



# Building a Bridge of Evidence for Applied Educational Neuroscience:

*Pathways for Possibility*

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# Session Objectives

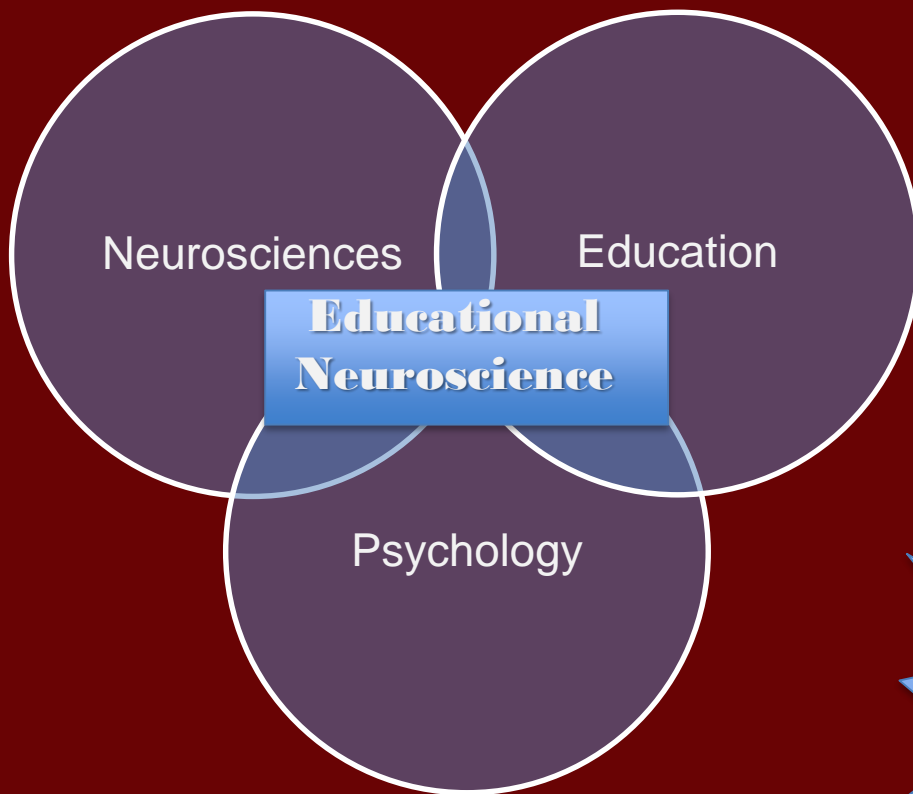
- Define Educational Neuroscience
- Background and Rationale for EN
- Bridging Neuroscience and the Art of Education Delivery
- Qualitative Study on Applied EN Practices
- Envisioning Possibilities for Knowledge Building



SCHOOL OF  
**SOCIAL WORK**



# **What is Educational Neuroscience?**



SCHOOL OF  
**SOCIAL WORK**  
GIVING HOPE *and* CHANGING LIVES

(Adapted from Sousa, 2010)

## Educational Neuroscience Definition

“...syntheses of theories, methods, and techniques of neurosciences, as applied to and informed by educational research and practice.”

(Patten & Campbell, 2011, p. 1)

