survival, though may fail to understand others' motives (van der Kolk, 1996b).

Beginning at birth, infants rely on caregivers to read their response signals in a situation; infants cannot self-regulate, so their caregivers are an integral part of organizing their affective-behavioral systems (Eisenberg, 2012). Over time infants behave to elicit a response from a caregiver, and regulation remains organized if distress is followed consistently by recovery. Infants internalize this effectiveness,

expect it of others, and connect outwards and build self-confidence. Consistent

responsive care also regulates infants' nervous systems, enabling them to be flexible

and not overstimulated. As children grow, this guided self-regulation builds their

capacities. However, when caregivers are inconsistent, rejecting or neglecting, infants

respond with louder and more urgent behaviors to elicit a response, a pattern known as

anxious/resistant attachment; over time, the infant stops expressing attachment

behaviors. This conflict of needing but not wanting the threatening caregiver has been

called disorganized/disoriented attachment (Sroufe, Duggal, Weinfield, & Carlson,

2000).

     To survive, the brains of students with trauma constantly monitor nonverbal

cues for threats, called hyperarousal. This is due to being in a persistent fear state,

even if in a nonthreatening space like a classroom (Child Welfare Information

Gateway, 2015).

> School represents the major extrafamilial environment in which children are
>
> exposed to a novel community of unfamiliar peers and adults, and are
>
> presented with a new set of stage-salient tasks that include integration into the
>
> peer group, acceptable performance in the classroom, and appropriate
>
> motivational orientations for achievement (Cicchetti, et al., 2000, p. 711).

Home experiences are the foundation on which students transition to school, so

negative experiences often lead to academic failure, maladaptive social behaviors that

lead to less social competence and more discipline referrals. These represent

significant vulnerability factors that increase the chance of psychopathology emerging

(Cicchetti, et al., 2000).

When a child experiences weak attachment early on, their ability to self-soothe and trust others is stunted. They do not have a balance between soothing and stimulation, which may lead to chronic hyperarousal in the presence of trauma-related or intense stimuli, poor impulse control, reduced ability to modulate strong emotions, disturbed sense of self, and insecurity in relationships (van der Kolk, 1996b). Since the body prepares for a physical response to stress, even if the stressor is psychologically-based, students with trauma need an outlet for their frustrations (Sapolsky, 2004). In an attempt to control some aspect of their lives, traumatized students may use self-destructive behaviors, such as drugs and alcohol (Mersky, Topitzes, & Reynolds, 2013), eating disorders (Cook et. al, 2005), and self-mutilation (Zetterqvist, Lundh, & Svedin, 2013). Self-mutilation is often concomitant with dissociation, or psychological numbing, that can be effective for getting through acute trauma but eventually interferes with everyday functioning if continuously used. Trauma can result in one's loss of identifying specific emotions due to a decrease in access to Broca's area, thereby leaving emotions to be expressed by the body. When trauma occurs at young ages, problems occur in the development of the utilization of words and symbols to identify feelings (van der Kolk, 1996b). Children may need to draw or act out their emotions, or borrow language from others to develop effective communication (Arwood, 2011; van der Kolk, 1996b). However, for children with stress may not think of a healthy outlet, such as exercise, because they do not necessarily have that past experience to from which to judge and conclude that is the best route. To arrive at that conclusion takes a lot of planning, judgment, and language, none of which are mature in children. Therefore, their response may be physical but socially

unacceptable (e.g. throwing a chair, hitting a peer, cutting oneself) and seen as

aggressive (Sapolsky, 2004).

The influence of timing of trauma. Timing refers to when the event occurred

and its duration in a person's life. This section discusses how timing of trauma, an

element relatively new to the study of trauma, makes a difference in terms of impact

and long-term neuronal, psychological, and behavioral outcomes. Timing of

maltreatment and outcomes correlate with various immediate and delayed negative

behaviors.

Often the immediate consequence after maltreatment, particularly when

maltreatment occurs early in life, is disengagement from school indicated by

absenteeism (Leiter, 2007). However, the "impacts of maltreatment appear quickly,

cumulate, and become increasingly difficult" (Leiter, 2007, p. 380). Longer-term

consequences of trauma include falling grades, slowed language and reading

achievement, diminished IQ memory problems, poor decision making skills, attention

problems, social isolation among peers, aggressive behavior, and poor understanding

of social cues (ACE Interface 2014; Leiter, 2007; Thompson & Whimper, 2010). One

long-term consequence can be developing mental health issues that contribute to poor

grades and test scores, high dropout rates, absenteeism, and behavior discipline

(Kataoka, Rowan, & Hoagwood, 2009). Anti-social behaviors increase office referrals,

reduce academic engagement, increase special education referrals, and increase

dropout rates (Crozier & Barth, 2005). Mental health concerns, such as emotional

distress, also can predict negative academic outcomes and behaviors by way of

decreased motivation (Roeser, van der Wolf, & Strobel, 2001). These negative effects

can lead to early adulthood anti-social behaviors such as aggression, social isolation, and drug use (Schilling, Aseltine, & Gore, 2007).

Some studies delineate the timing of the maltreatment, a risk factor for adjustment problems in early adolescence. Timing of adverse outcomes can be linked back to one category of maltreatment, and multiple types of adversity can be linked to singular outcomes (Thornberry et al., 2001). Chronic exposure to adverse experiences (e.g. neglect, abuse, parent drug or alcohol use, parent mental illness) during late childhood and early adolescence can have a profound negative impact on adolescent behavior and health outcomes over time due to dose effect (Flaherty et al, 2009; Flaherty et al, 2013). The brain's plasticity responds to the lack of stimulation by creating a brain that adapts to a negative environment (Child Welfare Information Gateway, 2015). The comorbidity of neglect and other maltreatment muddles the neurodevelopmental impact of a singular type of maltreatment. For instance, though no clear causation can be made, often neglect is more common in alcoholic homes because parents are focusing on their own needs instead of those of their children (DePanfilis, 2006; Dube, Anda, Felitti, Croft, Edwards, & Giles, 2001).

Thornberry et al. (2001) conducted the Rochester Youth Development Study, a multi-wave panel of 1000 seventh and eighth grade students interviewed at 6-month intervals with data from agencies (Child Protective Service, schools, police, social services). Behaviors analyzed consisted of delinquency, drug or alcohol use or problem, depressive symptoms, teen pregnancy, dropout, internalizing behaviors, and externalizing behaviors. Students who experienced maltreatment in early adolescence were more than twice as likely than nonmaltreated peers to display delinquent

behaviors, drug use, alcohol-related problems, internalizing problems, and externalizing problems. Externalizing behaviors include restlessness, hyperactivity, stealing, and destruction of property. Internalizing behaviors include fearfulness, anxiety, lethargy, and nauseous. Interestingly, they found that adverse experiences in adolescence or persistent from childhood to adolescence was consistently related to negative outcomes. Those who experienced early childhood-only maltreatment (ages 0-5) had statistically significant depressive symptoms; late childhood maltreatment (ages 6-11) had statistically significant delinquency, internalizing problems, externalizing problems, and multiple problems. As well, childhood maltreatment was a risk factor for early adolescent adjustment problems but the impact can fade if maltreatment ends. Fading may be due to resilience and resourcefulness of children and families or effective intervention.

Ways to counteract damage. Though experiencing trauma can lead to a high stress reactivity and consequential neural, cognitive, and emotional harm, it is not destiny. There are ways to offset the effects of trauma by bolstering individual and social means. Not all children living through trauma experience deleterious effects; some are resilient in spite of their circumstances and can maintain positive daily functioning and academic achievement (Coohey, Renner, Hua, Zhang, & Whitney, 2011; Condly, 2006). On an individual level, McEwen (2006) addressed counteracting stress and allostatic load through a positive outlook on life, good self-esteem, good social support, and positive affect. Goals to meet are to improve sleep quality and quantity, have good social support and positive outlook, maintain a healthy diet, regular moderate exercise, avoid smoking, and find meaning and purpose in life

(McEwen, 2006). In addition, specific internal and external factors can strengthen resiliency in children: epigenetics, social support, the use of language, and school programs.

  Epigenetics. Epigenetics, as discussed earlier, can alter the way children respond to stress. If parental care is supportive and caring, they will be more likely to have reduced stress reactivity (Meaney, 2001; Weaver et al., 2004) in this midst of trauma. Environmental enrichment could counteract inherited effects of early life stress by aiming to increase the level of sensory, cognitive, and motor stimulation and promotes brain plasticity (Gapp et al., 2016). Gapp et al. (2016) used a mouse model to examine the consequences of traumatic stress on coping behaviors in adulthood and across generations. Typically when fathers experiences early trauma, glucocorticoid receptors increase in production of stress hormones in the hippocampus, so fathers are less able to appraise and respond to adversity when adults. However, when fathers are exposed to environmental enrichment in adulthood, the behavioral changes are reversible. In addition, behavior in their offspring is normalized, and the offspring can cope better with challenges similar to those faced by their fathers.

  Social support. Not all that experience traumatic events experience pathological outcomes like post-traumatic stress disorder (PTSD). Mediating factors for children of short- and long-term impact of trauma include degree of exposure, family cohesion, support outside the family, caregiver's response to trauma, separation from primary caregiver, gender, age, styles of coping, and personality characteristics (Davidson, et al., 2000). In particular, "social relationships have a key role in the etiology, maintenance, and remediation of disturbed behavior" (Sroufe et al., 2000, p.

76). Children with secure attachments to parents rather than anxious attachments are more protected from family life stress. Similarly, peer relationships can be assets or risks to behavior problems and pathology. Though one cannot make a direct causal link of a relationship to pathological outcome, relationships are crucial contexts that can put children "at-risk" for pathology. Inconsistent parenting, either too harsh or too lax, or abdication of the parental role have been positively correlated to later pathology such as conduct disorder. When extending parenting actions to include maltreatment and adding interpersonal conflict like divorce, the rate of children with diagnosable disorders increases compare to their non-maltreated peers. Those students who present negative responses to family life stressors have been found to lead to conduct problems that are associate with peer rejection and academic failure. "Problems in emotional regulation, like relationship disturbances, are pervasive makers of psychopathology" (Sroufe et al., 2000, p. 83) greatly owning to the role of relationship experiences of early regulation.

Social support can decrease children's stress-response if trusted and known individuals surround them but strangers can worsen a stress-response. Socially isolated individuals have an overly active sympathetic nervous system. Students experiencing chronic stress psychologically habituate to it, though do not adapt and retains physical allostatic load (Sapolsky, 2004). Unlike most adults, children do not typically have control over where they live. Those students how are used to moving between shelters might be able to adapt to the situation because they know they do not have a permanent home, but physically they would still be exhausted from poor sleep as their brains never truly rest. The stress-response can reduce if the person believes she has

control, even if she does not exercise that control. When forced into a situation, such as a trauma like homelessness, her stress-response increases. However, if she learns that her family will be getting their own apartment in a few weeks, her perception of the next few weeks living in shelters shifts from being hopeless to being doable. Therefore, outlets for frustration, social support, predictability, control, and perception modulate stress-responses (Sapolsky, 2004).

The unique role of language. An important piece of supporting students with trauma is the use of language by educators. Lenneberg (1970) described the nature of spoken language as relational: both the speaker and the hearer can interpret the utterance if they have a similar capacity for cognitive processes needed to know language. This point can be problematic though because the adult and child could have different cognitive capacities to process what is said. This is important because language is the primary tool used to change current and future situations if the speech act concurs with the speech context to create desired effects (Piaget, 1952). For instance, when a teacher wants to redirect students when they are reacting to invasive thoughts about their trauma that trigger unacceptable classroom behavior, the teacher chooses words to reflect how he or she is caring as defined by Noddings (2005). As Bruner (1974) pointed out, communicative intent may be for the speaker to induce engagement of the listener via particular language function. Intention versus impact of language depends on semantic conditions under which the hearer makes meaning of the speaker's signs. When students hear their teacher say words intended to display care, they may hear something different because of their reduced cognition due to the affects of trauma. However, when the teacher addresses students from their cognitive

capacities, they share increasing amounts of semantic, or meaningful, information and the cognitive representation becomes more complex (Arwood, 1983). Speaker-hearer reciprocity between ones-caring and ones-cared for depend on cognitive ability and physiological development (e.g. eye contact, smile) to contribute meaningful input (Arwood, 1983).

The speech act itself must be context-specific for the child to acquire and learn meaning shared with the speaker and organize that meaning at the cortical level (Arwood, 2011). This idea that using words socially increases structure and function of thinking conceptually, founded in Piaget's (1952) work, is foundational to Arwood's Neuro-Semantic Language Learning Theory. Speech acts are functions of conversational language between the speaker and the hearer, including "the rules for the context, verbal and non-verbal characteristics of the speaker's utterance, and the effects on the listener" (Arwood, 2011, p. 71). Language does not depend on sound— as seen with sign language or nonverbal body movement—so "what matters is the *functional use of signs* [emphasis added]" (Vygotsky, 1962, p. 38). Language acquisition is primarily a social process gained through interactions with and modeled by others (Cooper & Kiger, 2009) to create shared meaning (Arwood, 1983). Vygotsky's (1962) focus on external support in cognitive development led to his theory that learning occurs in what he termed the zone of proximal development. It is the gap between actual developmental level and potential developmental level that can be bridged by guidance, collaboration, and interaction with the physical environment "until they are internalized as an independent developmental achievement" (Kolb, 1984, p. 133). The external scaffolding provided by teachers helps students raise their

thinking to as they struggle relating prior knowledge to new information and reach a new cognitive level. Students' actual and potential development are equal in this area and a new zone opens up for the student to reach. In her Neuro-Semantic Language Learning Theory, Arwood (2011) used a spiral image to depict how one's system takes in information that originates from outside the person. With each new concept introduced, the learner's cognitive level drops in the struggle to assimilate or accommodate the new information load. As Vygotsky found, receiving external support or scaffolding—such as explanations with rich language from a teacher— raises the learner's level of thinking and he cognitively regains equilibrium, ready to take on more concepts that are novel. Behaviors give rise to physical substructure to create thoughts, meaning the brain function influences the creation of cortical structures to form language syntax (Lenneberg, 1970). Arwood (2011) describes language as the mechanism by which learners become conceptual thinkers capable of describing their thoughts. As Bruner stated simply,

> Indeed, 'thought' as it is usually discussed may be little more than a way of talking and conversing about something we cannot observe. It is a way of talking that functions to give 'thought' some form that is more visible, more audible, more referable, and more negotiable. (1996, p. 108)

Cognition is the process by which the speech act exists (Arwood, 1983; Peirce, 1868).

Children's theories of mind are how they interpret what others think, feel, intend, and mean what they say; it is also believed by most developmental linguists to be crucial to the acquisition of language. "Verbal intercourse with adults thus becomes a powerful factor in the development of the child's concepts," wrote Vygotsky (1962,

p. 69). Referents are the same but meanings are different. Language used by adults

may or may not mean the same things to children (Bruner, 1996). A teacher who

promises to a student with trauma that everything will turn out okay may intend to

reassure the student. However, that student, whose trust has been compromised as a

result of experiencing trauma, may not interpret the teacher's words in the same way

as the teacher intended. Children's tacit presuppositions about how people's minds

work comes from following a person's line of sight and how adults treat children as if

their intentional states were being taken into consideration (Bruner, 1996). Children

are told to *think*, *believe*, *pay attention*, and *remember* but are not necessarily

explicitly told what those entail. Again, how they interpret those words may differ

from adults. For those students with trauma, they are doing all of those tasks with their

mind but are focused on trauma instead of their school work or classmates. These

students see the world is through a dark, myopic lens. What is in front of their minds'

eyes are their trauma, whether or not their external behavior indicates their thinking

(Bruner, 1996). If their language helps them conceptualize the mental world, as

Astington (1995) said, adults need to be sensitive to children's use of words to

interpret what children understand. Asking students what they mean when they

describe a situation, a feeling, or a thought will bring adults closer to the children's

conceptualization of their experiences (Bruner, 1996). However, depending on the age

of the student, his language function, the dose and duration of the trauma, he may not

have the words to describe his situation, feeling, or thought. Adults sometimes assign

communicative intent to what children are saying instead of listening to what actually

is said (Bruner, 1974). When educators interpret students' communication incorrectly,

outcomes can harm their relationships (Bruner, 1974; Sitler, 2008; Valenzuela, 1999).

Adults can help by letting students draw out what they mean to help them focus their conceptual understanding first and offering words and descriptions with rich language (Arwood, 2011). Both adults and children require perspective and context to make sense of discourse, and these three elements are needed to develop theory of mind. When students explain their situations, feelings, or thoughts to adults, the adults have to make sense of what students told them in light of perspective, discourse, and context in order to explain it to others (Bruner, 1996). Indeed, adults have to bear the bulk of the cognitive load since children with trauma histories have diminished capacities to do so. A response-centered classroom opens up students to the idea that their ideas are important as opposed to right or wrong. They learn that their teacher values them, so, in turn students learn to value their peers and create a positive and safe environment in which to learn. How teachers ask questions and response to answers contributes to the classroom attitude of acceptance (Cooper & Kiger, 2009).

School programs. How schools support children, particularly those with trauma stressors, must cover several points to be effective. Condly (2006) encouraged considering children's personality characteristics in the context of their environments and relationships to create conditions to foster positive growth and development. However, any school program put in place to build resilience of students requires buy-in from school staff and students, otherwise it will not be implemented or received well. Interventions should take into consideration developmental levels of students, curricula should include target skills, and training should be intensive and ongoing.

Teachers, counselors, and school staff provide positive relationships for children, assess risk factors for maltreatment and promote children's assets and build daily living skills (Coohey et al., 2011). Coohey et al. (2011) compared risk factors, such as having a caregiver with substance abuse or mental health problems, with factors that promote and protect children's academic achievement. Protective and promotive factors are those using their assets to develop regardless of risk, and adaptation of those who have experienced higher risk than typical children. Included in this study were children's abilities (i.e. intelligence, competent on daily living skills, no behavior problems, and more engaged in school) and their relationships with others (i.e. better peer relationships and more emotional support from caregiver). Participants took math and reading achievement tests as a proxy for school success. Child maltreatment had a negative effect on math schools, but those children more intelligent tended to have better math and reading scores over time. Therefore, the researchers suggested more intelligent maltreated children may be able to cope better by asking for support or more likely to receive positive attention. As well, this population of children might promote daily living skills because they and academics have similar underlying attributes of attention to detail, self-regulation, and self-motivation. One unexpected finding was that children with behavior issues were protected from chronic maltreatment over time and had higher math scores than those chronically maltreated but had no behavior issues. This outcome could be due to receiving more services, attention, and assistance from adults (Coohey et al., 2011).

Summary. Trauma can place a heavy burden on the stress circuitry and cognitive structures involved in learning. The hippocampus, amygdala, and PFC take

the brunt of allostatic overload, at the cost of learning, health, sleep, emotions, and behaviors. Epigenetics and timing of when and how long trauma occurs were considered as influences on outcomes. However, though all these factors could result in detrimental outcomes, they do not have to. Positive supports from individual capacities, social supports, using language, and school programs can help protect against risks and promote students' assets.

Summary

Throughout this literature review, I built my case that educators care deeply for their students but lack the information and tools to address the needs of those students who experienced trauma. Though there is literature about how trauma affects students and ways to counteract it, none use a neuroeducation frame. Neuroeducation is a burgeoning field that accounts for the neurological and cognitive psychological aspects of learning, to which Arwood's (2011) contributed language as the third lens. As such, neuroeducation is an appropriate approach to infuse into teacher preparation programs and professional development for inservice teachers because it provides the multifaceted approach to development and learning essential for understanding the complex phenomena of trauma. A short-term professional development is an appropriate and effective method by which to increase content knowledge as the first step to shift attitude and expand content knowledge (Kalnin, et al, 2015; Kalnin, et al, 2013). In this way, my study fills a gap in both neuroeducation and professional development through the creation of a neuroeducation-informed professional development that addresses participants' need for content knowledge about trauma and learning. To that end, this action research study has two aims. The first part speaks

to the creation and refinement of a professional development workshop through the feedback of an expert panel. The second examines the participants' experience in the professional development experience to document how participation influences educators' content knowledge and beliefs about student learning and the ways trauma affects academic and social-emotional development.

    The two parts of the study are guided by four research questions.

    (a) When invited to review the content and process of a neuroeducation-informed professional learning experience on trauma, what input did experts provide in the fields of neuroeducation, trauma, and professional development?

    (b) How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?

    (c) How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?

    (d) In what ways, if any, do educators report that a professional development address their needs as they care for students experiencing trauma?

I describe in Chapter 3 the methodology used to carry out this study in order to answer these questions. Chapter 4 discusses the results of the study. In Chapter 5, I view the findings of the study in light of this literature review to answer my research questions.

Chapter 3: Methodology

The purpose of this qualitative study was two-fold. First, the purpose was to translate the literature of neuroeducation into an example of an adult professional development. Second, the study examined how engagement in a semester-long professional learning experience aligned with neuroeducation research affected educators' beliefs about student learning and the ways trauma effects students' academic and social-emotional development. Four research questions guided the work:

> (a) When invited to review the content and process of a neuroeducation-based professional learning experience on trauma, what input did experts provide in the fields of neuroeducation, trauma, and professional development?
>
> (b) How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?
>
> (c) How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?
>
> (d) In what ways, if any, do educators report that a professional development address their needs as they care for students experiencing trauma?

Study Overview

The design of this action research study was to (a) create a professional development presentation that reflects the learning process using specific neuroeducation-based activities, and (b) present the content of the learning process in the brain and the effect of trauma on learning.

Phase I. To begin this work, I identified the problem, clarified theories, and identified research questions on which to focus her work. A literature review (Chapter 2) helped inform the creation of a professional learning experience. To determine if the materials for the experience were accurate and doable, I identified local experts in the fields of neuroeducation, trauma, and professional development and invited them through email to participate. The first research question addresses input from expert panelists on the content and process of the neuroeducation-based professional learning experience about trauma. The expert panelists completed a formal evaluation of materials and communicated further thoughts via emails and in-person conversations. After reflecting on their comments, I modified the professional learning experience materials to echo many of their recommendations regarding content and process.

Phase II. The second phase was implementation of that professional learning experience with preservice and inservice educators over three sessions. Participants provided data used to answer research questions two through four. I emailed each interested participant with further logistical detail about the day, as well as a Qualtrics link of the needs assessment (Appendix J) with instructions to complete before attending. I used a PowerPoint presentation to guide the conversation (Appendix K). In addition, throughout the session I facilitated several activities to help participants understand and connect to classroom practices: watching an ACE video, writing case studies (Appendix L), taking a belief survey (Appendix M), and silently discussing educators' roles (Appendix N). At the end of the session, participants evaluated the experience. Following the session, participants received another email with a link to a Qualtrics follow-up survey (Appendix O).

Rationale

Qualitative research is a mean by which people construct meaning to make sense of their lives (Miles, Huberman, & Saldaña, 2014). Gall, Gall, and Borg (2004) described Glanz's cyclical model of action research: select a focus, collect data, analyze and interpret data, take action, reflect, continue or modify action, return to select a focus. Two key components include reflection about the process and implication of the project, and reporting the results to achieve the purpose of the study. Sagor's (2004) seven-step process is a similar cycle: select a focus, clarify theories, identify research questions, collect data, analyze data, report results, and take informed action. This approach occurs in a short time frame and focuses on raw data for practical significance instead of theoretical implications (Gall et al., 2004). An action research study works well with the research questions of this study because action research focuses on personal motivation to improve practical experience (e.g. to solve a current problem or achieve a goal in practice), "intended to promote greater self-knowledge, fulfillment, and professional awareness among practitioners" (Gall, et al., 2004, p. 599). In this study, I wanted to better understand how to create and improve a neuroeducation-based professional learning experience about trauma and implement it with practicing educators. In a review of current literature, several professional learning experiences exist to inform participants about trauma (e.g. Anderson, Blizt, & Saastamoinen, 2015; Plumb, Bush, & Kersevich, 2016) but none use a neuroeducation lens. Therefore, in order to incorporate information from the fields of education, neuroscience, psychology, and language, I developed a new professional learning experience. In this study, expert panelists' feedback informed revisions to the

professional learning experience. With those suggested changes, I implemented the study with educators. Neuroeducation was the premise of both the experience and the content materials. During the implementation of the professional learning experience, I gleaned descriptive qualitative data from multiple sources. I incorporated that data within the action research cycle to revise and inform the professional learning experience again. With the expert panelists and participant sessions there were four iterations of the experience.

Setting

Phase I. I contacted and communicated with professionals primarily via email. Email was the most effective way of accessing and communicating with the experts as one recently moved overseas and the four others worked around the region.

Phase II. I conducted the professional learning experience sessions in one setting for three unique groups. Each group attended 270-minute sessions at the University of Portland. The first and third groups attended a one day session format, with a 40-minute lunch break halfway through. The second group met on two consecutive Thursday nights for 180 minutes each.

Participants

Expert Panel. I sought out professionals in the fields of neuroeducation, trauma, and professional development to evaluate her presentation materials (Appendix K). Criteria for identifying them included depth of knowledge and experience in their respective fields and current roles. I or my committee members knew all the professionals personally. Of the eight invited by email to participate in the panel, five agreed. Two education professionals agreed for the topic of

professional development and both have doctorate-level backgrounds in neuroeducation. One is a former science teacher and current Science teacher at NASA; the other is a math teacher and teacher coach. Two professionals with doctorate-level backgrounds in neuroeducation reviewed the topic of neuroeducation: one site support instructor at an alternative school and one school psychologist. One counselor education professor from a local university evaluated for the topic of trauma. They completed a consent form (Appendix P).

Session Participants. I advertised the sessions via emails and classroom announcements (Appendix Q) at the School of Education at the University of Portland, emails through Concordia University's College of Education, and through a local public school district's listserv. An initial email was sent out ten days before the state-wide professional development day in October. Due to the short notice and small response rate, another session for inservice educators was planned and announced for November. A separate session was announced and held for preservice educators currently in their student teaching year. The literature review suggested that preservice educators' limited experience in the classroom would offer a valuable contrast to inservice, informed my decision to offer this session. Participant selection criteria included licensed or preservice educators, availability to attend the entire day or both half sessions, and willingness to complete a follow-up survey or discussion a month after the last session. Participants responded to the advertisement by emailing me with their intent to participate. I communicated with each interested participant individually to address further logistical details about the day. Participants were able to obtain 15

professional development units (PDUs) or 0.5 credits from the University of Portland if they met the criteria.

Thirteen educators participated in one of three professional learning sessions. The first one day session had four inservice teachers. Each was an inservice educator currently working at a school, predominantly in the field of special education though two taught at least on general education course. Two worked in middle schools, one at a high school, and the other was retired but substitute taught on a regular basis.

The second session (two evenings) had four preservice teachers comprised of two undergraduate education majors with no prior education work experience and two master's-level students with prior work in education. They were all completing their student teaching at the time of their participation in the study.

The third (one day) session had five participants, three who were inservice general educators (one semi-retired) at the elementary level, and two preservice master's students in a unique program that made their experiences and schedules aligned more with inservice educators than preservice undergraduates. The master's students worked at a school with seventh through ninth grades; one had prior experience working in education. In this session, all six preservice educators (2 males, 4 females) were completing their student teaching at the time, two of which had worked in in different roles education before entering their master's program.

Table 3

Description of Participants

	Preservice	Inservice	Total
Total	6	7	13

	Gender		
Male	2	2	4
Female	4	5	9
	Age		
18-30	5	1	6
31-40	1	2	3
41-50	0	1	1
50+	0	3	3
	Years at current school		
Student teaching	6	0	6
0-3	0	2	2
4-7	0	2	2
8-11	0	0	0
12-15	0	2	2
16-20	0	0	0
20+	0	1	1
	Years in education		
0-3	4	1	5
4-7	1	1	2
8-11	1	1	2
12-15	0	1	1
16-20	0	1	1
20+	0	2	2

All participants were teachers, representing both special education ($n = 4$) and general education ($n = 9$). No other professional (e.g. counselors, administrators, nurses) signed up. About half ($n = 6$) were aged 30 or younger. The seven (2 males, 5 females) inservice educators ran the gamut of working one to 20+ years in education (Table 3).

The Researcher

I am both a participant in and the professional development facilitator of this study. Spradley's (1980) continuum of participant observation spans from non-participant to complete participant. In the middle is an active participant observer who takes on a typical active role, in this case I was the professional development facilitator. One facet of my role as the facilitator was to endeavor to illuminate assumptions made by participants about students experiencing trauma and offer information by which they can better care for students through the creation of realistic expectations for students' work and behavior. Being the facilitator meant potentially biasing the data. To reduce bias of the data throughout those interactions, I

> [Engaged] in the self-reflective process of 'bracketing,' whereby [recognized] and set aside (but do not abandon) [her] a priori knowledge and assumptions, with the analytic goal of attending to the participant's accounts with an open mind. (Starks & Trinidad, 2007, p. 1376)

I witnessed and responded to students experiencing the fallout of adverse events during 10 years of counseling in schools. Many of these students experienced physical or psychological trauma, made obvious by immediate and delayed behaviors. As well, I have personally experienced trauma including frequent moving, emotional neglect, death of mother leading to chronic post-traumatic stress disorder, and two concussions. The investigator will be conscious of subjectivity throughout the study by writing jots and memos (Miles et al., 2014).

I took steps to prevent bias in analyzing the data in both phases of the study that contributed to the credibility of the study. She purposeful sought the advice and

wisdom from experts in the fields of neuroeducation, trauma, and professional

development to create a comprehensive and accurate professional learning experience

for educators. In the second phase, I inductively and deductively coded data to

categorize themes on which participants focused. Lastly, I triangulated those themes

with answers from the needs assessment, belief survey, experience evaluation, and

follow-up survey to determine the degree of convergence between results (Patton,

2002).

Data collection

      Phase I. In the first phase of the study, an expert panel evaluated the materials

used in the professional learning experience. Professionals in the fields of

neuroeducation, trauma, and professional development evaluated the content and

presentation of the materials. Their roles entailed reading through all materials,

making notes throughout to verify or recommend changes, and completing an

evaluation (Appendix S). The expert panel evaluation covered (a) the content as it

pertains to trauma and its effect on learning, neuroeducation, and professional

development; and (b) the process of the presentation in terms of organization, best

practice, and timing. Not all experts evaluated on each aspect but those they believed

aligned with their knowledge. They judged content using a Likert scale rating the

accuracy, comprehensiveness, and clarity of the material, and open responses to

expound upon answers. The process of the experience was rated for organization

structure (content confusing or out of order; logical flow overall with some changes

needed to content; or logical flow with clear content); best practice (appropriate for

preservice and inservice educators); and timing (estimate how long will the various

activities take). Four of the five completed the formal evaluation form; the fifth

emailed detailed notes and spoke to me in person, covering many of the same points in

the evaluation.

Phase II. The second phase of the study was implementing the professional

learning experience by providing it to in- and preservice educators. I collected data

from participants before, throughout, and after the session (Figure 1).
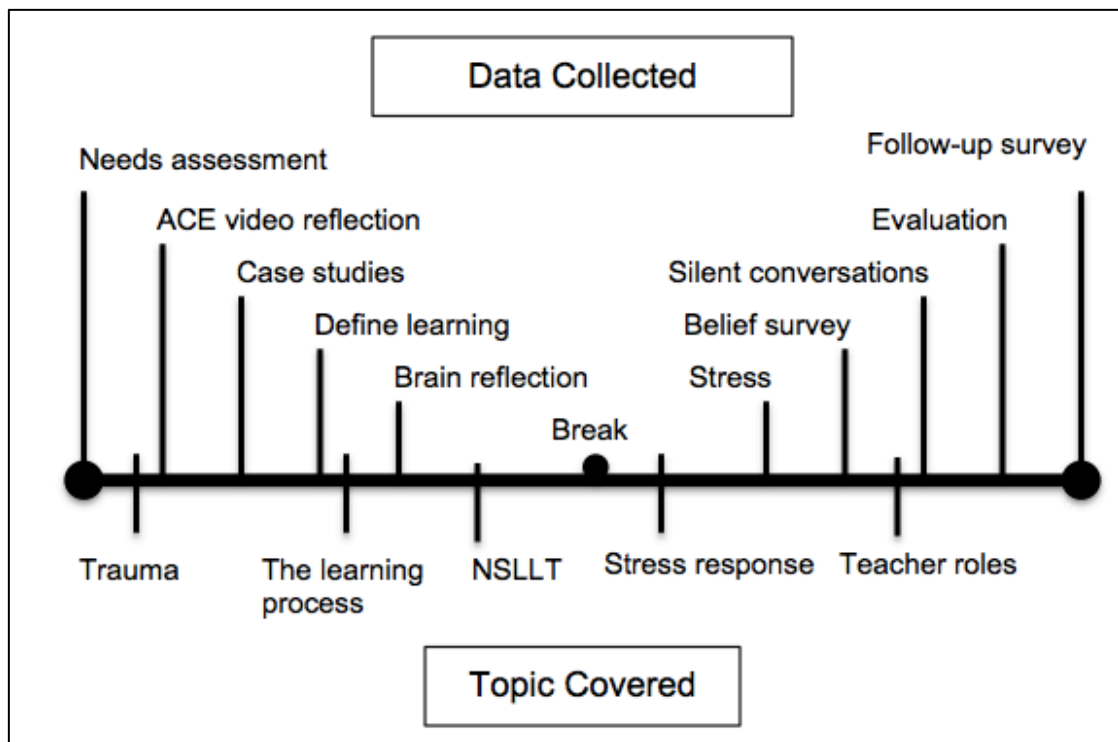
Figure 1. Timeline of session data collection.

Notably, participants completed the needs assessment a week before the session and

the follow-up survey a month after the session, as delineated on the timeline.

To start, the participants shared their wishes and current understanding of the

content through a needs assessment taken before the session. Aside from the initial

data, participants provided data through audio recordings of the conversations in the

session, completion of reflective journals and a belief survey, and silent [written] discussions later fleshed out through a verbal discussion. Participants responded to questions verbally and written, and were encouraged to make connections between the content presented and their personal beliefs and attitudes about students experiencing trauma. At the end of the session, participants completed an evaluation of the professional learning experience. A month after attending the session, I sent a follow-up survey.

      Session discussions*.* I asked participants several pointed questions based on specific slides and activities. After watching the ACE video, participants wrote in their journals initial reactions to what they saw and heard, followed by a discussion relating their thoughts to their classroom practices. I showed a slide entitled *Growing a Grown-up Brain* (Appendix T) and asked participants to write down what they noticed about the physical growth of a child's brain over time; a verbal discussion proceeded. I asked participants to consider what they remember about the physiological response to trauma and discuss the problem with this statement: *With new content, your thinking dips as you assimilate new information into previous knowledge stored in long-term memory.* I asked participants to discuss *Why is it important that we define learning when discussing trauma?* My rationale for this piece was to check for participants' understanding of the material at that point in the session.

      Needs assessment. Knowing what participants understood and believed before the session was the precursor to determining if a neuroeducation lens altered their knowledge, attitudes, and beliefs about students with trauma. Hence, the needs assessment (Appendix J) acted as a baseline for these areas, and subsequent data

illuminated any change. Elements of the needs assessment were adapted from several

evidence-based sources. The needs assessment is an amalgam of several studies and

dissertations that explored pertinent factors identified in the literature on professional

identity, trauma, and learning. To my knowledge, no needs assessment or survey

exists that cover these topics entirely. Participant characteristics and background

covered personal and professional information to give me a sense of the participants'

professional experiences with trauma (Neimeyer, Taylor, & Cox, 2012; Sniatecki,

Perry, & Snell, 2015). Participants answered the first five questions about their

demographics for me to prepare materials, such as example case studies. Questions six

through 10 addressed participants' preparedness to work with students in trauma to

give me a sense of what level at which to inform participants. Questions 11 through 13

were based on a case study of middle school teachers' perception of how the brain

learns best and the value of using that knowledge for supporting students and

designing curriculum (Shepherd, 2012). I asked participants what they hoped to get

out of the session (question 14) to determine preconceived notions and effectively

address needs. Gallagher's (2014) dissertation study of teachers' experiences

educating traumatized children informed questions about defining the effect of trauma

on learning (question 16), teachers' roles with students experiencing trauma (questions

17-18, 20-21), means by which they become aware of students' backgrounds (question

22), and resources available to teachers to support their work with these students

(questions 23 and 24). Johnson and Pugach (1990) interviewed teachers about

interventions they used for learning and behavior problems in the classroom; the

purpose of question 19 was to help participants consider the strategies they used and

consider how effective the strategies were. This line of questioning was also the basis for a silent conversation in the session.

Case studies. To help participants connect to the new information provided in the presentation, I asked them to write up a case study of a student who experienced one of the five types of trauma focused on in the literature review (Appendix L). For those who wanted or needed a case study, I provided examples (Appendix U). For each case, participants described (a) how did the student perform academically and socially?; (b) describe the strategies you used with the student; and (c) what were your struggles with supporting this student? VanderWegen (2013) used case studies to take theory into practice when implementing a trauma-informed care program in a school. "The purpose of the case study approach is to use the collective wisdom of school staff when brainstorming alternative proactive intervention strategies" (VanderWegen, 2013, p. 84). Similarly, case studies used in this study were an avenue for participants to share concerns about and strategies for supporting the learning of students with trauma. These case studies anchored new knowledge to participants' personal experience to create conceptual understanding throughout the session.

Reflective journaling. Participants required time and means by which to consider information presented in light of what they knew. According to Cooper and Kiger (2009) writing and discussion are two means by which new information can assimilate in with what one already knew and can be passed on or demonstrated. Reflective journaling using scenarios was found to increase critical thinking and determination to use new skills in a master's nurse practitioner program (Raterink, 2016).

Belief survey. For me to better understand participants' beliefs about their roles as teachers and students' responses to trauma, I asked participants to complete a belief survey (Appendix M) after the discussion about the effects of trauma and before discussing teachers' roles. Questions on the belief survey for this study came from a survey method used to measure attitudes regarding inclusion of students with disabilities (Taylor & Ringlaben, 2012), specifically questions regarding student behavior (1, 2, and 3) and teacher preparation (5, 6, and 7). Questions 4 and 8 derived from a survey about faculty attitudes and knowledge regarding students with disabilities at one university (Sniatecki, Perry, & Snell, 2015).

Professional learning experience participant evaluation. I aimed to meet the needs of the participants and improve the experience. To those ends, I asked participants to complete an evaluation of the study to find how the experience fulfilled their needs and what, if anything should be changed to refine the presentation (Appendix V).

Follow-up survey. A month after the session, I emailed the participants a link to a Qualtrics survey to determine how they defined trauma, what content was most salient to them from the presentation, strategies they tried since the session, and further professional development pursuits to gain knowledge about trauma (Appendix O).

Data Analysis

The hallmark of an action research study is progressing through a cycle of analysis to hone in on data most closely answering the research questions. When interpreting qualitative data, moving through phases of analyses is a central

assumption to build understanding (Saldaña, 2009). This study required several cycles within each phase of the study. Triangulating data from several sources strengthens data quality and confirmability (Miles et al., 2014). Member checks are a way to provide accuracy of descriptions, explanations, and interpretations by the researcher of the participants' words (Miles et al., 2014). Member check through participant feedback added credibility to analyses by reviewing for accuracy written responses read aloud by me in recorded discussions so later transcriptions were accurate; through an evaluation of the learning experience; and through statements made on the follow-up survey (Miles et al., 2014; Sagor, 2000). Adding other single sessions, or the combination of two half sessions, expanded the participant pool to include preservice educators.

Before the first session, I reviewed participants' experience and knowledge base to determine what to focus on in the presentation. Throughout the session presentation, I gauged the amount of time devoted to topics based on participants' interests, questions, and needs. In preparation for the second group or participants, I employed several steps to modify the presentation: (a) I analyzed session evaluations from the first group and needs assessments from the second group, (b) I reflected on jottings I took during the first session based on the process and participants' comments and questions; and (c) I reviewed written answers from the first group. I repeated this cycle with data from the second group to prepare for the third group.

During break time, either lunch for single session or days between split sessions, I was able to reflect on how the presentation was progressing, specifically looking at the balance between what I wanted from the participants and what the

participants wanted from me. After each session, I uploaded audio recordings to my computer and wrote a memo to reflect on participants as individuals and as a group in terms of their engagement level and quality, as well as my work presenting content clearly and keeping the flow logical.

Phase III. This phase of the study employed inductive content analyses of journals, silent conversations, a needs assessment, a belief survey, an evaluation of the experience, a follow-up survey, and transcribed audio recordings of participants' conversations (Saldaña, 2009). Individual contributions by participants were retained to thread together pre-, mid-, and post-session responses. Preservice and inservice educators' data were bifurcated to determine if there were unique themes attributable to each. I then looked across the data by research question to triangulate them and increase credibility of the answers.

Coding. "A code in qualitative inquiring is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2009, What is a Code?, para. 1). It is a cyclical act to link data to the idea by continuously focusing and filtering salient features to generate categories, themes, and concepts. Emerging categories may be descriptive or conceptual (Saldaña, 2009). Category construction is data analysis (Merriam, 2009; Miles et al., 2014). The process of working with the codes came from Saldaña's (2009) coding manual. Coding began with pre-coding the open-ended questions on the needs assessment, professional learning experience evaluations, transcribed journal entries, and transcribed audio recordings. Pre-coding was done by highlighting or circling key words and notable quotes from participants

that seemed illustrative examples. Following this was preliminary jottings that brought

out potential code words or phrases, as many as needed to capture the various

elements apparent in the documents and transcriptions. Next came writing analytic

memos, pulling together emergent patterns and themes within the data, reflecting on

participants and the process, and my personal connection to both.

Written answers to open-ended written questions and transcribed group

discussions were coded and categorized thematically. The use of inductive thematic

coding reduced data into descriptive categories and reorganized for thematic analysis

that facilitates the search for patterns of experience within a qualitative data set. "The

product of a thematic analysis is a description of those patterns and the overarching

design that unites them" (Ayres, 2008, p. 867). From thematic analyses, there were

seven codes: beliefs, content knowledge, goals, resources, responses, roles, and

teacher preparedness.

Thematic coding and analysis was applied to transcripts of audio-recorded

dyad and group interviews of adolescents' views about peers with mental health

concerns (O'Driscoll, Heary, Hennessy, McKeague, 2015). Notably, "all transcription

is in principle *selective* and entails the inevitable risk of systematic *bias* of one kind or

another (Kowel & O'Connell, 2013, p. 66), therefore I was cautious and critical

through reflective choices made when transcribing. For example, I did not transcribe

personal stories volunteered by participants. In particular, I used three methods of

coding described by Saldaña (2009): attribute, magnitude, and values.

Attribute coding. This method of coding notes the descriptive information

about participants and provides a means to manage the data and provide them context

(Saldaña, 2009). The attributes for which I coded were gender, age, years at current school, years in education, and current role. I did not want to make assumptions about participants' careers since participants may have taken a circuitous route to being an educator. Some may have worked in a school under a different role, so I asked for current role and years in education. Age was asked to establish if any participants became an educator later in life.

Magnitude coding. This method "consists of and adds a supplemental alphanumeric or symbolic code or subcode to an existing coded datum or category to indicate its intensity, frequency, direction, presence or evaluative content" (Saldaña, 2009, "Magnitude Coding," para. 1). For instance, educators mentioned strategies they used with students and then evaluated those strategies based on the new information presented. The code applied regarding the use of strategies were symbolic directions: an up arrow for increase, a right-pointed arrow for maintain, a down arrow for reduce, and an X for stop. I utilized this coding method to identify how much content knowledge participants had about learning and trauma, teachers' responses to students' with trauma, students' responses to their trauma, peer responses to students with trauma, and community responses to students with trauma.

Values coding. This method was key in helping me identify *attitudes*, *values*, and *beliefs* held by participants about learning and trauma. Saldaña (2009) defined attitude as "the way we think and feel about oneself, another person, thing, or idea" ("Values Coding," para. 1); and belief as "part of a system that includes our values and attitudes, plus our personal knowledge, experiences, opinions, prejudices, morals, and other interpretive perceptions of the social world" ("Values Coding, para. 1). He

cautions that what people say are their values, beliefs, and attitudes are not necessarily inline with their actions. I analyzed data and found relevant categories: teachers' definition of learning, descriptions of how students respond to trauma, attitudes about teacher roles and responses, attitudes about student roles and responses, attitudes about trauma and school context, beliefs about students with trauma, beliefs about teachers' roles, change in beliefs about trauma, and extending personal understanding.

Ethical Considerations

Institutional Review Board (IRB) at the University of Portland granted permission to conduct this research study. I am not employed by the participating institution and holds no position of authority over any of the educator participants.

Each participant signed an informed consent form (Appendix W). Informed consent means that those involved have all the information—study goals, participants' rights—about the study and give their consent freely (Miles et al., 2014). Included in the consent form were resources to support participants, such as local hotlines and websites. Participant benefits include gaining insight or learning about the affect of trauma on learning, improve professional practice, and get help in effectively supporting students in trauma. Participant harm and risk includes feeling uncomfortable hearing about children experiencing trauma and the potential to trigger personal memories of trauma.

Participants' identities were confidential; all school, district, and participant personal information were protected using pseudonyms. Raw data collected on paper during the study sessions were locked in a file cabinet inside a locked building. All audio recordings and data analyses were saved on a laptop computer with password

protection and backed up to both a memory stick, locked in a file cabinet, and a password-protected Dropbox account.

Limitations

The limitations of this study include convenience sampling, self-report, sample size, and a single study in a short time period. Due to sample size, results are not generalizable and must be interpreted carefully and used cautiously. There are advantages to me being in both roles as facilitator and participant: engaging with the participants will put me in a collegial role of mutual learner, which can keep the environment more relaxed and open for learning (Knowles, 1980; Knowles, 1990).

Summary

This chapter outlined the methodological choices I used to create and conduct my professional learning experience. A rationale was made for recruiting an expert panel to evaluate the presentation and related materials and the use of an action research approach. In addition, there was a discussion about the use of a needs assessment, survey, reflective journaling, audio-recorded group discussion as primary data sources to examine the research questions. In this study, the setting for expert panelists was different for participants and described in detail. Expert panelists and session participants in this study were selected based on specific criteria outlined in this chapter. Lastly, a detailed description of the professional learning experience process was described for data collection and analysis.

Chapter 4: Findings

The purpose of this qualitative study had two components. One goal was to translate the literature of neuroeducation into an example of an adult professional development, while a second was to examine how engagement in a professional learning experience aligned with neuroeducation research affected educators' beliefs about student learning and the ways trauma affects students' academic and social-emotional development. The research questions addressed in this study are:

(a) When invited to review the content and process of a neuroeducation-based professional learning experience on trauma, what input did experts provide in the fields of neuroeducation, trauma, and professional development?

(b) How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?

(c) How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?

(d) In what ways, if any, do educators report that a professional development address their needs as they care for students experiencing trauma?

The professional learning experience itself will be examined through feedback from an expert panel that reviewed the presentation and related materials. Next, I answer the last three research questions directed at implementing the professional learning experience using related data collected from preservice and inservice educators who took part.

Phase I: An Example of a Neuroeducation-based Professional Learning Experience on Trauma

To address the first research question, I invited expert panelists to review and evaluate materials I created for the professional learning experience. They rated the content and process of the experience based on their particular knowledge and expertise, providing explicit feedback on what elements to increase participants' learning. I used their responses to modify the presentation and related materials to enhance the experience for the participants.

The introductory PowerPoint slides noted the purpose of the research and included an image of overlapping circles depicting the agenda, highlighting the lack of linearity of the topics because of their interrelatedness. A definition of neuroeducation informed the participants of the fields that would be included as a lens through which to view the content. To create common language, I presented definitions of *trauma* referenced throughout the sessions. Participants received a copy of the ACE questionnaire and then viewed a 5-minute film on ACE's (KPJR Films, 2015) as background for trauma outcomes. Next, each participant wrote a case study based on past or current students who experienced one of the five areas of trauma I included in my dissertation. Anyone who did not have an example chose from one of the studies provided by I (Appendix Q).

I presented slides on the neuroscience of the learning process in the brain and the physiological reaction to trauma. The first slide displayed a definition of learning (Illeris, 2009). The following slides described how neurons work and related cognitive processes. I showed a slide entitled *Growing a Grown-up Brain* (Appendix S),

displaying the change in a child's brain over time. I then presented slides based on Arwood's (2011) Neuro-semantic Language Learning theory, connecting the information to the physiological, psychological, and language responses to trauma.

After a break, I defined stress in terms of neuroscience (homeostasis, allostasis, and allostatic load) as context for the physiological response to stress, as well as the subsequent responses psychologically and linguistically. Participants took a short survey about their beliefs about students with trauma and teachers' preparation to support them (Appendix T). Following that discussion, participants viewed slides showing common reactions to trauma and capacities affected by trauma. On one of two large, white poster papers, participants conducted a silent conversation in which they wrote what they believed educators' roles are in students' learning; on the other paper, they wrote what they believe educators' roles are in students experiencing trauma (Appendix U). The last minutes were devoted to completing an evaluation of the professional learning experience (Appendix V). Within a week of the session, I emailed the PowerPoint slides and relevant articles requested by participants. A month later, participants received a Qualtrics link to complete a follow-up survey (Appendix W).

Content. For the content of the professional development, expert panelists were asked to rate three topics based on their understanding: trauma and its effect on learning, neuroeducation, and professional development. They rated how accurate, comprehensive, and clear the information was presented in the PowerPoint presentation, surveys, and activities (1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent, N/K = no knowledge), and provided explanations for those ratings. Not all of the expert

panelists use this rating scale, choosing instead to provide only comments. Table 4

depicts the primary recommendations expert panelists offered and how I incorporated

them into the presentation. Specific ratings of areas within content are then detailed.

Table 4

Expert Panelists' Recommendations For Content and How They Were Implemented

Recommendation	Implementation
• Be explicit about goals and purpose • Unable to grasp timing of presentation • Technical language could overwhelm participants • Consider participants' needs in the session	• Specifically include in invitations and start of study • Present materials in person to expert panel to hear pacing and language • Use case studies, give time for questions and discussion

Trauma and its effect on learning. The expert panelists rated highly the

accuracy, comprehensiveness, and clarity of the presentation with the recommendation

that the goal and outcome of the study be clearer for prospective participants. One

expert in neuroeducation, the school psychologist, and the expert panelist on trauma

assessed the accuracy and clarity of the presentation materials on trauma and its effect

on learning as excellent. They rated those same materials as good to excellent in terms

of comprehensiveness. The counselor educator recommended the goal and learning

outcomes of the learning experience be made clearer. To help interested educators

decide if they should participate, the trauma expert panelist also thought the purpose

of the experience should be clarified to explicitly tell teachers how to recognize if

students had experienced trauma, "Or, is the purpose to make all teaching universally

accessible to students who *may* have experienced trauma?" (Expert Review of

Professional Learning Experience, November 8, 2016). Based on these responses, I

clarified the purpose of the study in the announcements, in the invitations sent out to prospective participants, and in the presentation when discussing how traumatic stress influences learning.

    Neuroeducation. Experts in neuroeducation did not agree in their ratings about the accuracy, comprehensiveness, and clarity of the presentation materials. The school psychologist rated the accuracy of presentation materials on neuroeducation as excellent, while the site instructor rated it as good. An added comment from the site instructor explained his rating:

> I wonder if there's potential for some participants, based on the notes in the slides, to come away with the idea that just awareness and naming of emotions/feelings will automatically engender pro-social thinking/behavior in youth who've experienced trauma. In my view, that would be an incomplete/underdeveloped understanding of the mechanism(s) involved in pro-social development. (Expert Review of Professional Learning Experience, October 7, 2016)

The school psychologist found the comprehensiveness and clarity presentation materials as excellent and fair respectively and wrote, "It's just hard to explain this to folks with little background" (Expert Review of Professional Learning Experience, November 11, 2016). I interpreted that feedback to mean participants would benefit from having some background knowledge in neuroeducation fields to better understand the technical language and abstract ideas included in the presentation. Therefore, though the technical terms remained, I further defined the technical vocabulary in layman terms to help the participants connect it to their everyday

teaching practice. The site instructor rated both comprehensiveness and clarity as fair

but gave a caveat:

> Not having the benefit of knowing the language that will be added when the
> presentation is given, my ratings for the comprehensiveness and clarity may be
> lower than what I'd provide if I had the opportunity to see the presentation
> given. The latter two scores could just as easily be 3s (or higher) if presented
> well. (Site Instructor, Expert Review of Professional Learning Experience,
> October 7, 2016)

The science teacher provided comments to increase the accuracy of language on a

specific slide but noted that, overall, "There is a great deal of information that

generally seems accurate and comprehensive" (Science teacher, Expert Review of

Professional Learning Experience, October 10, 2016). This expert panelist

recommended, "Consider boiling down to essential neuroed, language, emotion, etc.

concepts – and focus on concepts rather than details" (Science teacher, Expert Review

of Professional Learning Experience, October 10, 2016). The rationale provided for

this comment was to improve clarity and balancing presenter versus participant talking

time. Therefore, I made sure to add time for discussions and activities between content

slides (Appendix K, slides 13-15, 19, 27, 31, 41) and encouraged participants to ask

questions throughout the session.