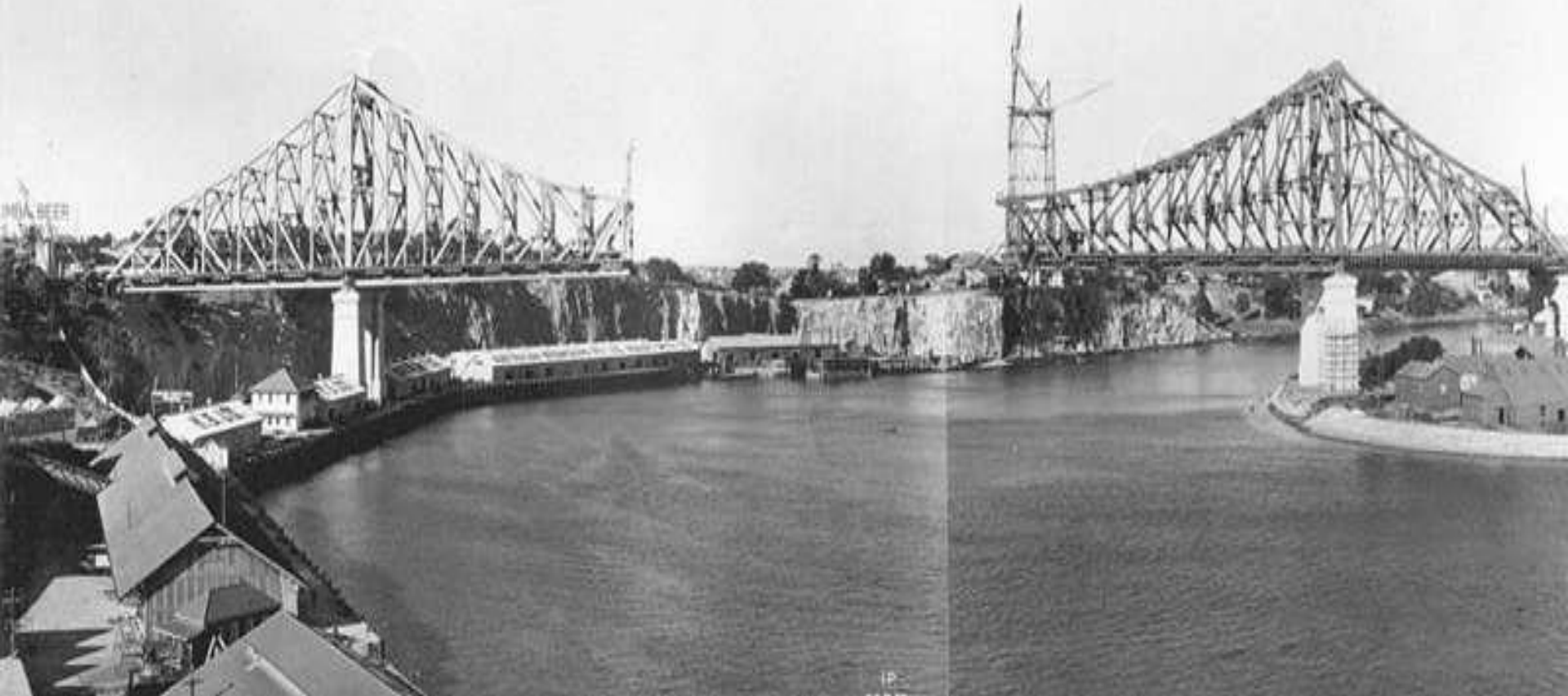


# Principles of Transdisciplinarity

(Leavy, 2011, p. 30)

Principle	Practice
Problem-Centered	Issue driven research determines disciplinary insight and instructs methodology
Holistic & Synergistic Inquiry	Issue is assessed holistically and iteratively, generating integrated knowledge
Transcendence	Conceptual frameworks transcend disciplinary parameters to provide real-world solutions
Emergence	New Conceptual and methodological frameworks
Innovation	Researchers build new conceptual, methodological, and theoretical frameworks
Flexibility	Openness to new ideas and willingness to adapt

# A Transdisciplinary Science



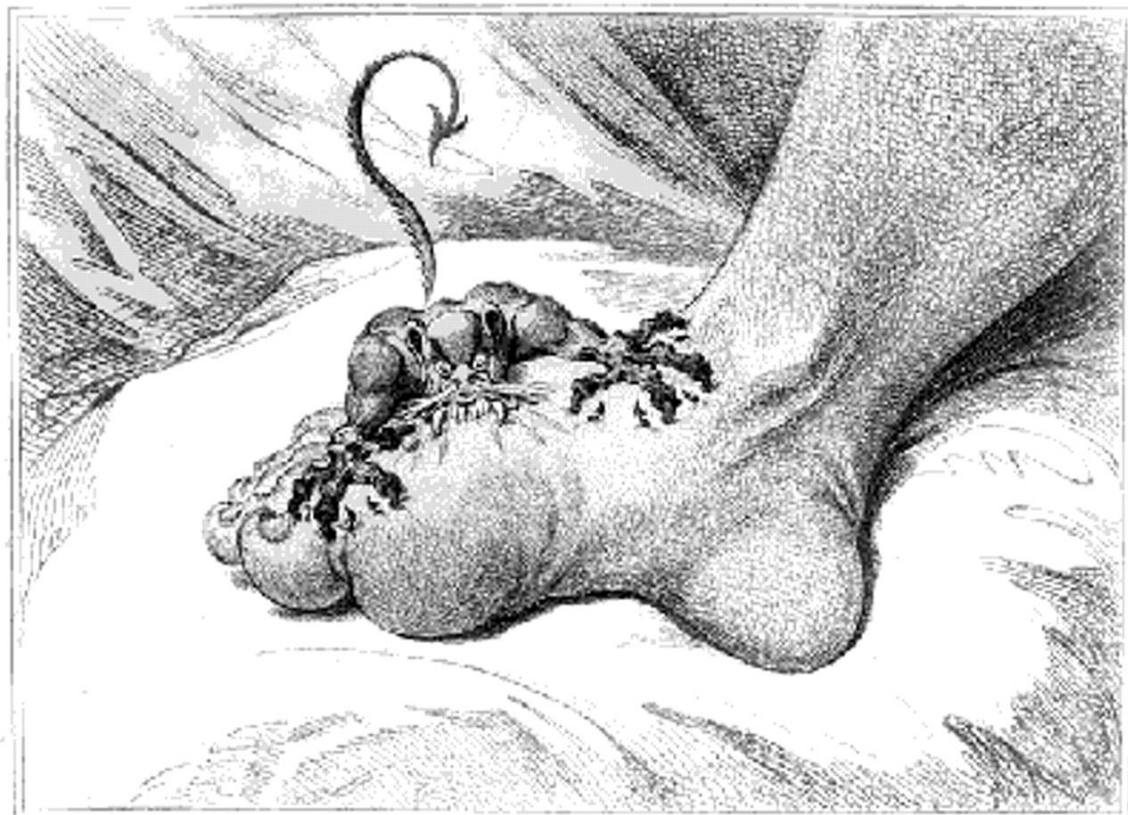
**WATER**









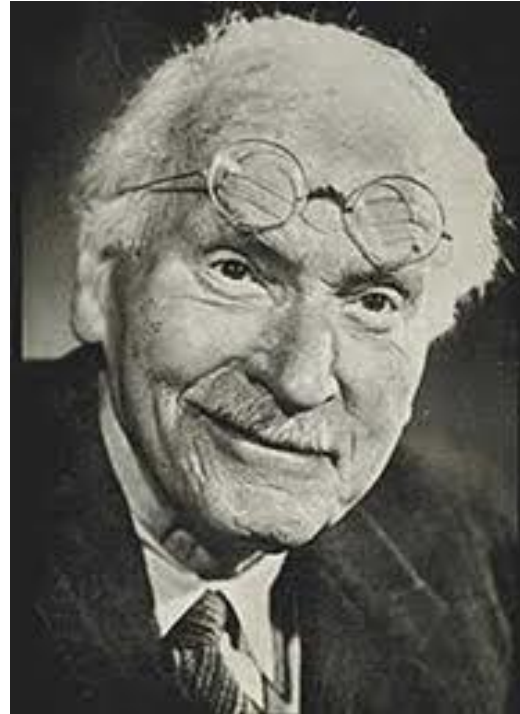
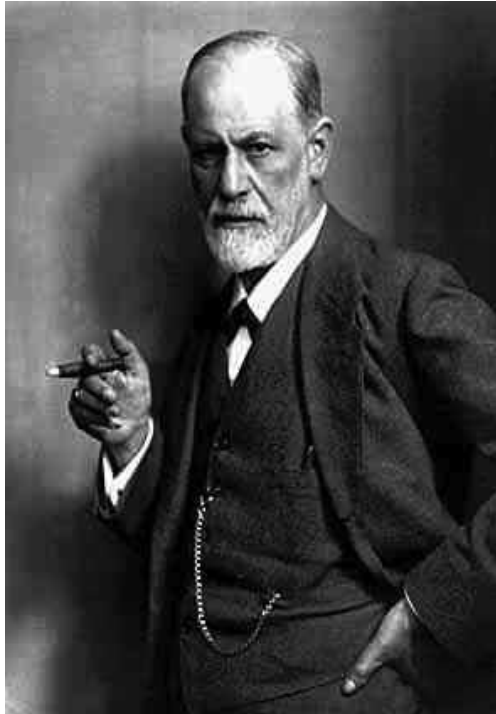