    Professional development. Both expert panelists for professional development

gave specific advice for how to improve the presentation. The science teacher was

unable to predict the pacing of the presentation without more detailed presenter notes.

She recommended clarifying definitions and use of terms, and making sure each slide

contributed to the goal in some way. In addition, she wrote about having citations for all of the information in case participants want to reference a resource or pursue further study. Both experts agreed that that the amount of information in the presentation might overwhelm participants, particularly depending on their roles in schools, professional backgrounds, and experiences with trauma or neuroeducation. The math teacher wrote the information was "good and well thought out" (Math teacher, Expert Review of Professional Learning Experience, October 10, 2016) depending on how it was presented. This expert panelist recommended using case studies to which participants could relate information. "If you are telling a story of a real or fictional person that you keep relating back to each of the elements that you are talking about it might help in keeping attention and retention of information" (Math teacher, Expert Review of Professional Learning Experience, October 10, 2016). This recommendation was implemented in the presentation by asking participants to create their own case studies or for me to provide them with examples. I included the science teacher's recommendation to add a question about goals since they were important enough for partners to discuss. At the suggestion of the math teacher expert panelist, I used Ping Pong Protocol by School Reform Initiative (www.schoolreforminitiative.org) to encourage participants to ask each other questions to extend their thinking about the case studies and their responses. Probing questions included who, what, when, where, and how to extend thinking and language. I also encouraged them to name other sources of information about their students, such as parents and other teachers. After discussing their case studies, I defined reflective

journaling for participants to reflect on what others said about their cases and strategies they used and how this feedback informs their own case.

In addition to the experts in professional development, the school psychologist expert in neuroeducation rated the accuracy and clarity of the professional development as excellent and comprehensiveness as good. Regarding those participants who might only want to know how to deal with trauma, the school psychologist recommended the presentation should "convince them the neuro angle has value to them!" (School psychologist, Expert Review of Professional Learning Experience, November 11, 2016). This suggestion highlighted the importance of participants understanding the concepts of learning and trauma from multiple points of view as a way to benefit their work with students. Therefore, I aimed to make the concepts of stress concrete and relatable by including discussions and activities about personal reactions to stress. One activity was to have participants mark on the outline of a body where they felt stress and discussed how those physical reactions affect their cognitive processes and work production. In the other activity, I asked for their gut reaction if they saw a lion to get at the neurological fight, flight, or freeze response. Then I asked them to describe how they reacted to seeing a lion at the zoo to help them understand the difference in reaction results from their use of language to make meaning of the situation.

Process. On the process of the professional development, experts were asked to review the presentation based on organizational structure, best practices, and feasibility of getting everything done in the period of 270 minutes. Table 5 shows the

primary recommendations offered by the expert panelists and how I incorporated them into the presentation. Specific ratings of areas within content are detailed.

Table 5

Expert Panelists' Recommendations For Process and How They Were Implemented

Recommendation	Implementation
• Consider two presentations for two audiences or refine to one presentation • Potential for slide fatigue due to quantity of material presented • Use lots of language to clarify terminology	• Formatted presentation to address both audiences • Reduced material on slides, focused on concepts • Described vocabulary with daily classroom practice

As one professional development expert stated in her review, "Information is the What. Teaching/learning/developing, leading PD, etc. must take into account the Who. Can the neuroed be a vehicle through which you share some of the content?" (Science teacher, Expert Review of Professional Learning Experience, October 10, 2016). Her use of *What* refers to the content of the presentation. The *Who* are the participants, each of whom have their own learning systems that should be considered when determining how to present the content. Utilizing a neuroeducation framework encourages connecting the new material with their prior knowledge and understanding through scaffolding with language and visual images. I incorporated visual images in the slides (Appendix K, slides 16, 19, 20, 25, 29, 32) and on the board by drawing out the neuron and McEwen's stress curve. Those with visual learning systems could see my mouth and hand move as layers of perceptual patterns to help raise conceptual understanding. For those with auditory learning systems, I made sure to be silent when they wrote in their journals to reduce verbal distractions.

Organizational structure. Overall, the organizational structure of the presentation needed fine-tuning to clarify the purpose of the training and smooth out some of the transitions between topics. The trauma expert marked the presentation as having logical flow overall with some changes needed to content and purpose of the training. One neuroeducation expert also marked the presentation as having logical flow with the exception of one transition between slides but added, "Though I think language added while presenting could easily smooth that transition" (Site instructor, Expert Review of Professional Learning Experience, October 7, 2016). The professional development experts agreed the presentation logically flowed in general, but identified areas in the presentation that could be refined by reorganizing them. One neuroeducation expert rated the organization of the presentation as having logical flow with clear content with the caveat, "just make sure to add real-life examples along the way" (School psychologist, Expert Review of Professional Learning Experience, November 11, 2016).

The professional development expert panelists considered whether the same presentation could be used for those sessions that occurred over one day as well as the one that was split over two different nights. One addressed the potential of "creating two distinct and separate workshops both directed toward the same overall goal and specific outcomes: the full-day session and the 1/2 day sessions because "the nature of each (audience, timeframe, location, etc.) is important in PD creation" (Science teacher, Expert Review of Professional Learning Experience, October 10, 2016). The group that experienced the two half sessions were preservice educators completing their student teaching while taking classes. Their schedules did not permit them to

attend a full-day session. However, the other professional development expert wrote, "with refinement, this could be the same presentation/information" (Math teacher, Expert Review of Professional Learning Experience, October 10, 2016) for both types of sessions.

These panelists' notes led to further refinement of the presentation to split the content in such a way that there was one presentation used for both full-day sessions and the two half-day sessions. I timed my presentation of the first session as an additional measure to ensure I divided the materials properly for the two half-day sessions. As well, I integrated more trauma effects into explanations of the learning process to give participants more connection between topics. The most prevalent difference in how the presentations differed was due to the preservice participants' teaching experience. Therefore, I made sure to include conversation about teachers' responses to trauma in the first half of the presentation to create concrete connections to the trauma information. This was in lieu of having those discussions only in the second half of the presentation, which occurred the following week for these educators. I did not want them hearing content of trauma and learning without some context for understanding why it was important. Four of the six preservice educators participated in the two half-day sessions and had less teaching experience than the inservice educators. Acknowledging their unique positions, I verbally provided more examples of students from my own experiences to contextualize the content presented.

Best practice. The expert panelists provided ideas for how to best present the material and for whom the presentation would be most suited. One professional

development expert panelist provided several recommendations for interacting with participants to help them better understand the information:

- Personal connection to teachers and their work with students on a daily basis promotes interest.

- The ratio of presenter talking versus participant talking is 10-15 minutes to two minutes to provide them time to discuss and better understand the material in their own words.

- Participants turning and talking to each other may not have the desired effects. The expert panelist wrote, "I'm a little concerned that when you ask teachers to turn and talk they're going to feel they don't know enough to recognize or react to stress."

- Provide examples to ease the fear of being wrong.

- Playing role games like interpreting scenarios or body expression might be useful in getting teachers up, moving, and talking in a way that is nonjudgmental.

- Use "group scenarios in which they jointly apply what they have learned" and state there is not just one right answer.

- Participants should reflect back on the case studies. (Math teacher, Expert Panel Review, October 10, 2016)

From these recommendations, and in light of the small group size, I decided to forego having participants share in pairs but instead facilitated a large group discussion. Reflective activities, like writing in journals, were interspersed throughout the presentation to make the material more concrete and relatable to participants' daily

work experience. When asking participants to define the terms trauma and learning, I verbally emphasized there was no one answer in order create a nonjudgmental opening for them to share.

In addition to factors for the facilitator to consider when presenting the information, experts responded to a question about the appropriateness of the information for an introductory level presentation provided to two populations. For preservice educators, each expert panelist agreed the information would be appropriate. One neuroeducation expert particularly thought this population would be a best fit. "This might actually be your best audience for this – they are eager to learn everything they can and will likely find this highly valuable!" (School psychologist, Expert Review of Professional Learning Experience, November 11, 2016). The other neuroeducation expert agreed the materials would be a good fit with preservice educators if they had previous classroom experience. Expert panelists agreed the learning experience would benefit inservice educators as well. The neuroeducation expert who is a school psychologist wrote about who might welcome all of the information presented, suggesting psychologists and counselors might appreciate the presentation because of the brain and mind elements. However, the individual was concerned only some inservice teachers would appreciate the neuroscience piece while others would want only information about how to help traumatized students. I took this concern to mean I needed to consider these potential responses to the presentation materials in regards to participants' interest in knowing the research behind why those strategies work, as well as their prior training and comfort with the elements of neuroscience, psychology, and language. To help reduce anxiety associated with

participants feeling unprepared, I defined terminology and repeatedly referenced it throughout examples to make terms concrete and understandable. As well, I encouraged participants to ask questions, verbally or in writing depending on preference.

In response to the question *Which, if any, slides are too complicated for an introductory presentation and may lead to misconceptions?,* the predominant feedback from expert panelists involved the quantity of information in the presentation. Both neuroeducation experts warned of putting too much information on the slides because participants might feel overwhelmed from "slide fatigue." The expert panelists recommended avoiding too many details and using lots of language to clarify concepts. The trauma expert panelist was not concerned about any of the slides because the information was basic and participants would take what they needed. Therefore, in order to support those who were unfamiliar with terms and content, I emphasized concepts only and implemented best practices previously stated (Appendix K, slides 19, 20, 25, 27, 31, 32, 35).

Timing. Based on the materials provided or the number of presentations they have given, not all members of the panel felt qualified to speak to the amount of time different parts of the presentation would take. However, the school psychologist and site instructor were able to review for specific time amounts allotted to group discussions, activities, and the PowerPoint slides; their estimates were similar. The expert panelists directed me to keep participants' goals and the goals of the research questions at the center of the learning experience. One professional development expert panelist wrote, "With the format and information available for review, the

included material would be best presented over several sessions, over several weeks"

(Science teacher, Expert Review of Professional Learning Experience, October 10,

2016). On the other hand, the school psychologist neuroeducation expert panelist

thought the presentation was doable in the allotted time as long as I was aware of the

audience, judging when they needed breaks and allowing for questions throughout. If

short on time, the school psychologist recommended, "shorten up the poster activities

– because if each person doesn't get to every single one, it won't harm the progression

of the learning" (Expert Review of Professional Learning Experience, November 10,

2016).

Summary. I enacted action research to refine my study to plan, act, and

reflect. I planned my original draft of the presentation materials, engaged with an

expert panel to gather feedback, and then reflected on their comments to revise the

professional learning experience. This led to the second cycle of action research,

which was the implementation of the experience. Again, I planned for the two session

types (full-day versus two half-days) and acted by facilitating the workshops.

Reflection incorporated both smaller adjustments to the workshops from one iteration

to another, and larger data analysis from participants in the sessions. Overall, the

expert panelists' evaluations indicated this this professional learning experience was

an effective translation of the content.

The expert panel provided detailed recommendations about the presentation

that I took into consideration when revising the content and process to reflect

neuroeducation, trauma, and best practices. Table 6 shows the activities I used in the

presentation and their neuroeducation-informed use. Overall, the presentation

depended on the use of language to understand participants' range of cognitive understanding—preoperational to formal—of the material presented.

Table 6

Explanations of Presentation Activities as They Connect to Neuroeducation

Session Activity	Neuroeducation Use of Activity
Needs assessment	Self-reflection to identify goals and gaps in understanding provided me with discrete foci
ACE video reflection	Contextualize importance of learning about trauma through visual connection
Case studies	Connect new information about learning and trauma to prior cognitive understanding
Defining learning	Focus on conceptual understanding more than technical terms to relate neuroscience, cognitive psychology, and language to best teaching practices
Growing the Grown Up Brain	Visual images of typical brain development to show how neurological growth impacts cognition and language over school years
Stress diagram	Cognitive connection between self and student's reaction to stress by identifying personal physical reaction to known stressors
Belief survey	Cognitive awareness of teachers' roles and students with trauma
Silent conversations	Cognitive comprehension of teachers' roles
Evaluation	Formal reflection on the experience to reassess needs and learning goals
Follow-up survey	Determine understanding of neuroeducation terminology and concepts salient to participants

In response to those recommendations, I altered the presentation to focus on the needs of the participants by allowing time to discuss and ask questions, use examples and case studies to connect with the new concepts pertaining to teachers' work in their classrooms, and explain concepts with lots of language (e.g. Appendix K, slides 12-14). I reorganized the content to allow the presentation to be used for both full-day and two half-day presentations. Additionally, I emphasized concepts over terminology to help participants understand the underlying neurological and cognitive functions

pertaining to learning and trauma as they related to their classroom practices. My overarching goal was to make the professional learning experience useful to and attainable by participants, therefore the expert panelists' reviews were crucial to improving the presentation content and process. Completing this action research cycle with expert panelists in education improved the presentation materials for educators and informed me of best practices for presenting to adult learners as I implemented the professional learning experience.

Phase II: Implementing the Professional Learning Experience

As stated in chapter three, participants provided data through multiple sources. Analysis of their answers addresses the last three research questions. I will answer each question in turn. Saldaña's (2009) definition of beliefs incorporates values and attitudes in addition to knowledge, experiences, opinions, morals, and perceptions. In light of this definition, I took into account what teachers thought of and found important when considering students with trauma.

Beliefs about ones-cared for. To address the second research question, *How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?,* information from the needs assessment, case study journals, and follow-up survey were supplemented with data collected from discussions. I analyzed data and found relevant categories later grouped by themes derived from Noddings' theory of care (Figure 2). In addition, participants requested trauma research related to specific topics throughout the session.

Categories of Data

Teachers' definition of trauma

Descriptions of how students respond to trauma

Attitudes about teacher roles and responses

Attitudes about student roles and responses

Attitudes about trauma and school context

Beliefs about students with trauma

Beliefs about teachers' roles

Change in beliefs about trauma

Extending personal understanding

Noddings's Themes

Ones cared-for

Ones-caring

Others who need caring

Obstacles to caring

Caring community

Figure 2. Chart of categories related to belief about ones-cared for grouped by themes. Arrows depict those categories which informed a Noddings-based theme.

Participants most frequently commented on their attitudes and beliefs about their roles in working with students. The next most mentioned topic was descriptions of students with trauma as they presented in the classroom. As they relate to Noddings's terms, that means participants focused on the ones-caring and the ones-cared for.

Defining trauma. Teachers gave explicit definitions of trauma and descriptions of students' responses to trauma; those responses formed the baseline that

I used to compare teachers' understanding of content presented, as well as to analyze teachers' beliefs and attitudes about trauma and learning. Trauma was explicitly defined for participants on the needs assessment and during the session so that all participants answered related questions based on the same definition. On the follow-up survey, some of the participants were able to take the given definitions and adapt them to their own beliefs. An inservice teacher emphasized the lack of agency one has when experiencing trauma,

> Trauma is an experience that was threatening or harmful, physically or
>
> emotionally, that typically the person has little or no power or control over.
>
> (Inservice teacher, Follow-up Survey, November 21, 2016)

A preservice educator understood trauma through a neuroeducation-based lens in terms of negative events leading to change of the whole self,

> Trauma can be an on-going or one-time event that causes changes in a person,
>
> cognitively, psychologically, and neurologically. (Preservice teacher, Follow-
>
> up Survey, December 8, 2016)

While another preservice teacher focused only on psychological impact but captured the challenge of trying to find just one definition,

> Trauma is something that is really hard to define in black and white terms, but
>
> usually it means that a person has endured one or more negative events that
>
> have caused a lasting psychological impact. Trauma might be caused by
>
> reoccuring *(sic)* events, or one significant event, both of which negatively
>
> affect a person for a long period of time even once the traumatic event has
>
> ended. (Preservice teacher, Follow-up Survey, December 8, 2016)

Others repeated the given definitions verbatim. One inservice teacher directly quoted

the American Psychological Association (2000) definition and two preservice teachers

paraphrased it. This could mean either there was no change in beliefs or that change

was not captured. It could signify a change if they had no previous definition from

which to work and are borrowing the given ones until they form their own. Having a

definition, even if it is someone else's, contributes to one's understanding of trauma

by laying a foundation on which to build.

Ones-cared for. Based on values and magnitude coding, there were several

themes involving students that harkened back to Noddings's definition of *ones-cared

for*. Teachers shared data that suggests they drew on their familiarity with students

who experienced trauma to determine how trauma affects students' physical,

cognitive, and social selves in the contexts of school and home. However, teachers'

attitudes about responses to trauma demonstrated their incomplete understanding of

the learning process and the influence of trauma on academic and social outcomes.

Educator's expressions of belief about students with trauma came out primarily

through their discussions of case studies and were supplemented by answers on the

belief and follow-up surveys. Their initial descriptions of students' behaviors when

writing case studies showed a preoperational level of cognition because naming

behaviors is a patterned response but they could not explain the connections between

physical and cognitive process resulting in those responses. This early level of

understanding is missing both the neurological reaction to stressors and the influence

language has on how they comprehend their students.

Individual student responses. Through case studies and discussions, participants reported their perception of how students' behaviors indicated their intrinsic and extrinsic responses to trauma. Intrinsic reactions to trauma take aim at the cognitive and emotional capabilities of students experiencing the trauma. Not necessarily knowing what their students were thinking or feeling, teachers made conjectures about those intrinsic responses. Based on magnitude coding, the most frequent reports of perceived students' intrinsic struggles in case studies were with cognitive processes, specifically executive functioning (e.g. difficulty learning, focusing, inhibiting, concentrating, attending to tasks) and poor sleep. One teacher made reference to a homeless student who did not get enough sleep at night, possibly because he was, "thinking about how they do not have safe space to live" (Preservice teacher, Case Study, November 3, 2016). A few teachers reported that students harmed themselves psychologically using shaming and self-deprecating language. One inservice educator worked with a middle school boy who lost his mother and had suffered a traumatic brain injury. When describing the case study, this teacher repeated his student's language,

> You could tell when this kid would have a bad day because he'd come in and start using self-abusive language like, 'you're a bad boy', 'why are you so bad?' (Inservice teacher, Session Discussion, October 14, 2016)

Lastly, some participants noted how students emoted a mix of feelings. For instance, a preservice educator described her case study student's complex emotional reaction to trauma, "I feel like she's always angry, but at the same time, she's scared because she hides" (Preservice teacher, Session Discussion, November 12, 2016)

Extrinsically, the most prevalent remarks about students were their socially inappropriate interactions in comparison to expected school behaviors. Participants mentioned students who spoke both too loudly and frequently or too quietly and insufficiently, who walked in and out of the classroom at will or just laid down on the floor. Participants described students who acted older or younger than their ages. A preservice teacher described a student as mature and able to act much older than her 13 years, which the teacher recognized might skew her teacher's perception at times. This teacher admitted having to check her view of her students with trauma,

> I grapple sometimes with reminding myself when I see her show up the way the kids show up, that she's a kid. Because sometimes when I'm talking to her it feels like she's an adult in a little kid body. (Preservice teacher, Session Discussion, November 12, 2016)

Diminutive attributes of students came up for those who taught elementary school, particularly about students acting baby-like and younger than their peers. As one elementary teacher mentioned of her student, "He's like a little overgrown chubby baby physically, and he talks baby talk, and he bugs the other kids" (Inservice teacher, Case Study, November 12, 2016). In regards to physical reactions, a few teachers mentioned how their students could be unaware of where they were in space, as well as harm themselves or others with their hands or objects. For example, a teacher described his case study by stating, "We had a lot of problems with him in physical contact with other kids," (Inservice teacher, Case Study, November 12, 2016) and that the student would escalate when challenged until he would be sent out of the classroom. "He's working himself into this cycle" (Inservice teacher, Case Study,

November 12, 2016). Teachers' primary means in the classroom for becoming aware of students responses to trauma were through these external behaviors.

These extrinsic behaviors illuminate how responses to stressors like trauma can take over students' typical behaviors. The responses to trauma described by the participants are typical according to van der Kolk (1997) but do not match what these teachers considered to be expected and desired school behaviors. Again, these descriptors of students with trauma highlighted the unfamiliarity of teachers regarding the impact on neurological circuitry, psychological processes, and functional use of language. They knew the behaviors indicated some sort of change in cognitive functioning, but did not know the systems involved to trace the responses. This means they had expectations for behaviors that were less likely to occur instead of expecting typical reactions to stress. As well, some of the statements about these students could be seen as judgmental.

Students' abilities and willingness to complete academic work were two salient areas throughout case students and discussions of teachers' roles. Participants compared students' current and past capabilities, seemingly frustrated at altered work production, skill levels, and attendance following students' traumatic experiences. Magnitude coding showed students stopped, continued, or changed academic behaviors. Teachers reported students with trauma, even if they had proved capable in the past, did not make sufficient effort to attempt or complete work, as seen by their refusal to work or their effort to avoid it altogether.

He avoids simple tasks I know he can do. (Inservice teacher, Session Discussion, November 12, 2016)

> Getting him to read is impossible. Trying to sit him down to do math, he won't even try. (Inservice teacher, Session Discussion, November 12, 2016)

Some participants noted students responded to trauma through poor attendance.

> Student does as well as she can given attendance and her effort at behaving and giving correct answers. (Preservice teacher, Session Discussion, November 12, 2016)

> She's not showing up academically because she's not showing up period. (Preservice teacher, Session Discussion, November 12, 2016)

Participants described students who continuously asked for help continuously or checked answers for correctness, but others who refused to ask for help and were disrespectful to the teacher. A preservice teacher admitted she got tired of her student's constant check-ins, which she believed typically to be a positive student skill. It seemed the teacher might not have understood that repetitive check-ins were a reaction to the trauma instead of to the work.

Understanding the difference between students willingly not doing work and those unable to do work sets a rational and firm foundation on which teachers build expectations for assignments and work completion. Some of the frustration voiced by these teachers may be due to incongruent expectations indicating a lack of understanding of what changes in the brain when students live through trauma. It is reasonable that external behaviors were those reported most frequently since those were what teachers could see. However, teachers' witness of students' behaviors are a limited set of explanations about reduced work production and so poses questions about internal behaviors inhibiting learning.

Looking on the bright side. Participants spoke with greater frequency about students' negative actions compared to positive actions. However, a few focused on students' positive attributes when writing case studies. They noted students' behaviors in relationship to others and to self, such as responding appreciatively to teachers' help and consistency or participating in a family group. Though few positive attributes came up when initially describing the students, others identified positive behaviors throughout the discussions. Two reasons may have contributed to this shift in descriptions. First, I explicitly asked them to recognize positive characteristics to point the participants towards effective support strategies reviewed near the end of the session. Second, some participants responded in turn after hearing others remark on positive traits distinguished from unwanted behaviors.

In contrast to some of the adverse behaviors, teachers noted some students had positive and more school-appropriate reactions to their trauma realized through relationships and coping mechanisms. The positive qualities frequently mentioned centered on relationships and artistic or athletic talents. Several teachers mentioned their students thrived in positive relationships with teachers, staff, and family members. Participants' comments hinted at traits that, with adult encouragement, could foster resiliency in these students or, at least, buffer some effects from the trauma. For example, one teacher saw a student change personalities as he built up trust with a teacher who could then be more playful, allowing the student to relax more in class. A couple of participants spoke of students who were part of support or affinity groups that brought them into contact with students in similar situations.

In one case study, a teacher figured epigenetics into the students' response to trauma. She was the only one to mention a response outside the domain of cognitive psychology, even though it was an incomplete understanding of genetic heredity.

> What you said about so much of what you come into the world with you know, your own DNA, your grit, that sometimes that just comes with you in birth. He ought to have a resilience there. (Inservice teacher, Case Study, November 12, 2016)

The variety of individual responses to trauma shared by participants spoke to the need to understand how students may struggle as their underlying mental processes compete with teachers' expectations.

Some students in the case studies craved and appreciated time with adults they trusted, either their classroom teachers or those in the school. Teachers mentioned that some students had positive family relationships or at least did not resent those that contributed to the trauma. Teachers particularly noted when students were able to self-regulate through behavior-based breaks during the day, such as art, writing, and walking. One teacher saw her student work extra hard in class in spite of the trauma. There seemed to be a sense of hope that these positive effects would counteract adverse reactions the students were experiencing.

Catalysts for student changes. Over the course of the study, some teachers connected the students' trauma experiences to external behaviors. Participants associated some of the triggers that set off these behaviors, such as an increase in undesirable behaviors with changes at home (e.g. father's girlfriend moves out of the house) or subject content (e.g. discussing one's family culture in social studies). A

teacher mentioned how her student cannot communicate when escalated, while another mentioned anxiety might be why the student does not do work. Two teachers noted how their case study students were parenting younger siblings.

> She's definitely mothering the two younger boys. (Inservice teacher, Session Discussion, October 14, 2016)

> My little guy acts very fatherly to the two younger siblings. (Inservice teacher, Case Study, November 12, 2016)

Of students who are homeless, teachers stated several reflections. A student used to being homeless has "built that armor" (Preservice teacher, Session Discussion November 12, 2016). One may feel overwhelmed or have insomnia because she may not be used to where she's sleeping or "thinking about how they don't have a safe space to live" (Preservice teacher, Case Study, November 10, 2016) or where he will live. Another's lack of sleep may contribute to poor concentration, and one noted that poor attention is probably due to severe learning gaps as a result of tardiness and absenteeism related to homelessness and transiency. One preservice teacher wondered if a homeless kid might feel shame or sadness because he could not help as maybe he wished he could. Teachers noticed affected students' reactions to trauma: a student showed signs of sadness; "I thought, gosh this kid was kind of running his life here; he's in charge of himself" (Inservice teacher, Session Discussion, November 12, 2016); and "he works really slow which is the hardest part because he doesn't get a lot done, and he just kind of sits there a lot, so you can imagine what that little brain is thinking about" (Inservice teacher, Case Study, November 12, 2016). Other

participants considered medications and disabilities as factors contributing to students'

responses.