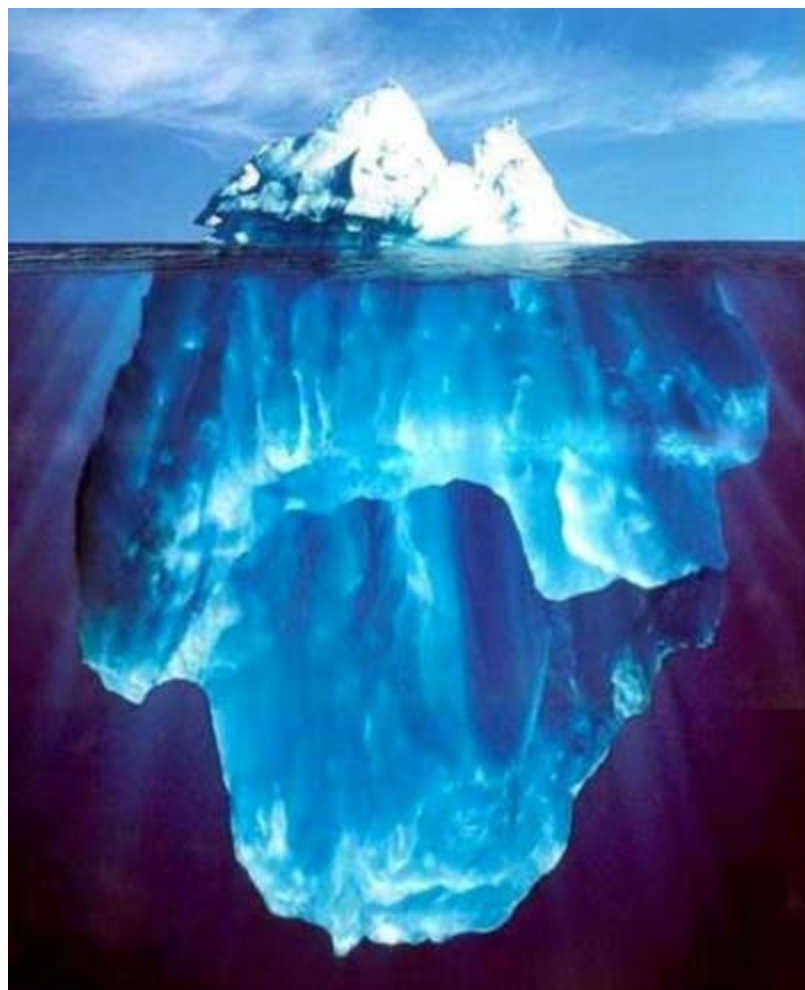
*The GOUT.*

W. H. P. & Co. & Son  
171, New York



***“I could draw it, but I don’t know  
how to say it.”***







SYMBOLIC

UNDIFFERENTIATED

FEARS



DREAMS

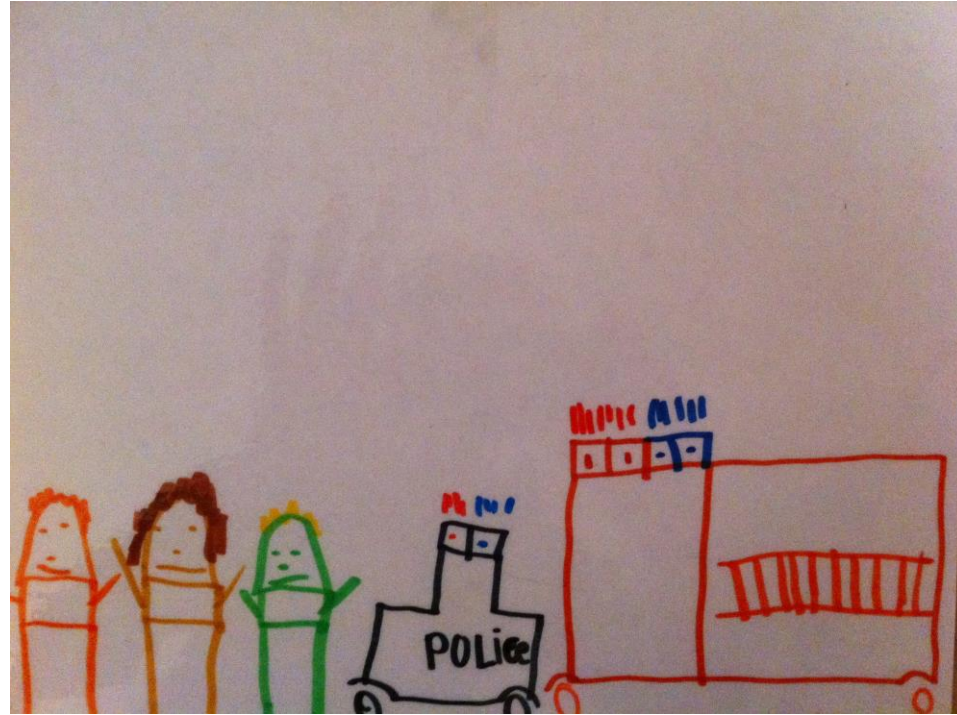
MEMORIES

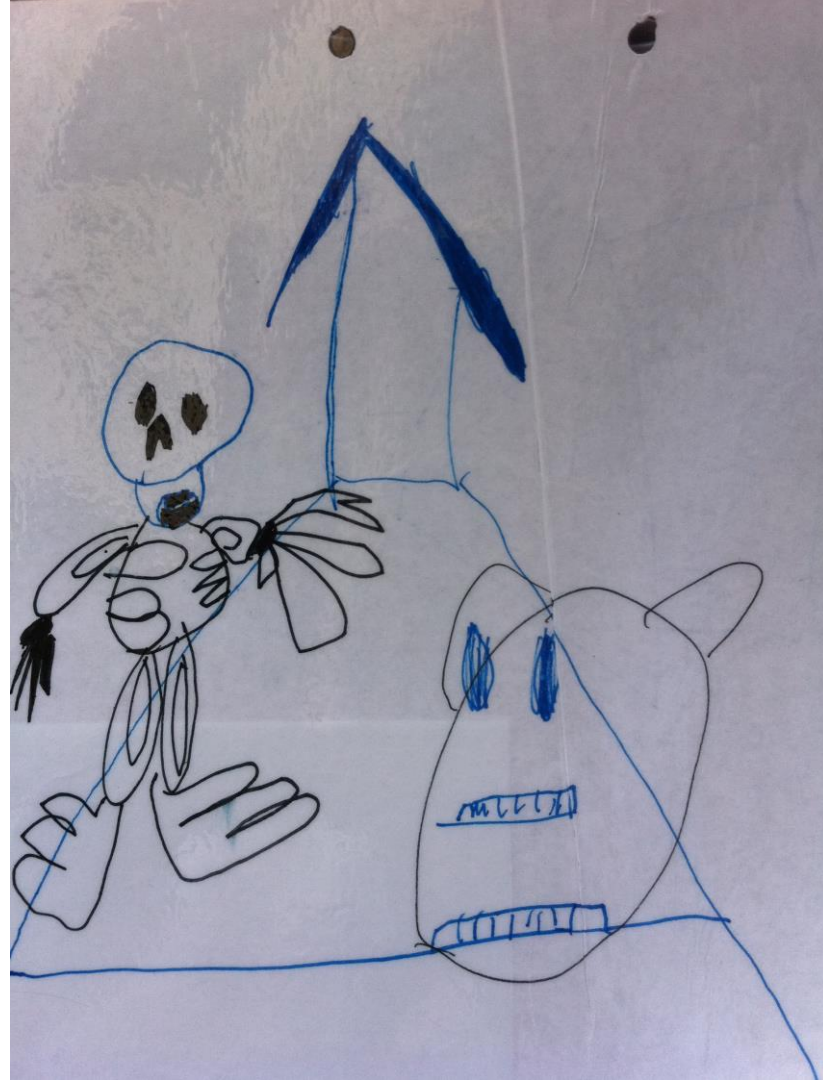
FANTASIES

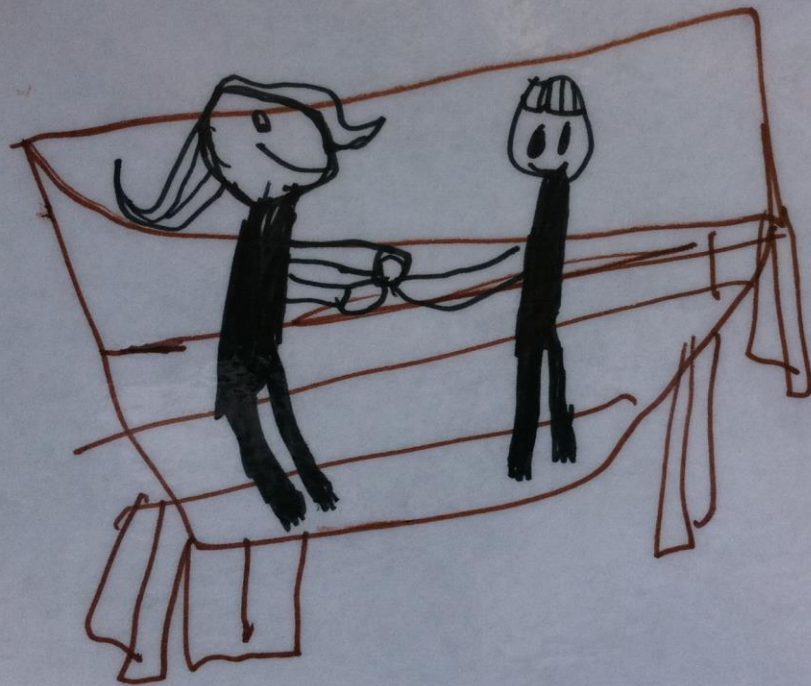
CONFLICTS











Psychoanalysis

Cognitive & Behavioral  
Psychology

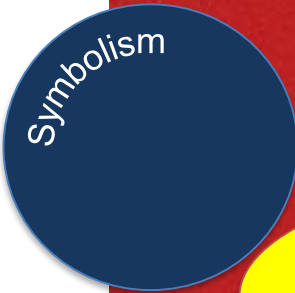
Humanism

Object Relations

Existential Theory



# ART THERAPY



**Relationship**





# Art Therapy Defined

“Art therapy is a mental health profession in which clients, facilitated by the art therapist, use **art media, the creative process, and the resulting artwork** to explore their feelings, reconcile emotional conflicts, foster self-awareness, manage behavior and addictions, develop social skills, improve reality orientation, reduce anxiety, and increase self-esteem.”

-American Art Therapy Association











**CONTAINERS** OF **COMMUNITY:** EHREN TOOL  
JULY 1 - SEPTEMBER 7



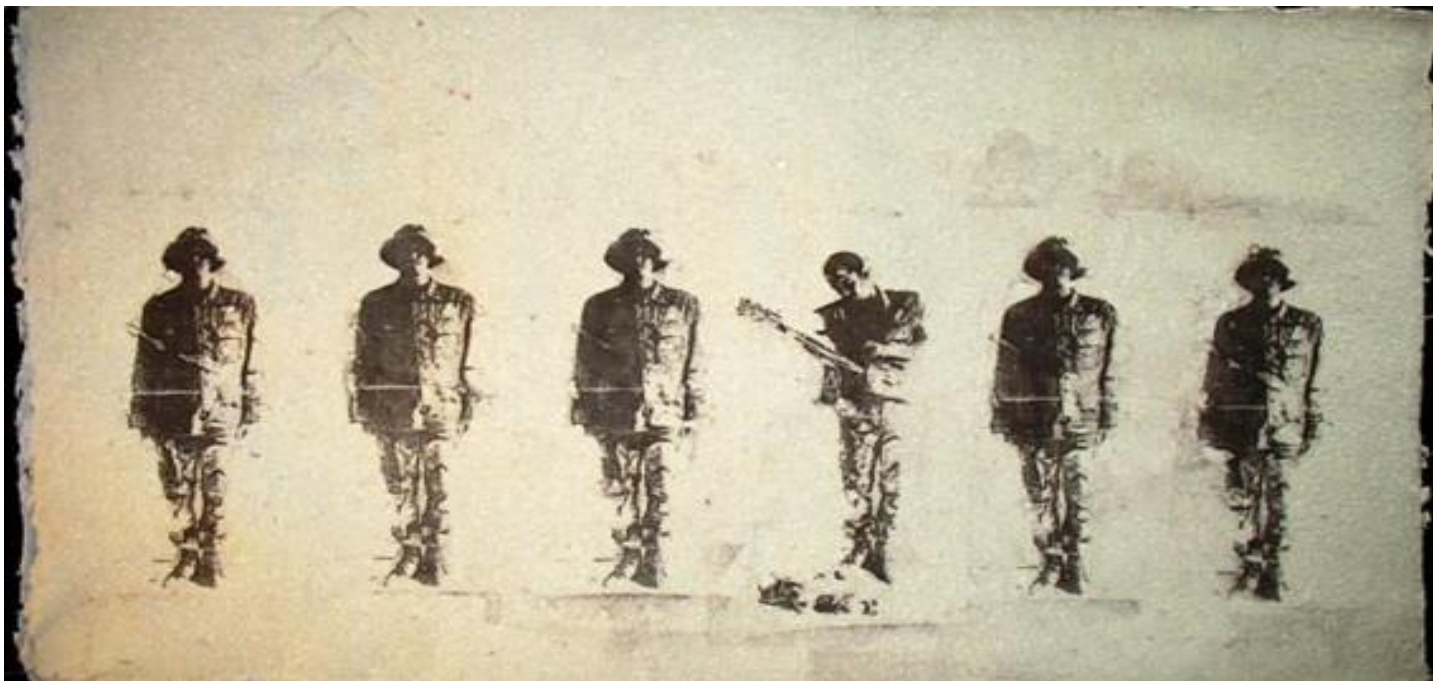






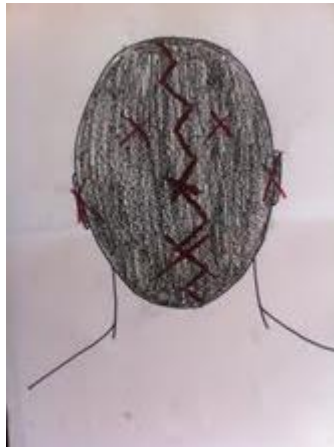




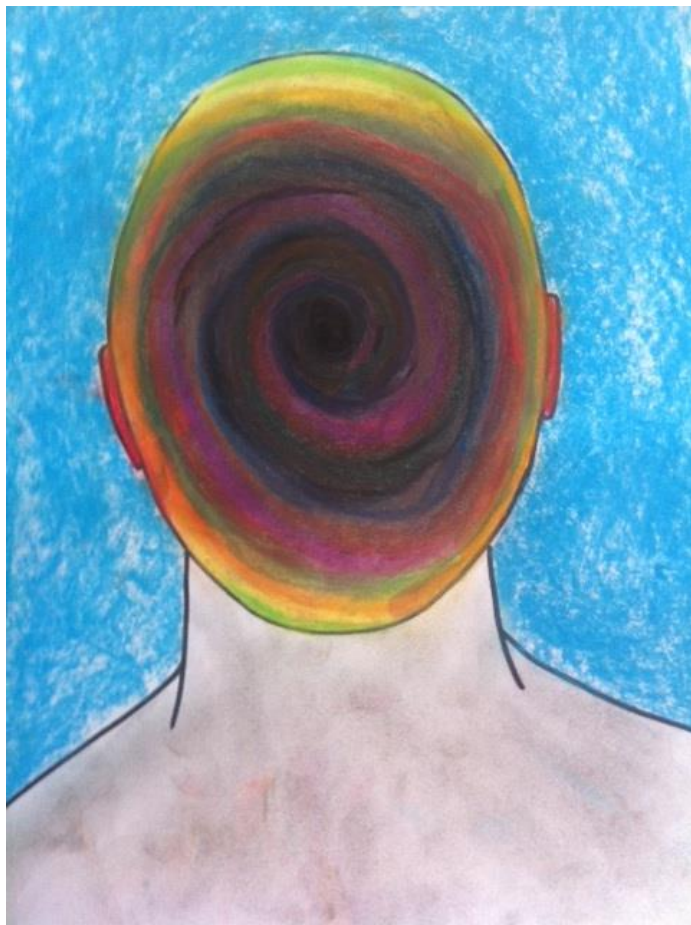




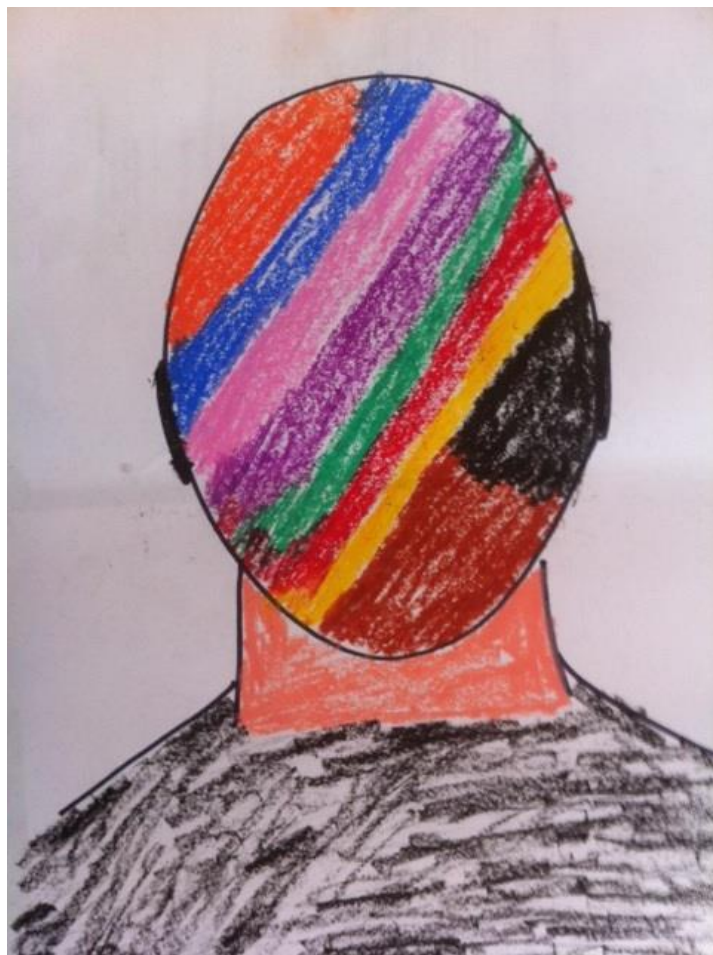




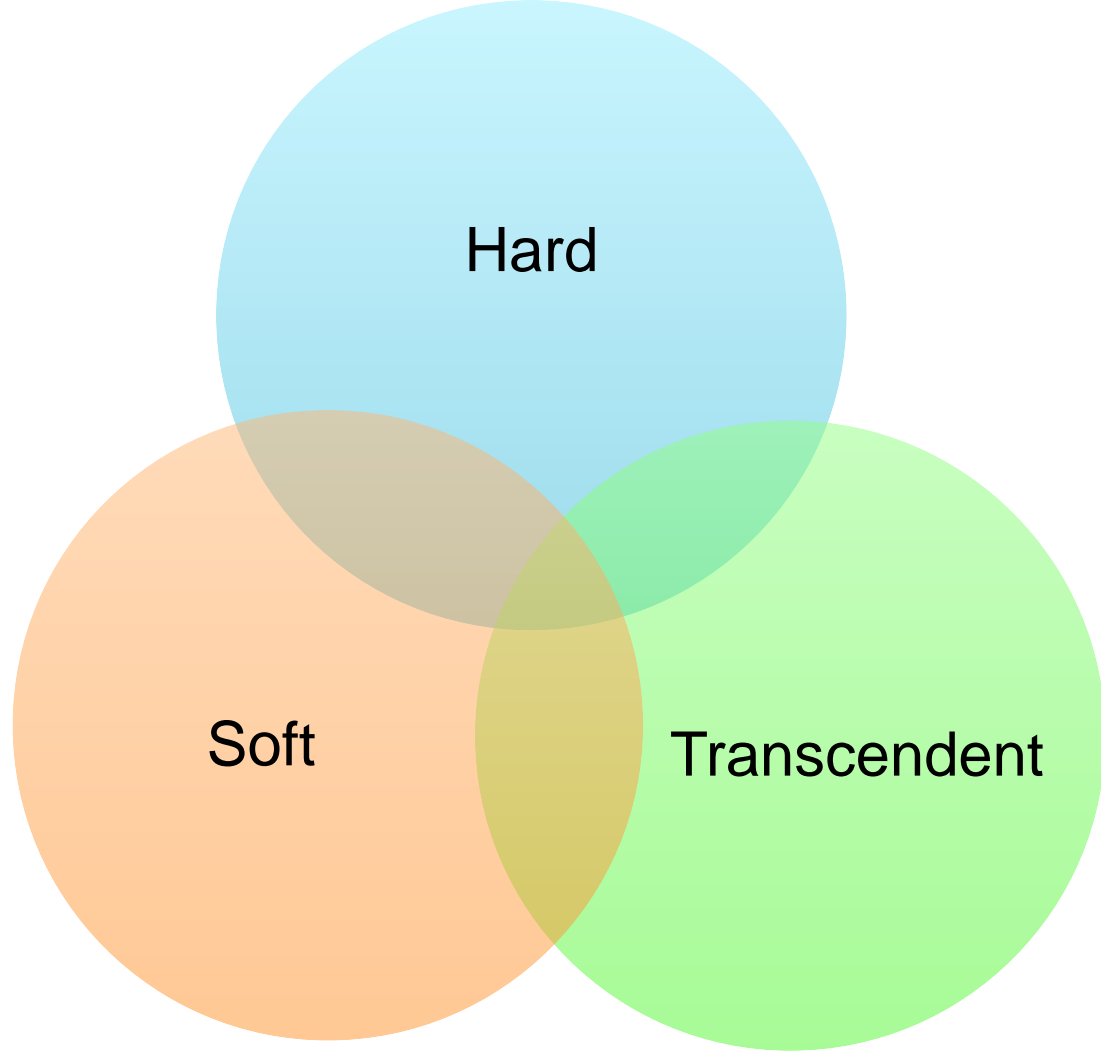






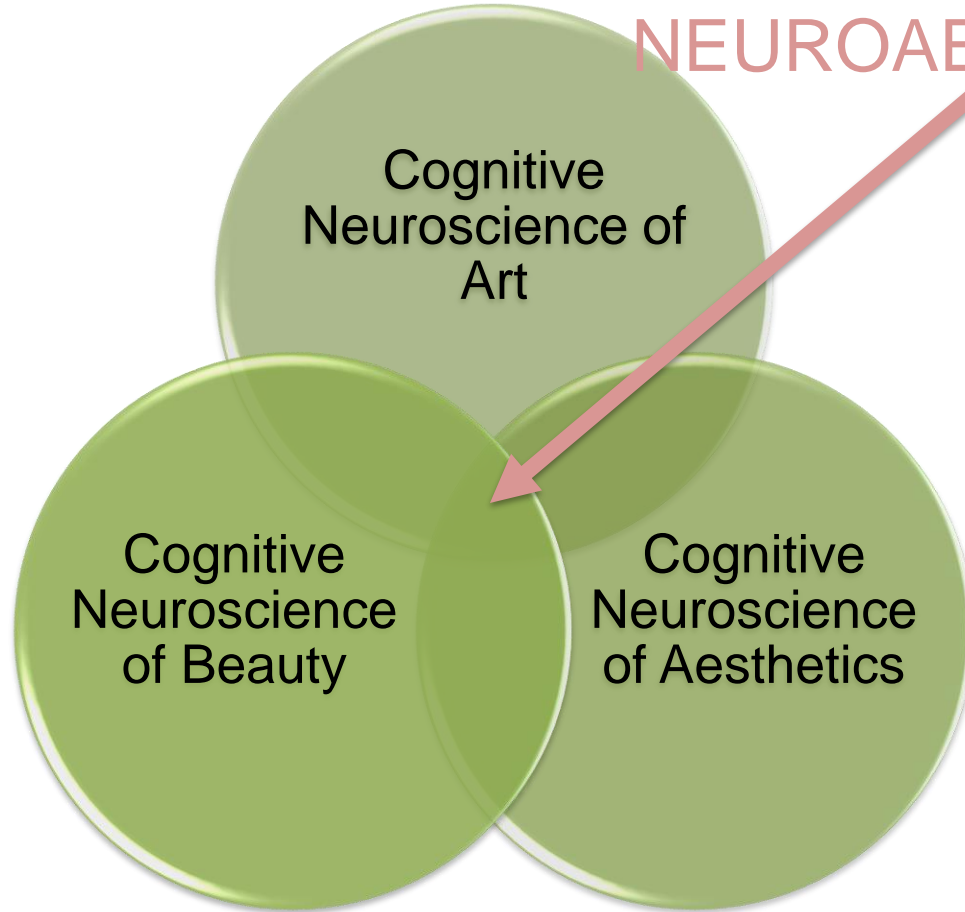