Preservice teachers were able to review their students in light of the trauma

information and backgrounds, "behaviors make sense in retrospect" (Preservice

teacher, Session Discussion, November 3, 2016), "his behavior makes a lot of sense in

hindsight" (Preservice teacher, Case Study, November 12, 2016), and "staff [were] not

as patient as they need to be" (Preservice teacher, Session Discussion, November 10,

2016). These perspectives demonstrated a deeper level of understanding about the

effects of trauma on students' cognitive and social capabilities.

The futures of students with trauma. Caring for students went beyond the

current classroom and extended into students' futures. Participants voiced concerns

they had for students because of the particular trauma experiences. In the follow-up

survey, a preservice teacher reflected on his case study, a student experiencing

homelessness, and voiced a concern,

> His learning is not only being affected because of how little he is in school but
>
> also how he is being affected neurologically and how this will affect him as he
>
> matures and grows up. (Preservice teacher, Case Study, November 3, 2016)

An inservice teacher referred to her case study student and the generational influence

of substance use,

> Obviously he was always at great risk for being a drug addict himself; certainly
>
> he had family history. (Inservice teacher, Case Study, November 12, 2016)

These comments illustrated teachers' worry for their students' wellbeing beyond the classroom. Their care for their students' whole persons contributed to their sense of urgency to understand the information presented.

Future impact was on the minds of one subset of inservice teachers who worked predominantly with students with learning disabilities and trauma. Preparing students for life after graduation in light of these challenges contributed to their concerns that community members may not recognize these students as needing additional supports:

> The sadness for me is that what supports there are when they're older, when they don't present as a person with a disability, invisible disability…because they don't have the skills needed to be in public and safe. (Inservice teacher, Session Discussion, October 14, 2016)

Teachers of this unique population seemed to struggle with the tension in planning for the now and not yet. Teasing apart students' responses to trauma with some of their disabilities was almost impossible, though these teachers have training about disabilities and could apply some similar strategies to their students in trauma situations. Not knowing the future seemed to add to the sense of urgency of what could be done in the present.

Beliefs about students with trauma. Participants acknowledged trauma to be individual, affecting students uniquely and influencing what they can and cannot do in the classroom. In the midst of contending with the fallout of trauma, teachers expressed a wide range of beliefs regarding students' capabilities to continue to learn. Two teachers attributed abilities to students in their case studies written at the start of

the session that conflict with the neuroeducation research on trauma. One inservice teacher believed his case study student can calm himself down; a preservice educator believed her student can explain why he behaves the way he does. These statements were written before they were exposed to the information about the effects of trauma. Working off the slide depicting a neurotypical brain developing over time, a teacher reflected on the dichotomy of what students with trauma *can* do versus what they *have* to do: "Whereas a lot of these kids haven't learned some of these basic things, nor are they capable to learn some of these higher level skills yet they're thrown into it" (Inservice teacher, Session Discussion, November 12, 2016). After learning how distinctively the brain wires, one inservice teacher remarked she should not judge what the trauma is like for a student, "I think it's really so important to hear it's the individual's interpretation. It's not like, that couldn't have been that bad" (Inservice teacher, Session Discussion, October 14, 2016). Another inservice teacher wrote in her follow-up survey, that what she kept thinking about was, "At what point stress becomes anxiety for different individuals, particularly those who have experienced trauma" (Inservice teacher, Follow-up Survey, December 8, 2016). Each of these statements came from different participants, and so none can show a change of beliefs; however, they suggest that participants might have taken in the information presented and started assimilating or accommodating it with what they already believed.

Some of the participants referenced their students' reactions as appearing more adult-like than their chronological age.

- Your home base is just kind of swept under you…the kid probably had to raise himself in some aspects because instead of two parents being there only one

parent was there…There's a little adultification *(sic)* that goes along with

separation and divorce. (Preservice teacher, Case Study, November 3, 2016)

- She isn't an adult; she is a child. (Preservice teacher, Case Study, November

  12, 2016)

- I guess the bottom line for this is they're not little, itty, bitty adults. (Inservice

  teacher, Session Discussion, October 14, 2016)

These statements from different participants illuminated the connections between case

studies and perceptions of students' reactions to trauma. Taken altogether,

participants' beliefs about students with trauma were based out of personal

experiences and interactions with students.

Summary. As stated earlier, initial descriptions of students showed participants

to have an incomplete understanding of what was going on inside their students'

minds, brains, and bodies. However, sharing their thoughts allowed me to respond

with information and examples to guide the learning process and scaffold

understanding. Participants' reflections on case studies showed that their thinking

about their students were based on students' external behavioral responses to trauma

that suggested psychological disruption, a narrow view of all that happens when youth

react to adverse experiences. As well, in the early part of the session, they did not

verbalize a connection between what they saw and what they believed about the

effects of trauma, evidenced by their attitudes about students' roles in the adverse

experiences (e.g. students are able to self-sooth versus recognizing students are not as

old or capable as they act). They did not link their perceptions with their beliefs until

they incorporated the neuroeducation lens of trauma into their thinking towards the

end of the session and on the follow-up survey.

Ones-caring. Referencing Noddings' term denoting those who support others,

ones-caring refers to those participants who teach students with trauma. Though the

emphasis of participants' conversations was on their students, their discussions

indicated a number of variables related to both their roles as teachers to care for

students and their sense of preparation to do so to their high standards. Using values

and magnitude coding, data indicated participants' beliefs about their preparation,

abilities, teacher positionality, supports, and student-centered responses, particularly

using language. How participants' thought about teacher versus student roles revealed

their beliefs about who should be in charge of what responses to trauma-influenced

situations.

Teacher preparedness. Overall, few participants had relevant background

information that prepared them to work with students who have experienced trauma.

During the session, participants completed a belief survey in which half the questions

addressed teachers' preparedness to support students with trauma. All participants

somewhat or strongly disagreed that general educators received sufficient training to

support students with trauma. These responses agreed with those on the needs

assessment taken before the session: none of the participants received formal

substantial training around working with students with trauma. Half the participants

had no training of any sort, and the other seven participated in such learning activities

as attending a conference or workshop, class discussion or staff development, and read

books or professional journals on the topic. All agreed educators' training should

include classes on teaching students with trauma histories. Two participants each felt their personal history and attributes prepared them to help students with trauma, but five others did not feel adequately prepared to meet the needs of student with trauma. This lack of preparation concerned participants for several reasons: five mentioned the large number of students in class with trauma, either apparent or yet identified; and nine wanted to be prepared so they could identify, support, and meet students' needs.

Abilities. Participants did not solely report on their training to rely on for teaching students with trauma. Data from the belief survey and case studies showed that they knew they had abilities that could apply to working with this population of students. Results from the belief survey showed that the majority of inservice and preservice educators either disagreed or neither agreed nor disagreed that general education teacher possess the level of expertise needed to work with students with trauma, but two inservice participants somewhat agreed or strongly agreed. These results could indicate that they were not sure if general education teachers had enough expertise to work with students with trauma. The two teachers who agreed general education teachers had the expertise might have had more experiences to work out of, possibly with positive results, which would increase their comfort and confidence in those situations. Though none strongly disagreed with the statement about having sufficient knowledge to make adequate accommodations for students with trauma, there was no majority answer for either group. Being proficient at teaching students with trauma could include knowing how to accommodate them, but the lack of strong answers from the majority of respondents leads to inconclusive results about teachers' self-efficacy.

In discussions about their case studies, teachers reported relying on their own strengths, usually in the face of unconquerable obstacles that often defeated their best efforts or misled expectations based on prior experiences with students. Primarily participants discussed their own abilities in terms of deficits. For example, after the section in the presentation on learning, one inservice educator shared she did not know how to present content material visually and could not recreated visual ideas for her students. When reflecting on her case study near the end of the session, that same teacher voiced regret about how she felt her did not do all she could for the student in her case study, "It was like he just expected that was what life was but that maybe we would have found a way to temper that and show his really good side" (Inservice teacher, Case Study, November 12, 2016). Another inservice teacher shared about his case study that, "Everything we did was just gone" (Inservice teacher, Case Study, October 14, 2016). He felt defeated because the student he had worked with for over a year on communication skills lost significant ground with the onset of puberty. All participants somewhat agreed or strongly agreed on the belief survey that general education teachers need retraining to effectively work with students with trauma.

Teacher positionality. When describing case studies and other students they have taught, participants provided their personal reactions that added a facet to their beliefs regarding students with trauma. For example, one retired and now substitute teacher talked about one aggressive student she spent two days constantly and physically redirecting him,

> I was pulling the student here and there by the hand. [Instead, I] just wanted to teach the other children…I was there for two days and thought if my child

were here I would pull my child out because he's aggressive. (Inservice

teacher, Case Study, November 12, 2016)

Another educator referenced her own children, one of whom is the same age as the

case study she discussed, and used her child as a plumb line for her case study

student's behavior and interests. She stated, "I have to remind myself to be patient"

(Inservice teacher, Case Study, November 12, 2016) after she discussed the case with

the other participants and acknowledged her student was not developing like her son.

Some participants remarked on their personal connections to students and trauma

situation. Several spoke of an emotional response to their students' situations. For

example, a preservice teacher felt letting go of personal feelings was hardest to do.

Though she could relate to having personal hardships in childhood, an inservice

teacher stated, "We have a responsibility to work through those, get help if we need

help" (Inservice teacher, Session Discussion, October 14, 2016). She had higher

expectations for adults than children to seek support independently.

Participants' personal responses are worth reporting because they exemplified

the difficulty in remaining emotionally neutral or how to appropriately react when

working with students in trauma. Teachers recognized they could not change the lives

of their students at home, but voiced they could change students' experiences at school

through their roles as teachers.

Supports. Participants had mixed attitudes about their external supports from

the school and families. A special educator explicitly stated she lacked adequate

support from the school, particularly when a student left the room and needed

finding. Parents and guardians were also described as unreliable supports. For

instance, an inservice teacher described how a mother used to confide in her, but "she's actually kind of turned on me" (Inservice teacher, Case Study, October 14, 2016) and no longer trusted the teacher when circumstances changed. These teachers' statements of regret and isolation highlight the situational variables with which teachers contended. Additionally, there were some logistical and legal questions around trauma information in the discussions.

- I'm curious what the age is, that parents have to be part of that, or get permission. (Inservice teacher, Session Discussion, October 14, 2016)

- Are parents required to inform the school when their student has experienced trauma or is that optional? (Preservice teacher, Session Discussion, November 3, 2016)

- Can a student self-report? (Preservice teacher, Session Discussion, November 3, 2016)

There seemed to be a lack of clearly stated school policies to inform educators of reporting procedures and a lack of protocols for how to return students to the classroom.

Though participants felt underprepared to support their students, they were not without some resources. Figure 3 shows the frequent sources of information about students that were accessible to teachers, though not substitute teachers or all of the student teachers. Mental health professionals ($n = 7$) and other involved educators ($n = 6$) were the predominant ways that participants found out more about their students.
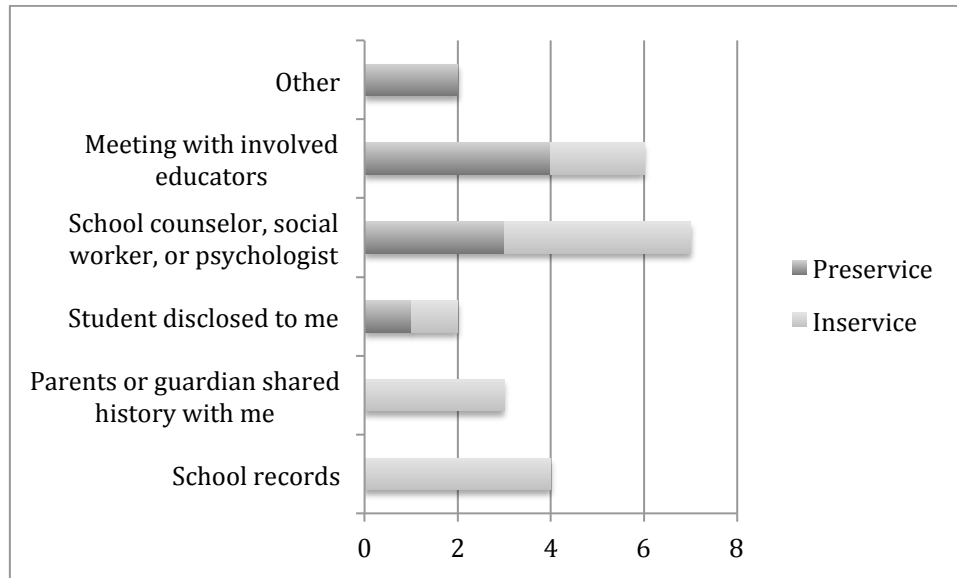
Figure 3. Most frequent sources of information on students with trauma for preservice and inservice educators.

When perplexed about a student, the majority of participants sought the advice or support from a fellow teacher (*n* = 9) or school counselor (*n* = 8), and about half would go to a supervisor (*n* = 6) or school psychologist (*n* = 5) (Figure 4).
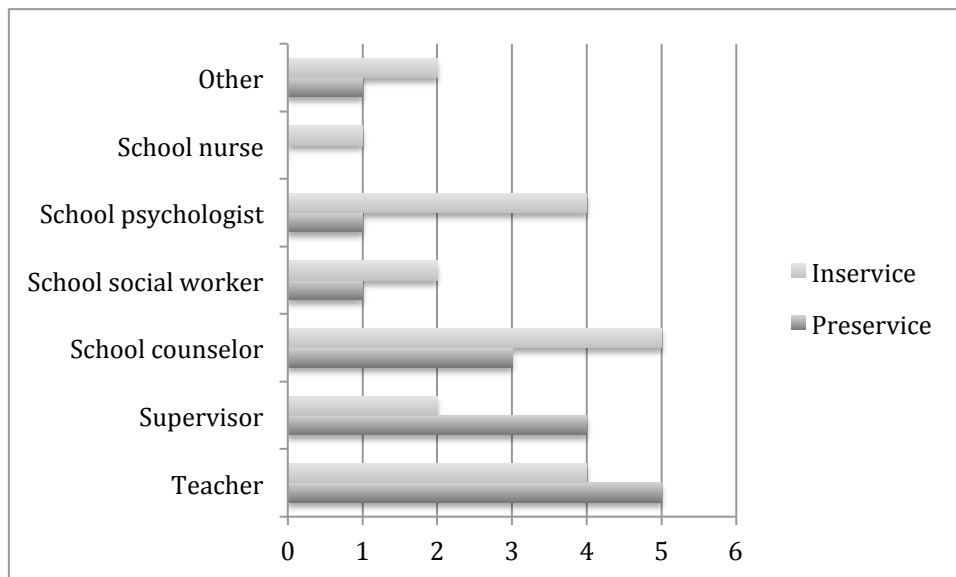
Figure 4. Most frequent people accessed when faced with a puzzling student.

Other resources from which they drew knowledge were based on individual experiences. Three inservice teachers had seen a movie titled *Paper Tigers* made by the same production company that produced the ACE study film watched in the session. The movie depicts students dealing with trauma and how their teachers interact with them at one alternative education school in Walla Walla, WA. One inservice teacher was familiar with the Felitti et al. (1998) ACE study, and another had special education training that taught him to stay at baseline emotionally in the midst of outside stressors. They reflected on personal histories and many experiences with prior students. However, even with some background, one veteran teacher noted, "Most of my career nobody knew, or I didn't know about this, and I taught in a teacher training. Nobody knew about this. Nobody talked about this" (Inservice teacher, Session Discussion, November 12, 2016). These few resources revealed a gap in training that participants attempted to fill on their own and may explain their eagerness to attend the training.

Preservice educators have less experience in the classroom, but they discussed in session ways in which they picked up tools and ideas for how to interact with students. Since they were in their student teaching year, they witnessed how more experienced teachers supported students. Cooperating teachers modeled care by making food available to students, building trusting and safe relationship with student, and being appropriately firm because he built trust with the student. One participant noted how teacher care contributed to positive changes in a student's personality, such as being more playful and trusting. Other teachers (e.g. SPED, reading) modeled care by making themselves available for when student needs a break or is rewarded with

relationship time. In contrast to positive models, participants picked up on what not to do. In response to students' individual learning needs, one preservice teacher commented, "My cooperating teacher doesn't believe in differentiation" (Preservice teacher, Session Discussion, November 10, 2016). This was opposite from what she learned in her preparation courses. In addition to their student teaching, participants built their foundational knowledge using projects they had to complete for graduate classes; classes taken, theories learned, and pedagogy developed; participation in a trauma informed practice professional development offered by the cooperating school; and knew the teaching program reiterates that teachers attempt to reach all students. Even if modeling is a preoperational pattern out of the cooperating teacher's classroom management system, it is a starting point from which preservice educators can build. Working with some tools during their student teaching gives them a chance to try them out and decide if they want to bring them into their own classrooms in the future.

Most of the participants referenced other sources of support. Working out of his case study, one preservice teacher reflected on how his student interacted with a teacher outside the classroom made a positive difference, "His personality has changed because of the relationships he's made with specialists" (Preservice teacher, Case Study, November 3, 2016). On the needs assessment, participants were asked to describe the types of resources available to them at school to support students with trauma histories. Seven of the 13 participants responded that counselors are an available source of support for students, though not all were sure about availability of or how to connect students with those counselors (Table 7).

Table 7

Available Resources at School to Support Students, Preservice vs. Inservice

Source	Preservice	Inservice	Total
Counselors	4	3	7
School psychologist	1	0	1
Contracted outside therapist	0	2	2
Principal	1	0	1
Other teachers	2	0	2
Advocates	1	0	1
"People who have backgrounds with this"	0	1	1
None	1	0	1
No answer	1	2	3
Not sure	0	1	1

Lack of substantial training, access to information, and awareness of school policies contributed to participants' reported low self-efficacy to support students with trauma. However, they were not without resources. Information about their students and other school professionals were on hand to support participants and students. Though training in education and abilities provided some foundation for educating participants, the majority viewpoint was one of desiring more specific information and strategies to adequately support students.

Teachers' responses to students. Beliefs about teachers' roles touched on strategies they could use to address students' needs. Interestingly, many of the explicit conversations came from preservice teachers. This may have been due to their limited experience and, therefore, every strategy is worth deliberation. On the needs

assessment, preservice teachers in particular wanted to address certain strategies: how to deescalate students once they were triggered, to reach out to students and be a safe person to whom students could talk; to know if avoiding topics is the right thing to do in conversations; to be welcoming and safe; to create productive and meaningful opportunities for learning; and to speak to students, teach them, and serve them. After discussing her case study, one preservice teacher doubted her impact on the situation at all since it occurred at home, "I was conflicted with how much I as a teacher can actually affect that situation for the better" (Preservice teacher, Case Study, November 3, 2016). Throughout the session, strategies about relating to their students were the foci of preservice teachers' discussions. The group discussed compassion and empathy:

- Maybe the idea of cognitively separating or seeing somebody else or seeing where they're at is different than the actual feeling, like actually responding with your feelings as opposed to responding with your mind. (Preservice teacher, Session Discussion, November 10, 2016)

- You don't want to remove emotions completely because they're important to seeing them as human beings who need a certain level of care. (Preservice teacher, Session Discussion, November 10, 2016)

Several teachers thought it better to assume students have trauma and work off the positives because all students deserve a high level of care. Using simple but effective methods, like shaking hands and giving high-fives, to devise a welcoming and caring classroom environment. At least one teacher noted she could not judge a student's response.

- Better to err on the side of caution probably. (Preservice teacher, Session Discussion, November 3, 2016)

- It isn't necessary to know the nature of the trauma but what is important is for educators to teach in a climate that is 'trauma sensitive.' In other words, let us treat all children using proven strategies to reach those who have been traumatized. (Inservice teacher, Follow-up Survey, December 17, 2016)

- Make the best of the days/times the student is there, appreciate their attendance and effort. (Preservice teacher, Case Study, November 3, 2016)

- Having this welcoming classroom may help illuminate areas or students of concern so that the supports can be made more individually. (Preservice teacher, Case Study, November 3, 2016)

- It's not up to me to say it wasn't that bad. (Inservice teacher, Session Discussion, November 12, 2016)

In particular, one veteran teacher remarked that she wanted to support and be encouraging but not too much; she did not want to be a crutch for her students. A few participants were willing to share personal histories with trauma as a way to illustrate how to maintain support without enabling students' unsafe behaviors. For example, a teacher whose parents divorced shared, "The fact that your parents separate or divorce is just kind of like, your home base is just kind of swept under you, and so I think that's what the firm anchor, firm strategy works" (Preservice teacher, Session Discussion, November 10, 2016). This balance is challenging and required specific discussions around appropriate strategies. For example, there were conversations about the nuanced use of language in strategies. Some teachers recognized the

importance of knowing children's development or advantage of employing rich language with advanced vocabulary:

> The factor of age has a lot to do in how we communicate with our student and check in with them to see how they are doing. (Preservice teacher, Case Study, November 3, 2016)

> If the student doesn't understand, it's a better opportunity for you to break it down at that point. (Preservice teacher, Session Discussion, November 10, 2016)

When describing her case study about a student that frequently acted out, a teacher wanted to balance between keeping behaviors on track and calling him out for them. Using language to support students with trauma gave hope to a preservice educator, who worked with students at an alternative school,

> I'm stuck thinking about the use of language to redirect students…I've been present for several of these borderline-meltdown stages and it feels like there is no way of turning back but with language I hope that I will be able to in the future…I feel like I'm in front of these situations a lot and sometimes it just feels like it's downhill and there's no way to stop it and okay they went there now but knowing there's something we can do it doesn't have be just downhill. (Preservice teacher, Session Discussion, November 12, 2016)

Some participants saw language as a foundation on which to support students and as a means by which to deal with students' reactions to trauma.

As they reflected on their case studies and personal lives, participants expressed simple but foundational strategies to implement in the classroom, as well as

addressing how they could frame their responses to students. How teachers saw students, what they thought they could do or not, and how they felt about their students' stories were examples of how teachers' expressed beliefs about students with trauma histories during and after the session. Their statements switched from being disheartened about their influence on this population to expressions in which they had an opportunity to be positive supports, one strategy at a time.

Summary. To care for their students, teachers supplemented their training from preparation programs and personal abilities with school and community resources. Inservice educators had experiences to work from which, at times, skewed their perceptions of why students behaved inconsistently with classroom expectations. Preservice educators had less experience but training that was more recent and generated fewer preconceived notions. Regardless of preparedness, initial responses from the ones-caring were based on psychological. However, through the course of the study, they began to incorporate more understanding of the role language plays in the classroom.

Others who need caring. I coded for social interactions between students and found the data showed the ways in which students with trauma acted out affected their peers. Behaviors affecting peers included students being sneaky, "appears manipulative of his fellow students" (Inservice teacher, Case Study, October 14, 2016), seeks attention from others, says and does things to get a rise out of peers, and easily derails and distracts the whole class. The negative reaction peers have in relation to students with trauma were highlighted in a case study discussed early on in

the session. The preservice educator concluded his student had no peer support

because of his behaviors,

> He's kind of crazy, he acts on instinct a lot and doesn't have much inhibition,
>
> but I don't think he's there enough to make friends…. Not many students like
>
> to work with him. (Preservice teacher, Case Study, November 3, 2016)

Teachers reported that peers did not want to work with students with trauma because

they felt intimidated, saw them as weird, or did not have much in common so did not

think to include them. One teacher reported that the student received no peer support.

Data from the belief survey taken after the break added to data about the

dynamics of the classroom. Seven participants did not agree that students with trauma

monopolize the teacher's time, but six did not agree or disagree, and one strongly

agreed. Participants tended to not agree that their responses to students with trauma

inhibited them from attending to other students. In addition, five of the seven inservice

and one of the six preservice educators reported on the belief survey that they did not

believe it is difficult to maintain order in a general education classroom that contains

students with trauma. On the other hand, two inservice and three preservice did find

maintaining order a challenge when students with trauma were in the class. This latter

finding was supported by case studies discussed in session. Some participants reported

students with trauma derailed classes, so peers were not learning. For example, one

teacher saw firsthand how a student throwing chairs in reaction to being stared at

creates unsafe space for classmates. A preservice teacher pointed out that, in his

alternative school, the whole class could spiral down in response to each other's

reactions or the environment. Another comment about peers' reactions to students

with trauma was around peers not clear why student got certain privileges, such as using the computer.

These comments describe indirect influence of trauma on the community, such as the safety for all students in the classroom and strained peer relationships. This piece is yet another dynamic for teachers to manage in the classroom. However, most teachers did not report concerns about their ability to manage their classrooms or differentiate support. However, classroom dynamics could affect the way they think of the students with trauma histories or even their own capabilities as teachers.

Obstacles to caring. Participants noted obstacles that impeded their abilities to fully support their students with trauma. Inservice educators wrote in their case studies that they needed help and more strategies, because they had tried what they knew and found very little worked in terms of satisfying students' needs.

- A lot of kids are struggling in school, and we're all trying but it's not enough. (Inservice teacher, Case Study, October 14, 2016)

- I'm trained as an educator but we can't get to education, because there's just so much going on that's preoccupying their attention that they can't sit and focus and engage in learning. (Inservice teacher, Session Discussion, October 14, 2016)

- It can be the littlest thing that somebody says that wasn't even supposed to be insulting and it's just, snap, and he's escalated, which has been hard. (Inservice teacher, Case Study, October 14, 2016)

- Maybe it has to do with the trauma and maybe some of his development. (Inservice teacher, Case Study, November 12, 2016)

Several worked with students with learning disabilities; one suggested that cognitive disabilities could be a potential ACE category. Throughout the sessions, participants' stories showed how intertwined trauma reactions with students' academics and the frustration with not being able to eliminate the trauma in order to focus on the learning.

External factors. Often these obstacles were outside the school and involved students' families or home environments. One preservice teacher summed her relative lack of influence on trauma, "The case study was a good reminder of how complex trauma situations are and how little power a teacher has in comparison to those larger factors at home" (Preservice teacher, Case Study, November 10, 2016). Those who taught students with special education needs and trauma were concerned about their students having social interactions with children outside of schools. They wanted their students to have more interaction that is human but were inhibited by other home factors. "Kids are so isolated and parents are strapped many times for money, time, and energy, and they're plugged into screens all day" (Inservice teacher, Session Discussion, October 14, 2016). A few teachers mentioned other hardships that accompany trauma, such as getting to or staying after school for help. An inservice teacher shared in her case study that the mother had signed her son up for after school support but never brought him due to working multiple jobs. In her reflection, the teacher said, "I can't blame her [mom]. I mean, I just can't even imagine" (Inservice teacher, Case Study, November 12, 2016). Two teachers had case studies that involved parents who were drug addicts. One talked about "the wiliness of drugs" that influenced a student's family outcomes (Inservice teacher, Case Study, November 12,

2016). The other teacher described "home is not a happy or safe place for him"

(Preservice teacher, Case Study, November 3, 2016).

School factors. Thoughts about school-related factors peppered conversations

and case studies. Small rules, like expecting middle school students to sit for six hours

a day were remarked on as, "It's just crazy and not reasonable to expect them to do"

(Inservice teacher, Session Discussion, October 14, 2016). However, most looked at

the benefits of school being a stable place for students with trauma.

School is probably the safest space for him. (Preservice teacher, Case Study,

November 3, 2016)

That's her safe place, that's her eight hours of adult consistency. (Preservice

teacher, Case Study, November 12, 2016)

However, one preservice teacher remarked that teachers can set goals but home needs

to change or it seemed like not much will change. For instance, a teacher mentioned

how an aide built a great relationship with his student; she was like a mother but then

moved away and the student's abandonment issues were rehashed. Some trauma could

influence a teacher's decision to stay at the school. For example, a substituted teacher

voiced concerns about losing a valuable educators because of a student with violent

reactions. There are many variables at play to consider besides the teacher and student

with trauma.

Summary. In addition to responding to their students' academic and social

needs, participants reported other dynamics that hindered students' learning and

classroom relationships. External factors, such as parents' capacity to support their

children, and time in school were major hindrances for these participants, adding to

their frustration of being underprepared. However, instead of being overwhelmed by these concerns, participants wanted to know how they could shift the dynamics in favor of their students.

  Caring community. Teachers do not work in isolation with the few students experiencing the effects of trauma. Community factors influence students' responses. As one inservice teacher stated while discussing his case study, "You have a lot of external things outside of our control that are all impacting this kid" (Inservice teacher, Case Study, October 14, 2016). Participants' conversations expanded the context to include the idea that creating a safe environment is not just the role of teachers but is a community-wide concern. Supportive peers could play a part in enhancing an accepting classroom if they better understood what happens when someone experiences trauma. One inservice teacher recounted the conversation he had with the neurotypical students in his class. He summarized how telling kids with trauma to do certain things to get them in trouble is like pushing someone in a wheelchair down a flight of stairs; "When you emotionally do that to somebody you do damage, too" (Inservice teacher, Case Study, October 14, 2016). In addition to peer relationships, school-wide care would bolster support of students with trauma histories. A preservice teacher reminded the group that students might not only be dealing with their trauma, so a range of supports are necessary in a school. Through her case study of her student questioning gender identity, she remarked that school could feel unsafe for LGBTQ kids, too, and they needed unique support. A way the school can support students is through the classes offered. An inservice teacher discussed the inadequacies of current "middle school, high school, and traditional

education systems, how not meaningful it is and if there's schools that are, you know, preschools, constructivist schools, problem-based learning, project-based learning, there's potential for it to be so much more meaningful" (Inservice teacher, Session Discussion, October 14, 2016). There was one example of creating a substantial experience for students. An educator found at his school that when kids with disabilities and trauma are in career and technical education classes that are meaningful to them, typical behavior issues are gone. School has meaning for them because it leads to employment and ability to support families. Through their stories, participants expanded the potential supports they could seek or ways they could incorporate more student-focused learning. Their original views of trauma were narrow but stretched as new information challenged their beliefs about what it meant to care for these students.

   Change in beliefs about students and trauma. Knowledge about trauma, both as a topic and as student-specific information, was an essential resource to participants. The student, the school, and outside factors contributed to how teachers thought about and responded to their students in trauma.

- Trauma is very situationally *(sic)* different and each student can be viewed differently by different people. (Preservice teacher, Case Study, November 3, 2016)

- It was interesting to think about the situation in different ways, both with the knowledge of home life and without. It makes so much of a difference to know what is going on. (Preservice teacher, Case Study, November 3, 2016)

- Knowing the 'how' trauma disrupts learning will help me advocate for these students as an education with a voice in the school culture…not know how it makes it difficult to take a stand, so I find this workshop empowering. (Preservice teacher, Journal, November 12, 2016)

- I have been thinking more about how trauma may present in my students, and to try to keep that in mind while teaching. I also feel like it has become a little easier to be patient with a few of my students who I know have one or more ACE that may potentially explain their behavior. (Preservice teacher, Journal, November 10, 2016)

Throughout and in response to taking part in the professional learning experience, several participants reported a shift in how they view students with trauma. Since writing their case studies came before the neuroeducation-based information about learning and trauma, teachers wrestled with separating what the students could not do versus what they would not do. Participants reflected on the follow-up survey and their case studies after the presentation of how learning occurs and what happens when trauma disrupts that process.

- Right now as screwed up as it is, I think that she's making the choice between her own safety and her academics, which isn't fair, but it's a choice she has to make right now. And if it was me, I would choose safety, too. (Preservice teacher, Case Study, November 12, 2016)

- Because trauma can mean many things, I think about these children and how their learning might be affected by the trauma in their lives. (Inservice teacher, Follow-up Survey, December 8, 2016)

- How the cognitive processes and the emotional processes can't effectively be

  online at the same time. (Inservice teacher, Follow-up Survey, November 21,

  2016)

This final quote highlights a potential reduction in stress for the teacher whose

expectations have changed for his student. He has less cognitive dissonance about

what he believes about students with trauma and how they present in the classroom.

Those who completed the follow-up survey wrote about keeping a balance when

teaching all students,

- Basically, I look at all students, especially the challenging ones, through a new

  lense *(sic)*, [and she would] treat all children using proven strategies to reach

  those who have been traumatized. (Inservice teacher, Follow-up Survey,

  December 17, 2016)

- I ordinarily try to practice patience with the whole class and with individual

  students, in front of the class if they are acting out, and when I speak with them

  individually. I think this hopefully demonstrates to students that they can be

  having a bad day (trauma or not) and they probably won't get in trouble for it.

  Granted I probably need to be more authoritative and more of a disciplinarian

  for some of the behaviors I patiently let slide, I think I've made an effort (both

  subconsciously as part of my disposition, and consciously with trauma in

  particular in mind) to make my classroom a place where students feel safe.

  (Preservice teacher, Follow-up Survey, December 8, 2016)

Participants recognized the need for knowledge about their students, trauma, and the

potential disruption to learning. They determined that they would have to change the

ways they interact with their students individually by altering expectations of

behaviors, and through creating a safe environment in the classroom.

   Extending personal understanding. Throughout the session, activities like

watching the ACE video and dissecting the *Growing a Grown Up Brain* slide, seemed

to spur teachers' interests about research available on trauma in relation to other topics

of interest.

- Has there been any research that's found gender differences in the ability to

  cope, work through, resiliency? (Inservice teacher, Session Discussion,

  October 14, 2016)

- Students with trauma are more or less likely to gain empathy than other kids?

  (Preservice teacher, Session Discussion, November 10, 2016)

- It's on the list, have they since Katrina and these events, are they researching

  that as well? (Inservice teacher, Session Discussion, October 14, 2016)

- I find interesting is that it doesn't mention death of a family member because to

  me that seems like it would be an extremely traumatic event. (Inservice

  teacher, Session Discussion, October 14, 2016)

- Does using marijuana effect young people depending on age? (Inservice

  teacher, Session Discussion, November 12, 2016)

- A lot of these kiddos haven't learned some of these basic things, nor are they

  capable to learn some of the higher level skills yet they're thrown into it, so

  how does that balance? They're filling in the holes for what they can'

  comprehend and why you'd be more susceptible to maybe turning to drugs

because you're trying to fill in these holes of all this stuff. (Inservice teacher,

Session Discussion, November 12, 2016)

A preservice teacher wanted to know about research on underdeveloped parts of the

brain in relation to insecure attachments to caregivers. A special education teacher

wondered if students from stable families had mental health issues because, "They're

displaying all the same effects as someone who's experienced trauma has" (Inservice

teacher, October 14, 2016). As well, she remarked that she could not always tell if the

trauma or the cognitive impairments came first.

Other participants looked to the sociological influence on supporting students

with trauma. Specifically, the city's housing market prices are driving out families to

more affordable rural areas. In turn, one teacher recounted from personal experience,

the creation of trauma informed group homes are being built to fill in supports for

affected students, and superintendents and teacher unions are seeking trauma informed

practices in schools. Similarly, another teacher wanted to know to what extent and

speed trauma informed care is emerging in education compared to the healthcare

system.

Discussion about these different areas showed their personal and professional

interests, as well as the points of view from which they entered the study. What was

salient to them and their work was where they connected the new information and

raised their thinking.

Summary. Using a neuroeducation lens of trauma and learning altered

educators' content knowledge, attitudes, and beliefs about students experiencing

trauma. Participants defined trauma in terms of having no control or power,

psychological damage, changing the person, and once or ongoing. They perceived students' intrinsic and extrinsic responses to trauma, both undesirable and beneficial, seen through interactions with peers and adults. How peers responded to students with trauma was an unexpected point made by participants. In terms of roles, inservice teachers' attitudes about their roles illuminated their unpreparedness to adequately support students with trauma histories, and preservice teachers focuses on strategies they though best to use with this population. Student's roles centered around their academic and social behaviors in the context of school. Other factors influenced teachers' beliefs about students, including their own personal responses as they interact with students and parent support. Participants' beliefs about students with trauma and teachers' roles changed over the course of the professional learning experience. In addition, they pursued extending their personal understanding of trauma to related topics such as gender, drugs, and natural disasters.

The learning process. To address the third research question, *How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?* I used relevant responses from the needs assessment, conversations, journals, the discussion on *Growing a Grown Up Brain*, professional learning experience evaluation, and follow-up survey. Together, analyses of these data produced six main themes connected to learning: defining learning, understanding the science behind learning, students' and teachers' roles in academics and social interactions, connecting trauma to learning, teacher roles in caring for students with trauma, and goals in the learning process (Table 8).

Table 8

Progression of Participants' Understanding of Learning Topics Throughout the Professional Development

Topic	Before	During	End
Definition of learning	Had limited vocabulary, incomplete definitions of learning, and partial understanding of brain development	Incorporated neurological and psychological concepts into discussions of case studies	Maintained an increased understanding of how trauma disrupts the learning process and influences social and academic behaviors
Understanding the science behind learning	Had predominantly cognitive psychological lens of the learning process	Familiar with some more well-known terminology related to brain structures and cognitive processes but not describe cellular processes	Assimilation of neuroeducation lens was essential to informing their beliefs about learning and what they viewed as important to the process
Students' and teachers' roles in academics and social interactions	Students should exhibit school-appropriate and expected behaviors; teachers deliver content and manage classroom interactions	Brain research was important for students' social-emotional needs; preservice focused on trust and safety; inservice viewed overall wellbeing and classroom management	Academic and social values contribute to teachers' beliefs that determine their pedagogy.
Connecting trauma to learning	Stated students with trauma were unable to learn and process information as their brains were focused on the feelings and thoughts of the trauma	Layered neuroeducation concepts about learning to explain why students were not connecting new information to prior knowledge	Accurate account for the shift in students' academic and social behaviors; clear expectations for typical student with and without trauma
Teacher's role in caring for students with trauma	Roles as ones-caring different from academic roles	Use a trauma-informed lens as they teach, provide safety, and give support	Focused on building relationships and teaching social skills; connecting students to other resources
Goals in the learning process	Personal goals revolved around supports, safety, and relationships	Goals for students were too high for what they said they understood about learning and trauma	Inservice set concrete cognitive level goals; preservice set formal cognitive level goals

Defining learning. Participants' definition of learning changed from what they stated at the start of the professional development compared to the end. The majority of the alterations in their definitions incorporated the neuroscience information that connected to the cognitive psychology of learning. Participants' initial definition of learning was elicited prior to the provision of Illeris' (2009) definition during the session. When asked how they defined learning, an inservice teacher spoke about different forms of learning, such as conditioned behavioral versus cognitive. The other participants' definitions covered a variety of value codes. Growth came up several times in comments. A couple of teachers noted that growth was ongoing, and one inservice teacher looked at is as individual. "Growth that there's not one end point, there's individual end points" (Session Discussion, October 14, 2016). Others focused on gaining knowledge of content and skills, and then on an individual level "Being able to intake and process information and then being able to use that information in whatever capacity that you have" (Inservice teacher, Session Discussion, October 14, 2016). Making knowledge permanent came up, "It's like a psychological standpoint, where knowledge moves into long-term memory so that it's always going to be there" (Preservice teacher, Session Discussion, November 3, 2016). Connecting self to an experience, as a means to grow and adapt, was another definition, "Making connections between the world and yourself and then changing yourself in response" (Preservice teacher, Session Discussion, November 3, 2016). One inservice teacher saw learning as a way to challenge the status quo,

I think it's that inquiry piece that you're pursuing to look for, you're

introduced to something and you're finding how to interrelate it to yourself and

then finding that next question about it…take that interest, that initial passion

that they had, the fun that they had within that and take it to the next level.

(Inservice teacher, Session Discussion, November 12, 2016)

Being challenged took on a different meaning for a preservice teacher in that same

group. She saw learning as reframing one's perception of an experience,

Being comfortable with discomfort and uncertainty… and not having that

being a value judgment of who you are as a person to try something you've

never tried before and grapple with it and make mistakes. (Preservice teacher,

Session Discussion, November 12, 2016)

The variety of definitions suggest that participants did not have a clear definition but

instead several related parts. Providing a broad definition, then, encompassed these

many angles and encouraged the idea that there was no one correct answer.

Participants' early definitions about learning involved the concepts of growth,

making connections, and challenging old information. These ideas provided a broad

enough base on which to layer information that was more technical. Most were

unfamiliar with neuroscientific terms at the start of the study but they seemed to

acquire the concepts as they were referenced in discussions and the presentation.

In the follow-up survey, all participants' definitions of learning retained some of these

same concepts but were expanded in terms of including neuroeducation information,

particularly with their incorporation of neuroscience. They were more specific in their

language about the scientific and cognitive processes, naming how stimuli enter the

brain through the senses, interact within regions of the brain and process the stimuli in working memory and connect to old information.

- Sound and light waves [are] received and interpreted by the parietal lobe and occipital lobe, respectively…. Once new knowledge can be connected to prior knowledge, dendritic and neuro pathways can be formed and the knowledge can be stored in long term memory. (Preservice teacher, Follow-up Survey, December 8, 2016)

- These connections become stronger and more efficient the more frequently they are used. (Preservice teacher, Follow-up Survey, December 9, 2016)

- Learning causes new connections to form in the brain, meaning that new dendrites can grow to connect different neural pathways. Learning might also involve pruning, to make the brain more efficient at something it knows how to do well. (Preservice teacher, Follow-up Survey, December 8, 2016)

- If the emotional control center in our limbic system is not in flight, fight, or freeze mode, then there are chemical & electrical processes by which this information (learning) will be relayed to other parts of the brain where memories are made & stored. (Inservice teacher, Follow-up Survey, November 21, 2016)

Accuracy of terms was not always correct, but conceptual understanding was higher after the session than at the beginning.

- In learning, three main parts of the brain come into play (the stem, the cerebrum, and the cerebellum), the cerebellum being the most important

because reasoning and memory occur here. (Inservice teacher, Follow-up

Survey, December 17, 2016)

- As the brain comes into contact with new information, the brain goes through

  behavioral and physiological responses which become adaptions of

  assimilation and accommodation to reach an equilibrium. Humans are

  continually learning through new experiences. However, the allostatic load

  which comes with trauma prevents the brain from firing connections, learning,

  and continuing to grow. (Preservice teacher, Follow-up Survey, December 8,

  2016)

These data suggest participants gained substantial understanding about the

neuroscientific basis for learning and could begin making connections to their prior

psychological knowledge. The one missing part of neuroeducation was language,

which might have been because I did not emphasize it as much or explain it as well,

that it was less concrete and so more difficult for participants to relate to prior

knowledge, or was not as salient to them at this point in their understanding.

Understanding the science behind learning. On the whole, teachers did not

have a background in neuroscience or psychology but were a bit familiar with some

more well-known terminology related to brain structures and cognitive processes. (e.g.

executive functions). When unclear, educators asked in the presentation for

clarification of terms' definitions and uses, such as neuroplasticity, homeostasis,

pruning, chronic illness, and vigilance. Collectively each group could name the

structure of a neuron but few knew how neurons transmitted messages, the function of

biological systems, or parts of the brain. For instance, one teacher wondered if the size

the brain stays relatively the same from birth. Someone else asked if plasticity is similar to elasticity, showing her own struggle to assimilate new information. However, as the conversation progressed about how the brain works, new meaning developed for participants. For example, an inservice teacher created an analogy about the brain looking for stimuli, "So it's like a phone on roaming" (Inservice teacher, Session Discussion, November 12, 2016). Looking at the slide *Growing a Grown Up Brain*, participants wrote and discussed what they noticed about how the gray matter develops over time in the brain. Most preservice and inservice teachers correctly interpreted the gray matter density, but two struggled to understand the slide:

- From my understanding I thought [development] was from the inside out. (Inservice teacher, Session Discussion, November 12, 2016)

- I'm not sure if it's accurate is that the darker regions are less dense which to me, I'm equating with less active, less connections. (Preservice teacher, Session Discussion, November 12, 2016)

They discussed how brains became more efficient over the age range of 5-20 years, and gray matter decreased in density. In their journal entries and in group discussions, they pointed out areas that decreased in gray matter density over time,

- The temporal lobe is the most dense part of the brain by 20 years. (Inservice teacher, Journal, October 14, 2016)

- The diagonal crease by the temporal lobe stays the same color, so same density. Same kind of with the upper part of the occipital lobe. (Preservice teacher, Session Discussion, November 3, 2016)

- Concentrated areas of dense grey matter form in certain areas. The frontal lobe is the last to mature – Planning emotional control, problem solving. (Inservice teacher, Journal, October 14, 2016)

- [The] crevice between frontal and parietal lobe. Looks to happen in a specific order. Movement/vision and sense first – info but not meaning yet. (Inservice teacher, Journal, October 14, 2016)

A few participants, particularly those with more neuroscience understanding, interpreted what density change meant in terms of students' capacities:

- Some of the last to become less dense are the prefrontal cortex; some of the first are along sulcus for sensorimotor [so] kids first get good at sensory/awareness/movement. It makes sense that stuff like spatial perception would be more dense and developing. (Preservice Teacher, Session Discussion, November 3, 2016)

- If you go to the middle [brain], that's where you start having kids do athletics competitively at school, and so that's the part that's getting developed the most. (Inservice teacher, Session Discussion, October 14, 2016)

Though participants began with a hazy knowledge of some vocabulary, they seemed willing to pick up the terms, question the information, and use them to understand the learning process.

In particular, educators connected students' abilities to age and brain development. Younger brains "don't have past experiences" (Inservice teacher, Journal, November 12, 2016), whereas "by the age of 20 the brain has networked to a level that the brain percieves *(sic)* maximum efficiency" (Inservice teacher, Journal,

October 14, 2016). One inservice teacher explained to another about gray matter, "it's also made the pathways between the brain that it needs to make, the neurofunctioning in the essence. Like if you look at the early brain it's far more dense because you have all of these different pieces trying to fit together where each thing goes into it" (Inservice teacher, Session Discussion, October 14, 2016). One inservice teacher viewed the slide as one who teaches middle school students and integrated the information about neuronal pruning.

- Brain will have more neurons then a 20 yr. old brain. Because (I think) the brain is still processing information for spatial reasoning (where am I in relation to X), rules (what do rules mean what are consequences and which are meaningful rules), brain gets more developed it starts conceptualizing concrete meanings and values of ideas, as the brain prunes out of use data, making the density decrease as neurons are exited. (Inservice teacher, Journal, October 14, 2016)

Some took the next step to connect neurotypical development with cognitive processes based on students' ages.

- As part of typical brain development this makes sense of adolescent behavior —(risk taking, etc.)—rather than solely the impact of hormones. (Inservice teacher, Journal, October 14, 2016)

- It also makes sense that planning and emotional control areas are developing when younger. (Preservice teacher, Journal, November 12, 2016)

- One of the last places to turn colors is in the front [connected to another's inference] being able to think at a higher level doesn't happen until later in life. (Preservice teacher, Session Discussion, November 3, 2016)

- An inservice teacher assessed an older brain with decreased gray matter as, "It's more efficient overall…those first parts that are pruned…they're more concrete things so the layer of adding meaning and integrating and understanding comes much later." (Inservice teacher, Session Discussion, October 14, 2016)

One inservice teacher's remark summed up her thinking about students' brain development, "I guess the bottom line for this is that they're not little, itty bitty adults" (Inservice teacher, Session Discussion, October 14, 2016). There was only one question in the discussion about language but was at a decidedly formal level, "Does language form our reality?" (Inservice teacher, Session Discussion, October 14, 2016). A veteran teacher recounted her response to parents worried about their children's development, "Parents over the years asked why their kids couldn't do certain things, so much pressure, and I would reply that you can't will them into being that, you don't know what they'll be like so be patient" (Inservice teacher, Session Discussion, November 12, 2016) This scenario demonstrates that parents may not have an accurate understanding of child development, and that learning is individual, slow, and undetermined.

Participants were willing to try their hand at using the new language I provided in the presentation. They started to express the slowness of brain development that then influenced the capacity to learn. This initial foray into looking through the

neuroeducation lens was essential to informing their beliefs about learning and what they viewed as important to the process.

Students' and teachers' roles in the learning process. I examined what participants' expressed on the needs assessment and through discussions of case studies as important regarding academic and social abilities needed in the learning process. From their answers to questions, I value coded data for students' and teachers' roles in academics and in social interactions.

Students' and teachers' roles in academics. Participants brought up that students should have certain skills and abilities to learn and teachers played critical roles in promoting that learning. Inservice and preservice teachers had somewhat differing expectations of students' roles in the learning process (Table 9) but agreed students were responsible for fulfilling those roles. The table is organized by values and magnitude coded student roles as expected by inservice and preservice teachers, as well as teachers' roles. Student roles are listed by codes most frequently mentioned in discussions or written in case studies. I coded teacher roles, written in the silent conversations towards the end of the session, by theme.

Some teachers believed they could help foster these student traits through teachers' actions. An inservice teacher said he strived to get a student to be more communicative. Preservice teachers thought they could motivate students with external rewards, get student to produce work, passing classes, and keeping student focused and engaged. The preservice teachers described being in charge of getting students to school and staying there, and filling in learning gap that traditional education did not meet. The discussion of personal abilities was tied into the

discussions about teachers' roles played in students' learning experience. These lists of students' and teachers' abilities suggest teachers set high expectations for both parties in the classroom and illustrated participants' overall beliefs about the learning process.

Table 9

Expected Student Versus Teacher Roles in Academic Learning

Students' roles		Teachers' roles
Expected by inservice teachers	Expected by preservice teachers	
Use of expressive language	Work completion	Deliver content and present information
Completing work	Making an effort in class	Activate prior knowledge and scaffold
The speed at which work is completed	Academic abilities (reading, writing, language, math)	Pepper routines with novel experiences
Academic growth, regardless of start and end points	Comparing current work to past performance	Adjust instruction or support in the necessary and appropriate ways to engage students
Attempting work	Attendance	Differentiate instruction to meet child's needs
	Working hard	Spark curiosity, particularly in content which is less accessible
	Passing grades	
	Relying positively on adults	
	Being able to self-sooth	

I asked participants on the needs assessment given before the session how they valued brain research in helping them prepare and deliver curricula. With the exception of one inservice teacher who found little importance of brain research in

academics, 12 teachers believed brain research to be important or very important to support their efforts in working with students' academics. Participants were given room on the needs assessment to expound on their answers. Four inservice and five preservice educators responded that learning about brain research for curriculum and instruction design was "very important" and added value to their teaching:

- I think it is a whole new window on learning. Why not utilize cutting edge brain research? Research has been consistently presenting educators with information we can use to create new tools for a teacher's toolbox. (Inservice teacher, Needs Assessment, November 10, 2016)

- Very!! Understanding the whole student is key to creating differentiated lessons. Designing lessons that play up the brain's strengths is probably a good idea from a teacher's perspective and from a student's, and is more likely to result in an informative, meaningful learning experience for both parties. (Inservice teacher, Needs Assessment, October 10, 2016)

- Having a general understanding of the brain research is important because it will clear existing doubts on the approach and will allow me to teach with it more confidently. Understanding how the brain works can help me design activities and create content that will be memorable and impactful for kids.

- How can you expect curriculum to be developmentally appropriate if it is not designed with brain research backing it up? (Preservice teacher, Needs Assessment, October 30, 2016)

Therefore, according to participants, learning will more likely occur when students and teachers have the appropriate skills and fulfill their roles in the classroom. Using

brain research would support teachers' efforts to differentiate lessons for students' individual learning systems.

Students' and teachers' roles in social interactions. Interactions between students and teachers are the conduit for creating experiences that may or may not support academic learning. On the belief survey, all participants believed brain research was important for supporting students' social and emotional needs. Five inservice and all preservice educators wrote that learning about brain research is very important for informing their interactions with students. The other two inservice participants were interested in learning more about the research but did not take a stance on its importance. One preservice educator expounded on her answer to illuminate the difficulty in addressing social dynamics:

> Also incredibly important, but I think this is much harder. Whereas with planning your lessons and ultimately executing them, when you can build from the knowledge of student's neurological limits and strengths, but in social interactions it is more easily neglected. For example, it is easy for me to forget that students may be trying their best to concentrate, and I instead see them as actively disrespecting me by having side conversations. It is also very important when it comes to discouraging behaviors, because the emotional development of adolescents and younger students may likely perceive what I think is a request for attention as me yelling at them, or maybe thinking that I don't like them, neither of which are true. For me personally, this is the hardest to keep in mind, and perhaps the most important as an educator. (Preservice teacher, Needs Assessment, October 31, 2016)

Based on the teacher-written case studies, inservice teachers valued certain attributes in students, too, that contributed to more expected personal and social interactions: feeling loved, self-regulation, student well cared for at home, leaving other students alone, and students cannot take each other's freedom away. Personal characteristics mattered to some participants. One teacher spoke of her student's resiliency, "[He] was one of the lucky ones…born with a keen mind and can-do attitude and he overcame many obstacles that would have debilitated other children" (Inservice teacher, Case Study, November 12, 2016). Another teacher highlighted her student's intelligence, eloquence, deep thought, and engagement. Regarding social interactions with peers, preservice teachers valued social language and listening skills, social connections to peers, fostering friendships, talking nicely to others, finding a public voice but not too loud, and school-appropriate behavior. Some of these values describe what makes a student more likeable because they act in a school-appropriate manner, while others showed the teachers' desire to improve the students' school experiences.

Teacher held values coded by their interactions with individual students and the classroom as a unit. Teachers mentioned they should validate student's feelings; include student's positive skills in the classroom; smile, be pleasant and encouraging but not dote or give too much; set high expectations; and understand students' triggers that escalate behaviors to achieve calmness and social problem solving. Teachers saw their roles as treating students as whole beings: give students knowledge and tools to succeed in the world, flesh out the ways the student learns best, help students see themselves as learners, growth mindset, create lasting change by creating lifelong

learners, and have high expectations that push students out of their comfort zone just enough to be productive. Preservice teachers accentuated the importance of building relationships with students on a one-on-one basis. For example, a participant wrote about the importance of knowing an individual's story to help him or her, "because learning is different for different students and you need to know how exactly you can help that individual student who's experiencing something different than other students" (Preservice teacher, Session Discussion, November 3, 2016). They mentioned having a positive relationship with student, checking in with students, use a gentle approach, be more positive than critical of students, be patient with students, and connecting with student at start and end of class. Two teachers highlighted building trust: a strongly built relationship that has trust can be playful, and keeping trust in tact with the student. Inservice teachers' valued students' general well-being and believed student-centered learning is necessary to make content meaningful. Additionally, they discussed critical factors for learning, including language and sleep, human interaction is key to social growth, and teachers should give students some freedom. Some teachers stated holding boundaries with compassion and consistency and providing students with choices is important.

I coded data from case studies about the classroom context in which relationships develop: preparing the environment to foster relationships and learning through the creation of authentic and engaging classrooms, environments of cooperation, and safe structures where students can experience success. An example from an inservice teacher showed the importance of managing classroom chaos so no one could add to it for the benefit of students with trauma. Similarly, an inservice

teacher wanted to keep the classroom calm and "don't push the red button" that starts the cascade effect. An inservice teacher spoke of safety being an issue if student leaves the classroom, and expressed concern for her own job in that she could be liable if the student goes off campus. In contrast, preservice teachers focused more on providing a welcoming classroom for all. Looking across her caseload, one said, "Making my classroom safe is a great, critical first step to make sure all students have their needs met" (Preservice teacher, Journal, November 3, 2016). Finally, several teachers mentioned the value of not letting personal feeling get in the way. One preservice teacher particularly mentioned being mindful of her personal feelings because, "student behavior is not a value judgment on me as an educator" (Preservice teacher, Case Study, November 12, 2016).

  Summary. As they discussed case studies, participants' spoke of what attributes they felt were important for students to have for academic and social success, which generally were school-appropriate and expected behaviors. Teachers' roles incorporated presenting content knowledge and evidence-based practices, ideally informed by brain-based research. Socially, preservice teachers relayed the necessity of building trusting relationships with students and developing safe classrooms. Inservice teachers looked at the overall wellbeing of their students while managing the chaos in the classroom. Academic and social values contribute to teachers' beliefs that determine their pedagogy.

  Connecting trauma to learning. Over the course of their participation in the study, teachers' statements of how students' trauma interacts with their learning became more comprehensive. Before participating in the workshop, many teachers

described in their needs assessment that students with trauma were unable to learn and process information as their brains were focused on the feelings and thoughts of the trauma. In turn, students' response behaviors include reduced class participation and increased anti-social behaviors such as being "very abrasive or hard to talk to" (Preservice teacher, Needs Assessment, October 31, 2016). One preservice teacher summarized participants' responses, "It can distract students. It disrupts human's basic need for stability in life which can lead to further instabilities and irregularities in thought patterns and behaviors and thus ability to learn" (Preservice teacher, Needs Assessment, October 30, 2016). Another preservice teacher concluded that, "Any instructions which follows for this student will be a waste of time, and possibly make matters worse" (Preservice teacher, Needs Assessment, November 1, 2016). There was a sense that the behaviors get in the way of learning but that those behaviors signified trauma.

After the presentation materials about defining trauma and writing their case studies, I asked participants why they thought learning was an important topic to consider for educators when thinking about trauma. Most teachers focused on the impact of trauma on neurology, citing issues such as, "disrupts capacity to learn and grow" (Preservice teacher, Session Discussion, November 12, 2016), "impacts ability to process information and take in info" (In Preservice teacher, Session Discussion, October 14, 2016), "reorganize those neural pathways or break them," (Preservice teacher, Session Discussion, November 3, 2016), "the hippocampus is blocked" (Preservice teacher, Session Discussion, November 3, 2016), "and the "body gives off chemicals…cortisol is one bad thing" (Inservice teacher, November 12, 2016).

Referencing the *Growing a Grown Up Brain* slide on brain development, a teacher understood that typical brains can do more as they age, "however, many of these trauma kids are trying to make sense of the world when they can't" (Inservice teacher, Journal, November 12, 2016). This teacher showed a concrete understanding of the influence trauma has on her students' abilities to process external stimuli. Two inservice teachers addressed brain development in light of trauma. One teacher wrote, "Different parts of the brain will develop differently depending on the trauma." (Inservice teacher, Journal, October 14, 2016). The other wondered if the "it depends on the kind of trauma so it's like sexual abuse, for the nonphysical things like divorce, these other things are going to affect different parts of the brain?" (Inservice teacher, Session Discussion, November 12, 2016). By referencing the neuroscience information, their use of language and questions asked suggested a concrete to formal level of understanding about the effects on the brain then they had demonstrated on their needs assessment.

Developing a neuroeducation lens continued as participants layered the psychological perspective. Through discussions of their case studies, a few teachers recognized student's potential emotional states, such as feeling unsafe, that could distract them from learning subject content. A few empathetic teachers saw these distractions from a student's point of view:

> My understanding is that in order to achieve the best learning, students must be in the right mindset and fully engaged in the learning, but with trauma, the mind seems to be somewhere else. (Preservice teacher, Needs Assessment, November 11, 2016)

If you're dwelling on getting yelled at or an abusive situation, how are you

expected to come in and sit down and inquire about how to structure a

sentence? because your mind is on other places or what's going to happen after

I get home. (Inservice teacher, Session Discussion, November 12, 2016)

A teacher stated that students might learn but more about trauma, which, "can be a

learned behavior…you learn how to react in the situation either to be safe or to get the

thing to stop." Psychological processes were coded for during the journal entries and

session discussion on *Growing a Grown Up Brain* slide. For example, a participant

wrote a concrete cognitive statement that trauma "slows down process (less pruning)

leads to less integration and meaning." (Inservice teacher, Journal, October 14, 2016).

She made a connection between more gray matter and less efficiency in processing.

Similarly, preservice educators were asked about students' ability to evaluate

situations, and one responded "Their frontal lobe isn't really efficient yet" (Preservice

teacher, Session Discussion, November 3, 2016), thereby showing her understanding

that the frontal lobe is the center of executive functioning. To check for participants'

developing understanding of the relation between neural and cognitive processes, I

asked: "In light of the physiological response to trauma, what's wrong with this

statement? *With new information, your thinking dips as you assimilate new*

information into previous knowledge stored in long-term memory." Several inservice

teachers commented that trauma inhibits new information from connecting to prior

knowledge and so "you don't assimilate" (Inservice teacher, Session Discussion,

October 14, 2016) and "you don't integrate that information" (Inservice teacher,

Session Discussion, October 14, 2016). Another teacher responded to the questions,

"you also aren't accessing schema like previous knowledge if your amygdala is just like focusing on fear response" (Inservice teacher, Session Discussion, November 12, 2016). One inservice teacher gave another reason for not connecting new information to knowledge, "You may not have the previously stored knowledge. You may not have a piece of information to relate it to something else that you can access it to" (Inservice teacher, Session Discussion, October 14, 2016). Preservice teachers were less certain of their answers, "Because don't you have to accommodate new information?"(Preservice teacher, Session Discussion, November 10, 2016) and "Is it because the hippocampus is blocked that it doesn't go through?" (Preservice teacher, Session Discussion, November 10, 2016). By asking questions and relating information to prior knowledge, I observed participants' as challenging their own thinking to better understand their students with trauma.

One specific conversation demonstrated preservice teachers' deepening understanding of the impact of trauma on learning. Preservice teachers discussed the concept of differentiation when one brought it up in tandem with her case study. She told the group about her cooperating teacher who did not believe in differentiation. They figured some students in that class would be left out of the lesson "Because I'm not sure all students are engaged as she would like them to be" (Preservice teacher, Session Discussion, November 10, 2016). Participants said they could not teach students all the same way because "some of their brains are blocked" (Preservice teacher, Session Discussion, November 10, 2016), or "some of them might be in a place where they can't engage or where they're too bored that they don't want to be engaged" (Preservice teacher, Session Discussion, November 10, 2016). These

comments referenced the low engagement and low productivity intersection in McEwen's stress model. Others concluded students "don't learn the same way the teacher does," or "the content isn't accessible" because of "the way they learn or just the interest level in it" or there was need for "some sort of scaffolding and prior knowledge" (All preservice teachers, Session Discussion, November 10, 2016). In this relatively short conversation with only minimal prompts from I, they made several neuroeducation-based connections between trauma and Arwood's Neuro-semantic Language Learning Theory. Specifically, they mentioned students' learning systems, individual brain development, and assimilating new concepts and raising thinking with supportive language.

After the session, half ($n = 6$) the participants completed the follow-up survey and, again, reported what they thought about the impact of trauma on learning. Their answers about the learning process and the brain's reaction to trauma reflected more neuroeducation perspectives in their use of vocabulary and concepts. They used neuroscience terminology not present in their initial answers that were more psychology-based. For example, a preservice teacher wrote of trauma, "Because of this, neuropathways can be pruned and knowledge can be lost because the neurons outside of the amygdala are not being used anymore" (Preservice teacher, Follow-up Survey, December 9, 2016). What is not part of her answer are the nuances of plasticity in relation to the dose and duration of trauma. They displayed comprehension of multiple outcomes from trauma, such as "a new baseline of near constant emotional arousal" (Inservice teacher, Follow-up Survey, November 21, 2016) and trauma "messes with sleep cycles and sleep is when you consolidate

memory, so it can make it harder to new info to stick" (Preservice teacher, Follow-up survey, December 9, 2016) One teacher referenced McEwen's stress model discussed in the session:

> Trauma leaves students at the extreme end of the stress curve, which means they are not able to work or even pay attention because they may be continuously replaying a traumatic event in their mind. Their brain is so occupied with the trauma that there is no capacity for learning; safety comes first, and the brain believes everything is a potential threat. (Preservice teacher, Follow-up Survey, December 8, 2016)

This teacher rephrased the significant part of students' responses to trauma without using technical language. Teachers wrote about cognitive impairments, for instance "the cognitive functions of the brain are overridden by the survival function of the emotional brain such that [the cognitive functions] cannot come on line to allow the learning process to happen" (Inservice teacher, Follow-up Survey, December 17, 2016). A preservice teacher noted the impact on language, "Trauma causes kids to get stuck in the limbic system so that they can't access the neocortex network, which includes things like higher order thinking (such as language)" (Preservice teacher, Follow-up Survey, December 9. 2017). They recognized that trauma is a stressor that influences their students' neurological and cognitive functions, particularly reducing language functions, to focus on fundamentally staying alive rather than focus on higher thinking.

In a relatively short amount of time with the material presented, participants' comments displayed an appreciable change in their understanding and use of

neuroeducation to explain how trauma disrupts learning in their students. As neophytes, they were able to accurately account for the shift in students' academic and social behaviors. They had a clearer view on what to expect from typical students with no trauma versus expected behavior from typical students with trauma. Importantly, they were able to describe the shift in their roles as ones-caring, as shown in the next section.

Teacher roles in caring for students with trauma. Participants delineated their roles as ones-caring for students with trauma from their role of supporting academics. Though, as some concluded, the lines between those roles blurred. Participants wrote in their needs assessments and silent conversations, written near the end of the session, of unique roles they play in the lives of students dealing with trauma. The three predominant codes from the data were using a trauma-informed lens as they teach, provide safety, and give support. Teachers noted the importance of approaching students with a trauma-informed lens, this meant knowing and honoring students' backgrounds/trauma history to support students academically and socially. Participants discussed in the session that teachers should recognize that each experience is different, each person his own, and to treat students with trauma according to their own needs. Educators wrote on using this perspective when they develop and write curricula and create learning opportunities.

Participants serving students with trauma mentioned their responsibility to explicitly teach students strategies to cope and problem solve. One inservice educator said the job entailed teaching "them coping skills and improve their language to understand how the trauma impacts them" (Inservice teacher, Needs Assessment,

October 10, 2016) and know what they are feeling. This points back to the inservice teacher who did not want to be a crutch for students. However, another participant said, "be realistic in setting expectations" (Inservice teacher, Silent Conversation, October 14, 2016) about academic and social behaviors in the classroom. Four preservice participants included ideas of learning content and maintaining standards, such as "continue to hold them to high standards because school may be the only place the student has structure and regularity still" (Preservice teacher, Journal, November 10, 2016). This data set suggests reducing cognitive dissonance in educators by being realistic about what students will do, while building up students' coping skill and providing clear boundaries.

Safety was a primary concern for participants. They wanted to establish a safe, stable, and accessible learning environment, as well as foster trusting and safe peer and adult relationships. Part of that meant being a safe and accepting adult who does not blame student for behaviors, and ensures students know teachers are available to them and that students are safe in what they say. The latter comments elicited a response in the silent writing conversation: "what about what they do or don't do?" (Preservice teacher, Silent Conversation, November 12, 2016). She discussed in the session that she hoped students could be safe in what they say *and* do in the classroom because the teacher created a supportive and safe environment. Along those lines, one teacher noted that there was a better chance students would learn subject content if teachers first set the stage by "making my classroom a safe space is a great, critical first step to make sure all students have their needs met" (Preservice teacher, Case Study, November 10, 2016). These teachers linked the concepts of students'

hypervigilance from trauma with teachers' roles in reducing the cognitive load through creating a protected environment.

Teachers wanted to give students space, time, and support such as connecting students to resources, and making students aware that teachers are available. Examples of supports were:

- "As educators (we) should do our job and find the resources that the school has to connect our students with them." (Preservice teacher, Case Study, November 10, 2016)

- "Help basic needs get met as much as possible (food, rest, novelty, quiet)." (Inservice teacher, Silent Conversation, October 14, 2016)

- Advocating for the needs of these students and bridging the gap created by traditional education, which was not preparing students.

- Learn and identify triggers to find constructive outlets.

- Acknowledging care for the mental health of students.

Regarding addressing the psychological care of students, two specifically clarified that they were not mental health professionals. A preservice educator was open about being completely open: "I am unsure. I believe you figure out how a teacher generally helps students' injuries, particularly emotional ones" (Preservice teacher, Case Study, November 3, 2016). This response suggests this participant did not receive training in his program on how to address or find resources to support students' emotional needs. Everyone came in with a different level of self-efficacy about how he or she could help.

Participants agreed that as the ones-caring, they set the tone of support in the classroom by anticipating and responding to students' needs. By knowing their students and insisting their safety takes priority, teachers described themselves as advocates for students' wellbeing. They considered the broader context in which students learn and so focused on building relationships and teaching social skills. At the same time, they recognized that there is limit to what they can do; therefore, they determined connecting students to other resources would be benefit everyone.

Goals in the learning process. Through coding data of participants' goals they set for themselves and for their students, three main ideas became evident: supports, safety, and relationships. Participants wrote and discussed emotional, academic, and social goals depicted in their case studies and in the follow-up survey completed. Participants wanted to address their students' emotional needs, though each group addressed different facets for which teachers were responsible. Inservice educators mentioned using communication tools to meet student's needs and relieve stress, not triggering student to where the student will do something to get removed from the room, and being patient with the student. Some preservice educators wrote goals for themselves to meet the emotional needs of their students: not let my feelings get in the way, find resources for him and his family, check in with him about his situation. Participants set fewer academic goals, pointing to their understanding of how the brain's capacity of learning is affected by trauma. Inservice teachers wrote three academic-based goals: providing more visual learning opportunities, getting student back and engaged in instruction, and keeping the student in the classroom. Only one preservice teacher wrote an academic goal which was to set high expectations. These

suggest teachers knew students needed to be present and engaged to learn but that meant shifting how they presented information. The preservice teacher saw his students as capable of learning and wanted to give them the opportunity to do so. Socially, one inservice teacher mentioned focusing on social needs by engaging student in learning through building a positive relationship. Preservice teachers, who tended to highlight the importance of relationships, echoed the need to build trust, as well as foster safe environments. Two specifically spoke of their case study students: make sure he has access to academic and social supports, and involve her in an affinity group. Participants' goals for learning were intertwined with considering their relationships with students and providing appropriate academic and emotional supports.

Notably, teachers' goals for students were not aligned necessarily with what they said they understood about learning and trauma. As previously described, students with trauma react to the world around them at the sensorimotor or preoperational cognitive level because they are unable to access their language or higher order thinking. Inservice teachers' emotional goals for which students were responsible included being self-aware when escalating, using self-calming tools, being aware enough to self-regulate, and feeling loved. Knowing how one is feeling and being able to do something about those feelings requires language at a concrete cognitive level. Love is an abstract term and so feeling loved could be argued to be at a formal cognitive level. Academic goals for which students were responsible consisted of writing using more expressive language and growing academically, which require concrete cognition. Social goals encompassed current and future interactions

with people: be more communicative with his language; learn some social and/or academics to get along with peers; social coping strategies to prepare for post-high school; not add to the chaos created by unregulated peers by yelling, screaming, or banging; and increase social interactions. Each goal is at the concrete cognitive level.

Preservice teachers did not mark any emotional goal for students to complete. Instead, they focused on social and academic goals. Social goals at the concrete level were listen to instruction without disrupting others, hands to self, find a public voice, cut down on disruptive/rough behaviors, and take some initiative with making friends. The last social goal, talk nicely to others, is an abstract, formal idea. Preoperational academic goals were come to class, keep coming to class and doing work, and return to seat when asked. One educator wanted her student to worry less about being correct and more about being present and getting ready to learn, a concrete level goal.

Summary. Educators' descriptions of the learning process in students who are experiencing trauma changed over the course of their participation the professional learning experience. In their definitions of learning, they mentioned growth, gaining knowledge, connecting self to experience, and being challenged. Most began with a predominantly cognitive psychological lens of the learning process but took on a more complete neuroeducation lens by being more specific in their language about the scientific and cognitive processes. Teachers' beliefs about what is necessary for learning to occur included students' and teachers' academic and social traits, as well as including brain research in their support of students who have trauma histories. Their goals for students and themselves were uncoordinated with their understanding of what students *could* do when stressed by trauma. Goals set by inservice teachers for

students were primarily at the concrete cognitive level, split between emotional, academic, and social, and mostly for which students were responsible. Preservice educators wrote goals at the formal cognitive level for themselves to meet the emotional needs of their students also wrote concrete to formal goals for students. How they thought about their roles with students in both students' learning and dealing with trauma showed their recognition of providing a safe and consistent classroom environment, and supportive and individualized strategies. Inservice teachers entered the session with more professional experience than did preservice teachers working with students who have trauma histories. Regardless of experience, all participants demonstrated in the follow-up survey their ability to explain to some extent how trauma affects the learning process.

Addressing the needs of the ones-caring. The fourth research question aimed to determine, *In what ways, if any, do educators report that a professional development address their needs as they care for students experiencing trauma?* To understand if this experience met participants' needs, participants were asked in the initial needs assessment what they expected to get from the session and their backgrounds. Those responses formed the baseline from which to compare their current strategies to care for student. Figure 5 displays the factors on which teachers rely to support students with trauma. Answers addressing the fourth research question came from the needs assessment, questions on teacher preparedness from the belief survey, the professional learning experience evaluation, and the follow-up survey, supplemented with themes from the conversations.
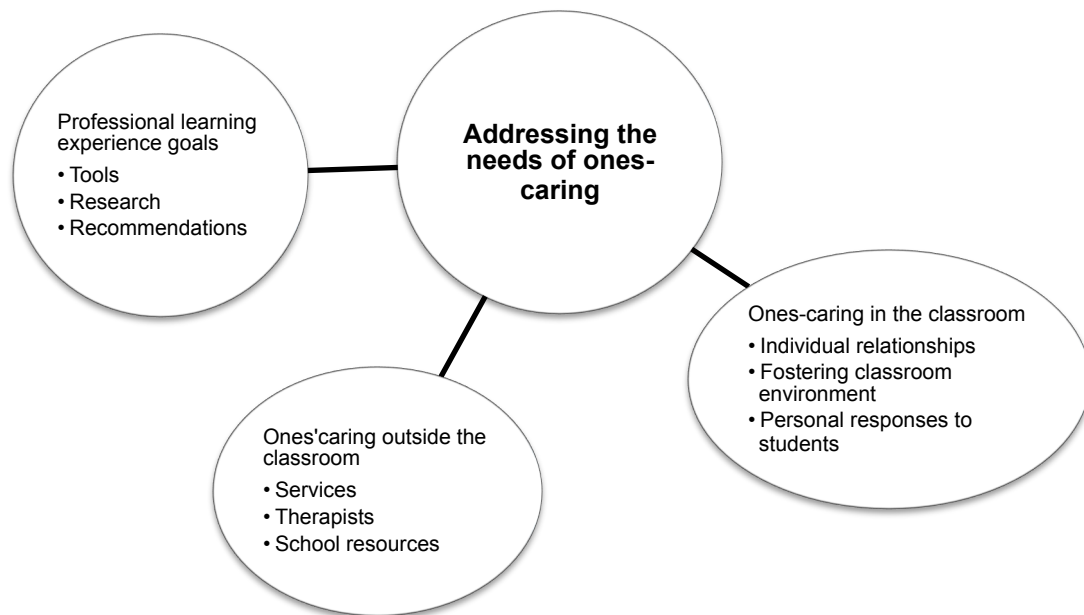
Figure 5. Factors that lend support to teachers caring for students with trauma.

Professional learning experience goals. In the needs assessment, I coded data

of participants' desires into three categories: tools, research, and recommendations.

Six teachers requested tools, or resources, to care for their students. Four teachers

wanted to learn the basic research underpinning the information presented, particularly

on technical information about which brain areas process trauma and which areas still

function in trauma. In addition, two voiced in the session that they wanted to know

how learning happens from the cellular level up. All participants desired

recommendation for strategies to use with students in trauma. One preservice educator

pointed to her need to address future concerns when she begins her career. A couple of

preservice teachers had specific requests: how to be a good teacher for kids who may

need more than they are getting right now; and research to understand why best

practices work. From these data, I surmised that participants were looking for concrete information with to better care for their students with trauma.

Also on the needs assessment, participants answered, *What professional learning experiences have you engaged in to support the education of students with trauma histories?* Few engaged in multiple trainings before the study (Table 10).

Table 10

Professional Learning Experiences Engaged in Before the Study by Group

Experience	**Preservice**	**Inservice**	**Total**
Conference Sessions	0	1	1
Materials (books, professional journals, etc.)	1	1	2
Workshop	1	0	1
None	4	2	6
Other: (explain)	1	3	4
"OIS Trainings"	0	1	1
"A couple of courses in interpersonal neurobiology"	0	1	1
"I have had a little in staff development and I attended a talk in the subject"	0	1	1
"A couple of class discussions"	1	0	1

According to answers in the follow-up survey completed by two inservice and four preservice participants, they planned to purse further study and conversations on the subject of trauma.

- Reading more articles from scholarly journals and other materials on specific types of trauma expected in student population.

- Attending professional develop at school on trauma informed teaching.

- Attending classmate's presentation on trauma.

- Bringing this info to Restorative Justice discussions.

- Attending a "brain pub" at the science museum on trauma in teens, specifically refugees.

- Dialoguing with colleagues.

- Furthering a class discussion by asking about stress versus anxiety.

Their responses were a month after the session ended, and their choices for future engagement on the topic of trauma are activities available through work or on their own time. To compare engagement, six participants reported no academic engagement with trauma information before the study, whereas all six respondents to the follow-up survey already chose at least one mean by which to pursue learning activities.

Ones-caring in the classroom. Ones-caring in the classroom environment relates back to Hargreaves' (1998) study of factors competing for teachers' time and energy. Teachers overwhelmingly discussed their strategies to care for students with trauma in terms of relationships, as demarcated in their case studies, on their needs assessments, and in the follow-up survey. I coded their responses into specific words and actions they used with students, efforts they made in the classroom to address trauma, and participants' personal responses to their students with trauma.

Individual relationships. Describing how they addressed positive relationship building and maintenance, teachers mentioned using culturally responsive teaching

practices, connecting behaviors and emotions to outcomes, and identifying the level of a problem and finding an appropriate solution. Specifically, teachers couched their interactions as being student-focused in order to build a safe and trusting relationship. For example, one preservice teacher wanted to keep "the who's and what's separate (not making the behavior the person, but keeping the behavior a symptom of something going on with the person)" (Preservice teacher, Follow-up Survey, December 9, 2016). Participants kept in mind students' social and emotional needs, thereby noting the importance of physical space, learning social skills, and praising efforts. Academic needs were met by working off students' strengths and being more flexible in terms of what work is completed. Throughout each realm, teachers mentioned the necessity of language in order to know their students better, support them appropriately, and build students' communication.

Fostering relationship in the classroom. Relationships with all students were paramount to how teachers designed their classroom environments. In their roles, participants reported that they got to know their students well but identifying those with trauma can be difficult. Therefore, one preservice teacher concluded it "better to err on the side of caution when interacting with students" (Preservice teacher, Session Discussion, November 10, 2016) in case there is hidden trauma. Participants wanted to, as one teacher said, "focus on making my classroom a safe, welcoming space where students can expect to be supported as a community and as an individual" (Preservice teacher, Follow-up Survey, December 8, 2016). Greeting students at the door with handshakes, high-fives, or using their names were basic tools used to create an inviting room. For students who need personal space, several teachers mentioned

providing a quiet area in which to move, lay down, or decompress, and providing more choices for how and when they will rejoin the group. Teachers wanted to help students foster inclusion, social relationships, or find their own voices. Another teacher wanted to provide snacks for those kids who need them. An inservice teacher recounted his conversation with neurotypical students about a student with trauma to help them make connections on how to act and what to say. Structuring the classroom to be student-centered encouraged positive, trusting relationships and bolstered teachers' work they did with individuals and encouraged positive relationships between students.

Personal responses to interacting with students. Participants reflected on their own personal responses in the midst of student interactions. Many spoke of being patient, calm, compassionate, and present. One preservice teacher in his needs assessment wrote of using his personal intuition when working with students. Other teachers decided to be mindful of personal feelings and not take things personally. These responses complement resources teachers have in the classroom. Inservice teachers have developed their craft over time and experience; preservice teachers have their cooperating teachers to model and help them problem solve situations. Most have access to school records to read up on background information or acquire it from other teachers and staff (e.g. nurses, counselors, speech language pathologists, and administrators). Some students share information with teachers through conversations or journals.

Ones-caring outside the classroom. As previously noted, students gained support from family, teachers, and affinity groups in their schools. In the needs

assessment specifically, one teacher was not sure of available supports and the other reported none available. During the discussion, one teacher was concerned about students whose trauma was hidden,

> I was thinking about the response to treatment, the approach that we take with kids who have experienced trauma. Are there really going to be difference with that and those who have the same behavior, same struggles, but no known histories of trauma? (Inservice teacher, Session Discussion, October 14, 2016)

Other potential supports mentioned in the needs assessment and case studies as available for students were school-based health centers, outside therapy and family services, therapeutic schools, school counselors and psychologists, principals' resources, advocates, support for queer community, best friends, after school programs, and social service though it is overwhelmed.

Summary. Educators reported throughout that this professional learning experience addressed their needs as they care for students experiencing trauma. Their backgrounds and what they expected to get from the session were compared to answers and discussions throughout and after the session. None of the participants had received formal substantial training around working with this population of students. However, they were not without some resources. Inservice teachers had experience working with a variety of students and leaned on other staff to help. Preservice teachers were able to recognize their sources of support, such as cooperating teachers or class projects. They wanted tools, research, and recommendations to best address students' needs. Though the presentation provided technical information and suggestions, participants were able to provide tools and recommendations for each

other through their case study discussions. Participants focused a great deal on how to foster positive relationships with students, both on individual level and within the classroom or community. As well, those who completed the follow-up survey mentioned they will be pursing further study and conversations on the subject of trauma.

Summary

The findings from this study addressed the four research questions. First, five expert panelists' analyses of the presentation materials helped shape a neuroeducation-based professional learning experience on trauma and learning. I implemented the learning experience with 13 pre- and inservice educators split into three groups. Coding data collected through multiple sources revealed information about participants' beliefs, including values and attitudes; their content knowledge about learning and trauma; goals set for students and teachers; responses by ones-caring and ones cared-for; and past preparation and currently accessible resources. From these themes, I answered the last three research questions. First, I found the introduction of neuroeducation-based information challenged their beliefs about learning and trauma, though to what extend they were changed was immeasurable. Second, participation in the study contributed to an appreciable change in the language participants used to describe their neuroeducation understanding about the learning process and how trauma affects it. Lastly, participants reported the study met their needs as they sought to better support students with trauma.

Chapter 5: Discussion

The purpose of this qualitative study had two parts. First, I translated the literature of neuroeducation and trauma into an example of an adult professional learning experience. Second, I implemented the professional learning experience with educators to examine how engagement in the professional learning experience affected their beliefs about student learning and the ways trauma affects students' academic and social-emotional development. The research questions addressed in this study are:

(a) When invited to review the content and process of a neuroeducation-based professional learning experience on trauma, what input did experts provide in the fields of neuroeducation, trauma, and professional development?

(b) How do educators express their beliefs about students experiencing trauma before, during, and at the conclusion of the professional development?

(c) How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?

(d) In what ways, if any, do educators report that a professional development address their needs as they care for students experiencing trauma?

I used an action research approach through the three phases of my qualitative research study. Through each phase of creating and implementing the professional learning experience, I reflected on the data and the process to improve the materials and gain a deeper understanding of the problem studied (Sagor, 2004). In the first phase, I created a new professional learning experience and recruited five expert panelists to review the presentation materials for neuroeducation, trauma, and

professional development. The second phase consisted of implementing the study and collecting data from 13 voluntary participants voluntarily took part in three groups. There were six preservice educators and seven inservice educators. All sessions were at the University of Portland, the first and third groups each met over the course of a full day, and the second group met for two half-day sessions a week apart. The final phase of the study involved analyzing the data using attribute, magnitude, and values coding (Saldaña, 2009).

This section reviews both the expert panelists' recommendations to improve the professional experience and findings from the sessions that have practical significance to educators' work with students, a necessary outcome for action research (Gall, et al., 2004). Next will be limitations to the study and recommendations for future research.

Research Question One

When invited to review the content and process of a neuroeducation-based professional learning experience on trauma, what input did experts in the fields of neuroeducation, trauma, and professional development provide?

The expert panelists positively rated the presentation materials as effective means by which to engage participants with the information. Though there are several professional learning experiences exist to inform participants about trauma (e.g. Anderson, Blizt, & Saastamoinen, 2015; Plumb, Bush, & Kersevich, 2016), none used and neuroeducation lens. Therefore, this study adds to the literature in those fields.

Timing of the presentation was an important element of the process that experts could not glean from the given materials. Without witnessing a full

presentation of the material, several expert panelists noted they could not estimate presentation length or pacing. Therefore, presenting the entire professional learning experience in person or video recorded could strengthen both expert panelists' comments and the validity of the study. They would hear the language used to describe each point and get a feel for the pacing of the information. However, the obstacles to this level of involvement include getting all of the expert panelists together at the same time and for approximately five hours to hear the presentation and provide feedback.

Expert panelists rated the accuracy, comprehensiveness, and clarity of the information in the presentation materials covering trauma and its effect on learning, neuroeducation, and professional development. A primary concern in the evaluations was the quantity and use of unfamiliar terminology. These concerns brought up a couple of points to consider for future presentations. First, terms used in neuroscience differ from those in psychology (e.g. early life stress versus early childhood trauma), therefore, it is important to create common language to define terms when educators translate research results into their understanding for classroom practice. Literature on the use of language supports the idea creating shared meaning (Arwood, 1983; Cooper & Kiger, 2009). Even when unfamiliar with terminology, the participants seemed interested in understanding the background information to have evidence-based strategies. Participants showed they have an introductory-level understanding of commonly used neuroscience and psychology terms, which could support their accurate interpretation of information on the topic. In particular, preparation programs

might best serve preservice teachers by including introductory information on trauma to familiarize them with related vocabulary and concepts.

Another concern of the expert panelists was putting the information into practice, a key factor in shifting educators from thinking to doing. Guskey and Yoon (2009) recommended participants have adequate time and practice with using the words and enough scaffolding from rich language by the presenter. Due to the setup of the professional learning experience, I could not coach participants in their classrooms or meet the minimum time of 30 hours suggested by Guskey and Yoon (2009). A single session was more intensive with considerably less reflection time but eliminated the possibility of attrition between sessions. I incorporated the use of case studies and a lot of descriptive language to help make the material relatable to participants' daily work that seemed to have helped assimilate this new vocabulary to prior knowledge, in agreement with Piaget (1973). The participants used more of the neuroeducation terms towards the end of the session and on the follow-up survey, but there was no assessment of their use on a daily basis. Future iterations of this study would be to extend the timeframe to include more sessions and practice time with the information. In addition, coached application of the strategies in the classroom would be necessary to move beyond learning the information to being able to apply it.

I attempted to incorporate as many best practices for professional development that focused on the needs of the participants. Two areas that I could improve upon are using role playing and giving preservice educators more time to talk. Role-playing could have given participants a way to practice interpreting scenarios and being more physically active, which would agree with Arwood's (2011) theory as another way to

layer patterns of stimuli into conceptual understanding. Participants in the second session were preservice educators completing their student teaching. They had few experiences from which to draw, so I spoke more than she did with the other groups. They, plus the two preservice teachers in the third session, would have benefitted the most from working more case studies or role-playing. In the future, I will alter the presentation to better fit the audience's needs by giving them more time to practice strategies and think through cases, in agreement with Knowles (1980).

Research Question Two:

> *To what extent does using a neuroeducation lens of trauma and learning alter educators' expressed beliefs about students experiencing trauma?*

Evidence shows the professional learning experience challenged, but did not change, participants' beliefs. I did not anticipate changes in beliefs but wanted them to consider alternative views about their students with trauma. According to Borg's (2001) definition, beliefs are propositions held true, reified emotionally, that guide thought and behavior. To change participants' beliefs, particularly those close to core identity, about students with trauma would take more than engaging in one study (de Vries, et al., 2014; Guskey & Yoon, 2009). There were many pieces of trauma and learning to consider in a short amount of time. Even after a month, some participants demonstrated on the follow-up survey that they were still working out of a given definition of trauma instead of their own definition. I incorporated the use of case studies a means by which to help participants assimilate the new information into previous experiences, raise their thinking about the content, and challenge their beliefs. This activity proved helpful for participants sharing the strategies they have

used before, which parallels VanderWegen's (2013) collection of educators'
intervention strategies in her study on implementing trauma-informed care programs
in schools.

Teacher preparedness to work with this population of students was lacking in
substantial training. They had some resources on which they could rely for help and,
personal abilities on which to rely. Few felt they could adequately support students
with trauma, which is what Shutz and Lee (2014) found in their study. Not caring for
students the way they wanted is the antithesis of what Nias (1999) described in teacher
identity development and Noddings' (2013) theory of care. This led me to believe the
session fulfilled a need that otherwise would have gone unmet. Implementing trauma
training into teacher preparation programs and school-wide professional development
would be a way to help support teachers as they care for these students. Inviting this
researcher to conduct multiple sessions over the school year with the school staff
would be one suggestion. Otherwise, several agencies and programs exist on which
schools could build their professional development (e.g. The National Child Traumatic
Stress Network, Helping Traumatized Children Learn, and Trauma Informed Oregon).

Participants' attitudes about students with trauma showed signs of shifting with
the introduction of the neuroeducation lens. Their descriptions of students' behaviors
shifted to take into account the expected responses to stressors, which aligned with the
work of Carrasco et al. (2015). Through their discussions of student cases, participants
came up with various strategies to implement. One implication for professional
practice would be to write up any student of concern as a case study, review the
behaviors through a neuroeducation lens, and consider which strategies gained from

the session might benefit the student. A few moved from responding to just the one student to considering teaching all through a trauma-informed lens, an outcome that aligns with Sitler's (2009) work. One broader implication of this could be to implement a trauma-informed care approach to an entire school, such as Walkley and Cox (2013) wrote about the Compassionate Schools Initiative that was exemplified in the ACE video and *Paper Tigers* film. A trauma-informed approach could support all students and educators. By caring for students with obvious trauma and those with hidden trauma, educators could possibly help them see school as a safe haven and, thereby, aligning with Leiter's (2007) work. Educators would have the backing of administration and each other; key factors in effectively managing evidence-based practice according to Foster (2014). Since some of the participants felt isolated and unsupported, this approach could eliminate many of the obstacles for caring shared by participants and would be in line with Nias (1996). As well, Acevedo and Hernandez-Wolfe demonstrated that teachers caring for students modeled how students could care for each other. This is an important implication because one unanticipated group the participants mentioned were the peers of those students with trauma. It is a facet of classroom dynamics not evident in trauma literature.

Researcher Question 3

How do educators' descriptions of the learning process in students who are experiencing trauma change before, during, and at the conclusion of a professional learning experience?

Participants' description of the learning process developed over the session. They started with a limited vocabulary, incomplete definitions of learning, and partial understanding of brain development. Over the course of the experience they incorporated neurological and psychological concepts into discussions of case studies, demonstrating the evolution of their thinking in ways that drew upon Arwood's neuroeducation model. I used language to scaffold participants' understanding and heard change of thinking through their descriptions of students, strategies to use, and the reasons for their thinking. They were willing to try using terminology as they discussed how trauma influenced learning, particularly connecting Arwood's theory with McEwen's stress model. Their willingness to change proved a flexible mindset, similarly found to Bangura (2005), and could be evidence of change in attitudes, congruent with Kose and Lim (2010). By the end of the session and on the follow-up survey, participants maintained an increased understanding of how trauma disrupts the learning process and influences social and academic behaviors. These shifts in thinking showed growth from a preoperational understanding to a concrete level as they created shared meaning (Arwood, 1983). The biggest obstacle for participants was the overcoming their beliefs about suitable goals for their students in trauma. Changing beliefs takes time and reflection, so retaining the status quo agrees with de Vries et al. (2014). Most of their goals required a concrete level of cognition, at least one level too high for most students responding to trauma. In light of these findings, professional practices should focus on what learning is from a neuroeducation standpoint through teacher preparatory programs and professional development provided by school districts.

Research Question Four

In what ways, if any, do educators report that a professional development

address their needs as they care for students experiencing trauma?

Participants reported that the professional learning experience met their

personal objectives. Most participants noted on their evaluations their desire for more

time with the material for practice, notably with case studies and role-playing. As

discussed in the first research question, more time in the session or adding sessions to

the training could give participants a greater opportunity to incorporate the

information into their thinking and so could possibly shift beliefs. Particularly for

preservice teachers with less experience, reflective practice could increasing self-

efficacy, as shown by Nevin et al. (2014). Instead of changing beliefs formed from a

dearth of information, education preparatory programs should include a trauma-

informed care course. School districts could review personal, school, and district

practices and implement trauma-informed trainings. At a minimum, they should

determine available supports in and out of school and inform educators how to access

them.

Teachers seemed to know students needed to be present and engaged to learn

but that meant shifting how teachers presented information. This appeared to be a shift

from the behavioral focus to a teaching focus, thereby separating the Who's (what

could I do?) from the What's (from what are they doing or not doing), as described by

Arwood (2011). This puts the burden of support on the teacher instead of expecting

students to handle more than are able, which agrees with Noddings' theory of caring in

the classroom (2005). Practitioners' espoused theories versus theories-in-action, or

what they say they believe versus what they actually do (Gall, et al., 2004). So if teachers truly want to be trauma informed practitioners they will alter their practice to include appropriate actions that resonate with their beliefs. They can collect data on themselves, such as through videotaping or having a colleague observe them, and assess their words and actions and reflect on if they align with best practices. Those who supervise preservice teachers should conduct observations of classroom techniques used with students who have trauma histories. Reviewing those observations with the preservice teachers should focus on positive moments, to promote problem solving, and contextual approaches (Timoštšuk & Ugaste, 2012) since a flexible mindset promotes professional growth (Gutshall, 2014).

Limitations

The limitations of this study include convenience sampling, self-report, sample size, and a single study in a short time period. Due to sample size, results are not generalizable and must be interpreted carefully and used cautiously. There are advantages to me being in both roles as facilitator and participant: engaging with the participants will put me in a collegial role of mutual learner, which can keep the environment more relaxed and open for learning (Knowles, 1980; Knowles, 1990). Though participants' responses presented as genuine and authentic, they may have wanted to please me by giving answers they thought she wanted to hear. In addition, though I took several steps to reduce bias in analyzing results, there is the possibility that she unknowingly dismissed data that did not fit the pattern (Patton, 2002). Lastly, the field of neuroeducation is relatively new, so there is little research to which I could compare my study to increase validity and credibility.

Recommendations for Future Research

There are so many aspects of this study that could lead to further inquiry. An obvious next step to take would be to implement another iteration of this action-research study. Changes could be made to the workshop design to determine what would produce similar or different results: more participants, one group of educators at an intact school, more sessions over time, or incorporate more role-playing to help teachers practice the language they would use.

Outside of an action research approach, there are other implications for further research. This study focused on teachers' voices about working with students with trauma. However, it would be interesting to interview students to describe their experience with teachers to compare and contrast viewpoints on relationships and learning experiences. In addition, interviewing students without trauma about their experiences in a classroom with students who have responded out of their trauma would capture points of view that could inform schools how to create protocols that care for all those impacted by trauma. As Cicchetti and Toth wrote, "The absence of a caregiving environment that provides sufficient opportunities for normal development does not necessarily condemn all maltreated children to negative outcomes" (2005, p. 414). Resiliency is trait that can be fostered for those in traumatic circumstances, so research should be conducted on how teachers can educate their students on such things as coping strategies and mindfulness. In addition, teachers are at risk for compassion fatigue and vicarious traumatization by caring for students with trauma. They would benefit from further research on ways to support them, perhaps by preparing them in preparation programs or professional development. Due to the lack

of teacher preparations programs incorporating the impact of trauma on learning, future research should include an extensive review of those schools that do incorporate trauma, methods used, and effectiveness of those methods. Findings could inform preparation programs of what to incorporate into their current coursework.

This scope of this study was limited to how participants expressed a change in thinking during the session. Future research could entail studying teachers' abilities to alter their approaches to responding to students with trauma by applying this content knowledge to their work in the classroom. Iterations could include extending the duration of the professional learning experiences to build content knowledge; then the expert presenter could coach participants through role-playing and in their daily practice to influence beliefs and change teachers' efficacy in the classroom with students.

Conclusions

I was pleased to conduct this study with educators about trauma. After years of counseling students dealing with adverse experiences, knowing the reasons for their response fortified my desire to inform educators about the interaction between stress and learning. Ultimately, conducting action research was the ideal methodology because of parallels to Arwood's Neuro-semantic Language Learning theory and to counseling, my background. The cycle of plan, act, reflect is similar to the NSLLT spiral because of changes made with outside scaffolds and reflecting on what was known with new information. This proved accurate for both the expert panel and me, and me and the participants. The action research process is similar to how counselors guide clients to grow: gain information from clients through their stories; be aware of

words and phrases that lead to asking deeper questions; find themes and address them through reflective conversations.

This dissertation research study demonstrated that educators interested in better caring for their students with trauma respond positively to a neuroeducation-based professional learning experience. Therefore, this study adds to the literature about ways to increase efficacy on trauma and learning. As always when discussing professional growth, more can be done to improve professional practice and add to the research, but this study fills a gap between the two increasingly salient fields of trauma and neuroeducation.

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    mechanisms of affective biases in perception. *Current Directions in*

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    communities. *Children & Schools, 35*(2), 123-126.

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    engaging in self-injurious behaviors with and without suicidal intent: Self-

    reported experiences of adverse life events and trauma symptoms. *Journal of*

    Youth & Adolescence, 42(8), 1257-1272. doi:10.1007/s10964-012-9872-6

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the genome and its function. *Annual Review of Psychology, 61,* 439-466.

Appendix A

Rate of Substantiated Maltreatment Reports of Children Ages 8-15 by Year in the US

	Victimization rate per 1,000 children			
	2010	2011	2012	2013
Ages 8-11	8.7	8.3	8.3	8.2
Ages 12-15	7.9	7.5	7.3	7.2

Note. Adapted from the Administration for Children and Families, National Child Abuse and Neglect Data System.

Appendix B

Percentage of Substantiated Maltreatment Reports of Children Ages 8-15 in 2013 in the US

	% Ages 8-11	% Ages 12-15
Neglect	71.1	63.6
Medical neglect	1.8	2.3
Physical abuse	17.0	19.6
Sexual abuse	10.5	18.1
Psychological abuse	9.4	9.2
Other abuse	9.1	8.0

Note. Adapted from the Administration for Children and Families, National Child Abuse and Neglect Data System. Duplicate count because an individual may have been determined to be maltreated on more than one occasion.

Appendix C

Past Year Serious Mental Illness among Adults 18 or Older in the US

Adult population	Percent
Insured	3.9
Not insured	5.2
Less than 100% federal poverty level	7.0
100% or more of the FPL	3.6
Metropolitan areas	4.0
Nonmetropolitan areas	4.8
Received treatment/counseling	68.5
Did not receive treatment/counseling	31.5

Note. Adapted from SAMHSA Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014.

Appendix D

Past Year Substance Dependence or Abuse Ages 12 and Older in 2014 in the US

	% Alcohol	% Drug
Insured	5.9	2.4
Not insured	10.0	5.0
Less than 100% federal poverty level	7.5	4.8
100% or more of the FPL	6.2	2.3
Metropolitan areas	6.6	2.8
Nonmetropolitan areas	5.6	2.0
Received treatment/counseling	7.6	14.6
Did not receive treatment/counseling	92.3	85.5

Note. Adapted from SAMHA Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014.

Appendix E

Homeless Population by Type and Shelter Status, 2010-2014 in the US

Homeless population by type	2010	2011	2012	2013	2014
Total	640,466	625,217	622,982	591,768	578,424
Sheltered	403,543	392,316	390,155	394,698	401,051
Unsheltered	236,923	232,901	232,827	197,070	177,373
Individuals	398,515	389,036	383,579	369,571	362,163
Sheltered	212,218	205,834	199,159	203,127	209,148
Unsheltered	186,297	183,202	184,420	166,444	153,015
Domestic violence victims	67,146	72,248	73,458	62,134	58,182
Sheltered	49,709	53,055	54,142	44,900	42,893
Unsheltered	17,437	19,193	19,316	18,789	16,709
Persons in families	241,951	236,181	239,403	222,197	216,261
Sheltered	191,325	186,482	190,996	191,571	191,903
Unsheltered	50,626	49,699	48,407	30,626	24,358
Chronically homeless people in families	(NA)	15,512	15,770	16,539	15,143
Sheltered	(NA)	7,198	6,913	8,150	9,362
Unsheltered	(NA)	8,314	8,857	8,389	5,781
Children under age 18, unaccompanied	8,153	6,826	6,632	6,197	6,274
Sheltered	4,349	2,981	2,746	2,522	2,554
Unsheltered	3,804	3,845	3,886	3,675	3,720

Note. Individuals = individuals are not part of a family during their episode of homelessness. They are homeless as single adults, unaccompanied youth, or in multiple-adult or multiple-child households. Persons in families = people in families are people who are homeless as part of households that have at least one adult and one child. Chronically homeless people in families = people experiencing homelessness, in families in which the head of household has a disability and has either been continuously homeless for 1 year or more or has experienced at least 4 episodes of homelessness in the last 3 years. Data are point-in-time (PIT) counts made on a single night in January by Continuums of Care (CoCs) in all States, DC, Guam, Puerto Rico, and Virgin Islands. Adapted from U.S. Department of Housing and Urban Development, HUD Exchange, PIT and HIC Data Since 2007, "2007 - 2014 PIT Counts by State," December 2014, https://www.hudexchange.info/resource/3031/pit-and-hic-data-since-2007/

Appendix F

Movers by Type of Move and Reason for Moving in 2010-2014 in the US

Reason for move	Total in Thousands (% Distribution)				
	2010	2011	2012	2013	2014
Family-related reasons	11,376 (30.3)	9,784 (27.9)	10,693 (29.3)	10,871 (30.3)	10,505 (29.4)
Work-related reasons	6,175 (16.4)	6,481 (18.5)	7,058 (19.3)	6,979 (19.4)	7,370 (20.7)
Housing-related reasons	16,406 (43.7)	15,736 (44.9)	18,041 (49.4)	17,225 (48.0)	17,098 (47.9)
Other reasons	3,583 (9.5)	3,073 (8.8)	698 (1.9)	844 (2.3)	706 (2.0)

Note. For persons 1 year old and over. Based on comparison of place of residence in year shown vs. previous year. Adapted from U.S. Census Bureau, *Geographical Mobility: 2013 to 2014,* March 2015, and earlier reports,
<http://www.census.gov/hhes/migration/data/cps/cps2014.html.

Appendix G

Children Ages 10-17 with Chronic Illness by Years in the US

	2008-2010 Cohort	2009-2011 Cohort
Hay fever or respiratory allergy	20.7	20.8
Current asthma	10.9	11.1
Attention deficit hyperactivity disorder	11.4	11.7
Food allergy	4.6	5.1
Asthma attack in the past 12 months	5.8	5.8
Serious emotional or behavioral difficulties	6.2	6.3
Skin allergy	10.4	10.9

Note. Per 100,000. The Centers for Disease Control (CDC) gathers health trend data annually via the United States Census Bureau using the National Health Interview Survey (NHIS; Centers for Disease Control, 2012). Each week a probability sample of the population is interviewed based on census data.

Appendix H

Chronic Illness in Adults in 2010-2013 in Multnomah County

	Percent
Angina (heart disease)	3.7
Arthritis	20.8
Asthma	9.9
Cancer	8.2
Cardiovascular disease	7.1
Chronic obstructive pulmonary disease	4.4
Depression	25.2
Diabetes	7.7
Heart attack	3.5
Stroke	2.6

Note. Adapted from the Oregon Behavioral Risk Factors Surveillance System 2010- 2013 county combined; age-adjusted to the 2000 standard population.

Appendix I

Rates of Child Injury and Leading Causes for Ages 5-14 in 2009-2010 in the US

	Rate per 1,000
All injury visits	117.3
All initial injury visits	107.6
Cut or pierced from instrument or object	5.0
Fall	31.3
Motor vehicle traffic	6.2
Natural or environmental factors	6.6
Overexertion	5.3
Poisoning	1.8
Struck by/against an object or person	21.9

Note. Adapted from the National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey.

Appendix J

Needs Assessment

Thank you for participating in this professional learning experience. Your input will contribute to my doctoral dissertation and is intended to contribute to your professional learning. Please fill out this questionnaire to the best of your ability. You are not obligated to answer any questions and may stop at any time. All identifying information will remain anonymous for data analysis and publication.

Participant Characteristics

Name _____

What is your current education role? _____

How many years have you worked at your current school? _____

How many years have you worked in education? _____

Gender _____

Race/Ethnicity _____

Age _____

Background

Did you receive formal training on how to teach students with a history of trauma as part of your educator training program? Yes No

If yes, at what level? (Circle all that apply)

>   Undergraduate

>   Graduate

What professional learning experiences have you engaged in to support the education of students with trauma histories: (Circle all that apply)

>   a. Workshops

>   b. Online or graduate courses

>   c. Materials (books, etc.)

>   d. Conferences

e. Professional learning communities

f. Other (please list) _____

g. None

1. Share your understanding of how the brain best learns.

    1a. What is the value, if any, of teachers learning about brain research in order to:

- Support students' academic achievement?

- Support students' social-emotional growth?

- Design curriculum?

2. What is your definition of trauma?

    2a. Do you think courses on teaching students with trauma histories should be part of educator's professional training? Yes No

    Please explain.

3. Working off your definition of trauma, what is your understanding of how trauma can affect the ability to learn?

4. Based on your definition of trauma, how do you understand your role(s) is/are when working with students with trauma?

5. How do you most frequently become aware of your student(s) trauma background?
   a. School records

   b. Parent or guardian shared history with me

   c. Student disclosed to me

   d. School counselor

   e. Meeting with involved educators

   f. Other (please explain)

6. When you encountered a student or students with a trauma background, did you feel prepared to adequately meet the student's needs in your classroom/office?
Yes No

   Please explain.

7. What challenges have you experienced in the process of teaching students with trauma?

8. Have you used strategies for supporting students with trauma? Yes No
   8a. If yes, what strategies did you use?

   8b. In what ways were they effective or ineffective?

9. Describe what types of resources are available to you to support students with trauma histories.

10. When faced with any type of puzzling or difficult student situation, to whom do you go for advice or support? (Circle all that apply)

       a. Teacher

       b. Supervisor

       c. School counselor

       d. School nurse

       e. School psychologist

       f. Other (please list)

11. What set of skills and/or body of knowledge would be helpful to you in workings with students with trauma histories?

Appendix K

PowerPoint Presentation

Trauma and Learning

A Professional Learning Experience
by
Megan Wright, M.Ed., NCC
Ed.D. candidate

Introduction

I am doing this research to
– Support your work
– Support student growth and educators' understanding
– Create an effective neuroeducation-based professional development on trauma

Agenda

Students
Educators
Trauma

Support

Neuroeducation

Neuroscience

Language
Cognitive Psychology

	Neurological	Psychosocial
A Typical System	• Hindbrain, midbrain, forebrain • Dendritic branching, neurogenesis • Synchrony, synergistic • Homeostasis • Inhibition/integration	• Working memory, executive functions increase efficiency with use and age • Attachment to caregivers creates safe foundation for developing emotions, relationships with others, self-confidence, self-efficacy. • Language development
A Stressed System	• Cell death • Dendrites disconnect • Asynchronous system • Allostasis, allostatic load	• Internalizing and externalizing behaviors • Impaired executive functioning • Reduced functional capacity, such as language and social skills • Emotions felt but may be hard to identify • Physical health at risk for decline

Trauma

Stress Hormones

The Body's Alarm System

Traumatic Event

Traumatic Stress

Center for Early Childhood Mental Health Consultation
www.ecmhc.org

Define *Trauma*

A physical injury or an emotional state of profound and prolonged distress in response to an overwhelmingly terrifying or unstable experience.

http://traumainformedoregon.org/

Define *Trauma*

The person has been exposed to a traumatic event in which both of the following were present:

- (1) The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
- (2) The person's response involved intense fear, helplessness, or horror. Note: In children, this may be expressed instead by disorganized or agitated behavior.

DSM-IV-TR http://www.ncbi.nlm.nih.gov/books/NBK83241/

Contributing Factors

- Timing
  - Early childhood
  - Early adolescence
  - Late adolescence
- Duration
- Dose

Trauma

- Watch ACEs film
- Based on Kaiser/CDC 1995 ACEs study
  - 3 areas: Abuse, neglect, household dysfunction
  - 10 categories:
    - Physical abuse — Mother treated violently
    - Sexual abuse — Household substance abuse
    - Emotional abuse — Mental illness in household
    - Physical neglect — Parent separation or divorce
    - Emotional neglect — Criminal household member

http://www.cdc.gov/violenceprevention/acestudy/about.html

This Study

- This session will focus on 5 categories of trauma
  - Household substance use
  - Household mental illness
  - Loss of parent through divorce or death
  - Homelessness/Transient
  - Physical injury/Chronic illness

Case Study

- Write a brief case study regarding a student you know has dealt with one of the 5 categories. I have examples if you need one.
  - How did the student perform academically and socially?
  - What goals did you have for this student?
  - How did you respond to this student's behaviors?
  - What were your struggles with supporting this student?

Share Your Wisdom

- Briefly share your case.
  - What were your goals for the student?
  - Which strategies were effective at meeting those goals?
- Probing questions – Who, what, when, where, and how.
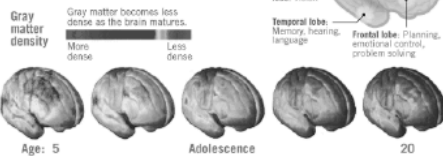- Reflective journaling – what did you learn?

Defining *Learning*

"Any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing" (Illeris, 2009, p. 7)

Why is it important that we define learning when discussing trauma?

- Illeris, K. (2009). *Contemporary theories of learning: Learning theorists in their own words.* New York, NY: Routledge.

Growing a Grown-up Brain

Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.

Gray matter: Nerve cell bodies and fibers that make up the bulk of the brain's computing power.

Parietal lobe: Spatial perception

Occipital lobe: Vision

Temporal lobe: Memory, hearing, language

Frontal lobe: Planning, emotional control, problem solving

Gray matter density

Gray matter becomes less dense as the brain matures.

More dense — Less dense

Age: 5 — Adolescence — 20

Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., *Proceedings of the National Academy of Sciences*, May 25, 2004; California Institute of Technology

Neuro-semantic Language Learning theory by Dr. Ellyn Arwood

Cognitive Psychology	Neuroscience
Formal	Networks
Concrete operational	Circuits
Preoperational	Pathways
Sensorimotor	Signals

Language

- Language makes concepts meaningful.
  - We only need the perceptual pattern to relate to an image but need to use language to scaffold understanding of before, during, and after to shape understanding.
- Uses the brain's network and activates most areas because brain is synergistic.
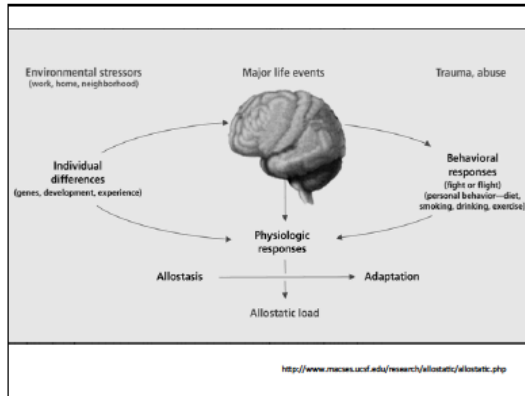
Emotions vs. Feelings

According to neuropsychologists LeDoux and Damasio:

- Emotion – automatic, unconscious, behavioral and cognitive responses triggered when the brain detects a positively or negatively charged significant stimulus
- Feelings – conscious perceptions of emotional responses; named with language

Take a Break!

	Neurological	Psychosocial
Typical Development	• Hindbrain, midbrain, forebrain • Dendritic branching, neurogenesis • Synchrony, synergistic • Homeostasis • Inhibition/integration	• Working memory, executive functions increase efficiency with use and age • Attachment to caregivers creates safe foundation for developing emotions, relationships with others, self-confidence, self-efficacy. • Language development
A Stressed System	• Cell death • Dendrites disconnect • Asynchronous system • Allostasis, allostatic load	• Internalizing and externalizing behaviors • Impaired executive functioning • Reduced functional capacity, such as language and social skills • Emotions felt but may be hard to identify • Physical health at risk for decline

Stress

- Homeostasis
- Allostasis
- Allostatic load

http://www.forbes.com/sites/travisbradberry/2015/05/26/how-successful-people-turn-stress-and-anxiety-into-top-performance/#3c9c500160c8

Neurological/Biological Reaction

Where do you notice stress in your body?

Biochemical Reaction

- Homeostasis, allostasis, allostatic load
- Genetics/Epigenetics
- Plasticity
- Integration, assimilation, accommodation
- Inhibition

Christine Heim, PhD, Emory University, USA, June 2009
http://www.child-encyclopedia.com/brain/according-experts/childhood-trauma-and-adult-stress-responsiveness
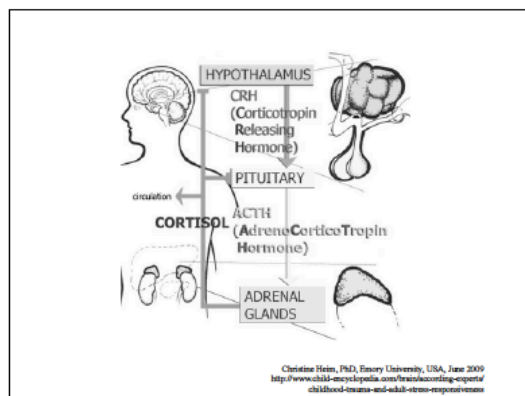
Trauma on the Brain

Our bodies and minds want to be balanced and return to homeostasis, but when the neurological system is dysregulated by trauma, the thinking process changes and is no longer in equilibrium.

In light of the physiological response to trauma, what's wrong with this statement?

With new information, your thinking dips as you assimilate new information into previous knowledge stored in long-term memory.

Common Reactions to Trauma

Thoughts:
Unwanted thoughts
Nightmares
Poor concentration

Behaviors:
Effortful avoidance
Withdrawal
Alcohol or substance use
Checking / vigilance

Emotions:
Fear, anxiety
Anger, irritability
Guilt, shame
Grief, sadness

Physical symptoms:
Insomnia
Changes in appetite
Fatigue
Tension
Headache

Dunning, C. University of Wisconsin-Milwaukee, Nature and/or Nurture: Trans-generational Transmission of Traumatic Stress Cortisol. Retrieved from http://slideplayer.com/slide/222967/

Quick Survey

Please take a few minutes to answer the survey and return it to me when finished.

Capacities Affected by Trauma

- Regulate body functions
- Awareness of and ability to describe emotions and bodily states
- Capacity to perceive threat or safety cues
- Ability to initiate or sustain goal-directed behavior
- Capacity for self-soothing or empathy
- Capacity to trust

Dunning, C. University of Wisconsin-Milwaukee, Nature and/or Nurture: Trans-generational Transmission of Traumatic Stress Cortisol. Retrieved from http://slideplayer.com/slide/222967/

Who's and What's

- The learner is a who, a person.
- An experience is a what, a product.
- Who you are is not equivalent to what you do.
- Keeping our who's and what's separate allow us to respond cognitively instead of emotionally.

Caring for Others

- Shared relationship at the concrete level informs us of what others experience to make it meaningful, relevant, practical, and to create common language.
- Healthy relationships involves shared power to promote social competence.

Theory of Mind

- Taking the point of view of another that may be different from our own.
- Allows us to be flexible or inflexible depending on how we frame experiences.

Defining Roles

Silent dialogue:

Using the white paper around the room, write what you think your role is in regard to students':
- Learning
- Trauma

✧ Please respond to at least one other person's remark.

Strategies

Write on the white paper purposeful steps you have taken to support students in trauma that were effective at helping them
- Academically
- Socially
- Emotionally

What are the common themes?
Journal: Which strategies could you use with your case study?

Helping Traumatized Individuals

Do's
- Listen
- Be available consistently
- Understand & normalize common trauma reactions
- Accept initial coping – (most) anything goes in the first few days

Don'ts
- Minimize (it will be okay, they're in a better place)
- Take control over their wellbeing
- Give advice
- Judge
- Pathologize a normal reaction
- Personalize reactions

The Royal Mental Health Centre
http://www.slideshare.net/theroyalott/dealing-with-fear-and-anxiety-in-the-wake-of-traumatic-events-ottawastrong-41522504

Reassess Needs

- Please take 10 minutes to journal about what further needs you have to support students in trauma in light of information presented and conversations held today.
- When you finish, please fill out an exit slip to tell me your thoughts on this professional learning experience.

THANK YOU!!

Please feel free to contact me with further thoughts or questions.

Megan Wright
wrightc17@up.edu

Appendix L

Case Studies

Name _____

Please think of a current or former student that you know or suspect experienced one of the five areas of trauma. For confidentiality, do not use the student's real name.

(a) How did the student perform academically and socially?

(b) Describe the strategies you used with the student.

(c) What were your struggles with supporting this student?

Appendix M

Belief Survey

Please check the box that best describes your belief or attitude towards each statement.

***Trauma* is a physical injury or an emotional state of profound and prolonged distress in response to an overwhelmingly terrifying or unstable experience.**

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree
1. General education teachers receive sufficient training to support children with trauma.					
2. It is likely that a student with trauma will exhibit behavior problems in a regular classroom setting.					
3. Students with trauma monopolize the teacher's time.					
4. General education teachers possess the level of expertise needed to work with students with trauma.					
5. Students can continue to learn even when they are experiencing or have experienced trauma.					
6. It is difficult to maintain order in a general education classroom that contains students with trauma.					
7. General education teachers will require retraining to effectively work with students with trauma.					
8. Currently, I do not have sufficient knowledge to make adequate accommodations for students with trauma.					

Appendix N

Silent Conversations

Please respond to at least one person's comment for each question.

1. What do you believe educators' roles are in students' learning?

2. What do you believe educators' roles are in students experiencing trauma?

Appendix O

Follow-up Survey

The purpose of this follow-up survey is to determine what information gained during our sessions was most potent and what strategies were most effective. Answers will be used to improve the presentation. After you complete the survey, you will obtain your 15 PDUs or 0.5 CEU from the University of Portland.

Again, thank you for your participation in my study!
Megan Wright

1. Since the last session, what information presented do you continue to think about?

    a. How learning happens in the brain:

    b. What trauma is:

    c. The effect trauma has on student learning:

2. What, if any, professional experiences (e.g. conferences, workshops, journal articles, conversations) have you participated in to further your understanding of these topics?

3. Since the last session, what strategies have you tried with students experiencing trauma?

4. Name one of the strategies you used:

    a. Was your goal for using this strategy (check all that apply)

        1) Academic _____

        2) Social _____

        3) Emotional _____

    b. How was it effective or ineffective?

Appendix P

Consent Letter for Expert Panel Participants

Dear colleagues,

You are invited to take part in validating instruments and presentation materials related to a research study about educators' knowledge, attitudes, and beliefs of how trauma affects learning in students. The focus of the study is to improve educators' understanding and support of students exposed to trauma.

Your role is to help the researcher confirm the content or delivery process and organization of the information, depending on your area of expertise. Your contribution will add to the validity of the professional learning experience offered to inservice and preservice educators. There is no risk of harm for participating in this study. Information you provide will be kept in a locked drawer and on a password-protected computer to maintain confidentiality.

This study is being conducted by Cara Megan Wright. She is conducting this study as part of the requirements for the degree of Doctor of Education. The results of the study may be used in a future journal publication. However, all information, including direct quotes, will be reported anonymously. For questions about the research, you may contact her at wrightc17@up.edu. Upon completion of this study, she will present her findings at her dissertation defense in the spring; date and time will be announced publically.

If you have any questions about the study, please feel free to contact my advisor, Julie Kalnin, kalnin@up.edu (503) 943-7886. If you have questions regarding your rights as a research subject, please contact the IRB (IRB@up.edu). You will be offered a copy of this form to keep.

Participant Agreement
I understand informed consent and agree to participate in this study.

_____
Signature

_____
Print Name

_____
Date

Appendix Q

Session Announcement

Did you know that 1 in 3 students experience trauma before they graduate high school. How does trauma affect them? What can we do to support them in school?

When Trauma Disrupts Learning:

Engaging Educators in a Professional Learning Experience

This study focuses on increasing educators' knowledge about what happens to students physically and psychologically when exposed to trauma, identify students responding to trauma, and implement strategies to help them.

> **Date**: October 14, 2016
>
> **Time**: 9:00am - 2:30pm
>
> **Location**: University of Portland

Those educators who attend the session and complete follow-up survey will gain:

- The role of neuroeducation in understanding trauma
- Defining educators' roles in the support of students with trauma
- A neuroeducation lens of learning: neuroscience, cognitive psychology, and language
- How trauma manifests in students
- Strategies to support students in school
- Anticipate being able to offer 0.5 CEU or 15 PDUs from the University of Portland.

This opportunity is offered by Megan Wright, M.Ed., NCC, as part of her doctoral research project for the University of Portland. If you agree to be in this study, you will be asked to:

- Sign an informed consent form which states your participation is voluntary and will be kept confidential
- Participate in a one-day session, including discussions and writing
- Be willing to be audio-recorded (note: individuals will not be identified and retain the right to discontinue recording at any time)
- Complete a follow-up survey one month following the final session

To participate in this study or ask questions, please contact **Megan Wright** at **wrightc17@up.edu**. Space is limited.

Appendix R

Expert Review of the Professional Learning Experience

Name _____

Current Role _____

Please mark if you are checking for:

Trauma Content _____ Neuroeducation Content _____ Professional Development

_____

Content of the Professional Development

Based on your understanding of the topic, please rate how accurate,
comprehensive and clear the information is:

1 = Poor   2 = Fair   3 = Good   4 = Excellent   N/K = no

knowledge

	Accurate	Comprehensive	Clear	Comments
Trauma and its effect on learning				
Neuroeducation				
Professional Development				

Comments welcome on any changes you think should be made to the presentation
materials. You may also make review notes directly on the presentation and then
return a copy to me.

Process of the Professional Development

Based on your understanding of best practice for your area of trauma, neuroeducation, or professional development, please review this presentation based on organization structure, best practices, and feasibility of getting everything done in the period of 270 minutes (4.5 hours).

Organization Structure

Please rate the presentation for progression and clarity of content material.

	Content confusing or out of order	Logical flow overall with some changes needed to content	Logical flow with clear content
Overall Presentation			

Best Practice

Is the information appropriate for an introductory level presentation for:

    Preservice educators?

    Inservice educators?

Which, if any, slides are too complicated for an introductory presentation and may lead to misconceptions?

Timing

How long should each activity take in minutes? For discussions, please give average # minutes.

Partner discussions _____   Poster activities: *Roles*_____   *Strategies* _____

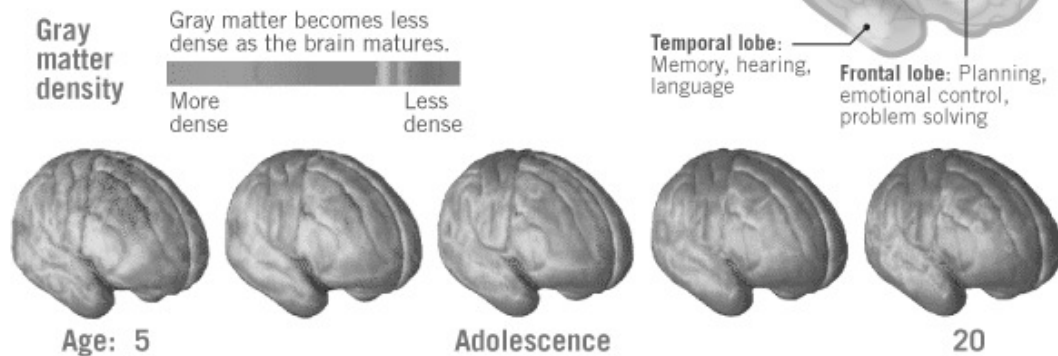Group discussions _____   Slides: _____

Comments:

Appendix S

Growing a Grown-up Brain

Growing a Grown-up Brain

Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.

Gray matter: Nerve cell bodies and fibers that make up the bulk of the brain's computing power.

Parietal lobe: Spatial perception

Occipital lobe: Vision

Temporal lobe: Memory, hearing, language

Frontal lobe: Planning, emotional control, problem solving

Gray matter density

Gray matter becomes less dense as the brain matures.

More dense — Less dense

Age: 5   Adolescence   20

Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., *Proceedings of the National Academy of Sciences*, May 25, 2004; California Institute of Technology

Appendix T

Case Study Examples

Homelessness/transient. Aaron started at the school in January after moving into a local shelter with his mom and three siblings. His mom told the principal that they lost their apartment when the rent went up and could not find affordable housing since the holidays. Aaron is trying extra hard in class to get all of his work done and constantly asks the teacher if his work is correct. He tends to react aggressively to abrupt and unexpected noises, and the P.E. teacher had to talk to him about playing rough with the other boys during class.

Household mental illness. Robert tends to sit by himself at lunch and is reluctant to work with others on projects. He fidgets, and either is glancing around the room or blanking out. He doesn't put much effort into his work and often doesn't turn in assignments. When the teacher addresses him about his work, he gets defensive and irritated. He confronts teachers when he think they aren't being fair in the way they treat hi compared to his peers.

Household substance use. Jean is a 12-year-old girl who lives with her older sister and both parents who work several jobs. Jean loves riding horses and is interested in science and poetry. Her attendance is poor but she works hard to keep up with coursework as she can and behaves in class. She cries when she gets in trouble or does not know the correct answer. Jean does not seem to have friends but gets along well with classmates. She likes to eat lunch with her homeroom teacher whenever she can and tells stories of adventures with her older sister. Recently she has been coming to school less frequently and appearing more disheveled and dirty.

Parental loss through divorce or death. Seventh grade twins Peter and Joanne live with their parents, who run a small business in town, and younger sister. Peter has been acting distracted in class, falling behind on homework, and acting goofy with his friends in the hall that sometimes causes him to be late for class. Joanne is a straight-A student with like-minded friends but has recently seemed sad and quieter than normal. She keeps up with her schoolwork but does not try out for the play, which surprises her drama teacher. Peter gets sent to the assistant principal for grades and attendance; he tells her that his parents announced they were divorcing and dad was moving out at the end of the month.

Chronic illness or physical injury. Jackie is shy 8th grade girl with high academics, is a devoted gymnast, and has several close friends. She broke her back doing repeated backflips and must now wear a full-torso brace for three months. Jackie cannot continue with gymnastics so she altered her diet to accommodate for using less energy and keeping her weight down for when she can return to her sport. Her friends increasingly voice their concerns for her health to the point that she no longer wants to spend time with them. In English, Jackie must give a speech in front of her class but is too shy and afraid of presenting. Though she asked her teacher if she present after school to just the teacher, the teacher told her she had to so what the whole class was doing. She has been to the counselor's office several times over the past 5 weeks for help to manage stress from both friendship and academic issues.

Appendix U

Professional Learning Experience Evaluation

Name _____

Please check:

	Excellent	Good	Fair	Poor
Facilitator's knowledge of the content				
Facilitator's presentation of the content				
Format and explanation of the course				

1. This professional learning experience was organized by the neuroeducation factors of inside (neuroscience, beliefs), outside (cognitive psychology, attitudes), and application (language, strategies). In what ways did you see this organization reflected in the sessions?

2. What was the most useful aspect of the experience?

3. What was the least useful aspect of the experience?

4. How can the experience be improved?

5. Please write any additional comments:

Appendix V

Consent to Participate for Session Participants

You are invited to take part in a research study gathering information on educators' knowledge, attitudes, and beliefs of how trauma affects learning in students. You responded to the invitation to be part of the study as an educator at a school or in a preservice program. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

The purpose of this study is two-fold: firstly, to ask educators at your school what they know, think, and believe about students who experience trauma; and secondly, to create a professional development for adult learners based on neuroeducation. Information about learning and trauma will be presented in accord with current neuroeducation research and theory, including the fields of neuroscience, psychology, and language.

Confidentiality

The focus of the study is to improve understanding and support of students. Individuals will not be identifiable in the final publication; names will appear on questionnaires and journal entries for analysis only. Demographic data will only be gathered for descriptive purposes. Discussions will be audio recorded, transcribed, and analyzed to determine themes in these areas. After the session and during analysis, materials will be kept in a locked drawer and on a password-protected computer to maintain confidentiality.

Risks and Benefits

There is minimal risk of harm for this study. Due to the content, namely trauma, participants may feel uncomfortable and desire to discontinue the study. Resources for supporting participants will be made available at that time and following the session. There is no obligation to provide personal histories or experiences. If they do volunteer sensitive information, I will not transcribe that portion of the recordings or include in data analysis. Participants have the right to turn off the recording device and inform me at a later point to eliminate sensitive information from the transcripts. The investigator anticipates a modest direct benefit associated with better understanding of one's own thoughts and feelings related to one's own experiences. I anticipate the ability to offer either 15 professional development units or 0.5 credit from the University of Portland. Also, data used from this study may provide helpful information about the experience of educators teaching students with trauma backgrounds and how the field of neuroeducation can better support these educators. Findings may also normalize your experiences as an educator teaching students with trauma backgrounds.

If you agree to be in this study, you will be asked to:
- Attend a full-day session.

- Participate in dyadic and group conversations and activities, as you feel comfortable.
- Be willing to be audio-recorded.
- Complete questionnaires and a survey as you feel comfortable.
- Create a case study and your experience in the professional development.
- Review your written materials to check for accuracy.
- Complete a follow-up survey one month after the final session.

This study is being conducted by a researcher named Cara Megan Wright. She is conducting this study as part of the requirements for the Doctor of Education. The results of the study may be used in a future journal publication. However, all information will be reported anonymously. For questions about the research, you may contact her at wrightc17@up.edu. Upon completion of this study, she will present her findings at her dissertation defense in the spring, date and time will be announced publically.

If you have any questions about the study, please feel free to contact my advisor, Julie Kalnin, kalnin@up.edu (503) 943-7886. If you have questions regarding your rights as a research subject, please contact the IRB (IRB@up.edu). You will be offered a copy of this form to keep.

Participant Agreement
I understand informed consent and agree to participate in this study.

_____
Signature

_____
Print Name

_____
Date