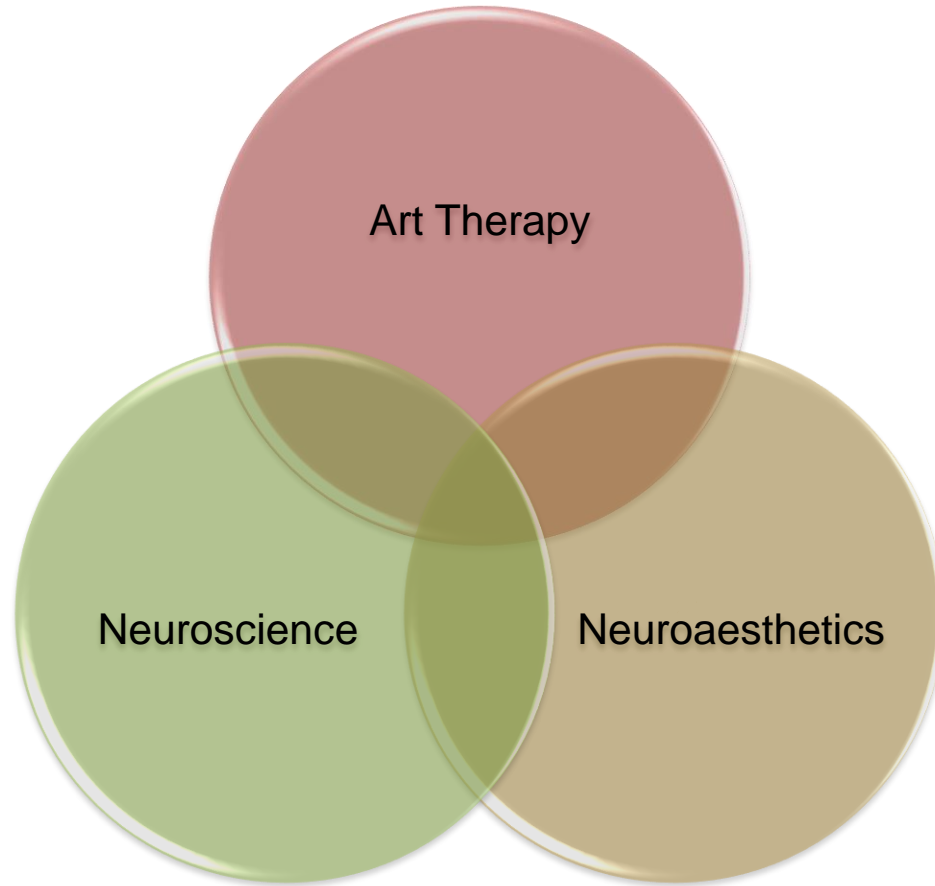




# NEUROAESTHETICS







# **Applied EN Qualitative Study: Background & Rationale**

# Applied Educational Neuroscience Research

- Translation to practice remains at a theoretical level (Goswami, 2006; OECD, 2007)
- Early attempts indicate a dynamic physiological and social phenomenon of teaching
- Fertile for further investigation



# Organisation for Economic Co-Operation Development (OECD) 2007 Report

*Understanding the Brain: The Birth of Learning Science*



# Implications for Classrooms

Stressor:

Critical life issues that exceed one's interpersonal and environmental resources for managing them

(Swick, Bowen, & Allen-Meares, 2015)

Approximately 2/3 of Americans experience some level of childhood trauma (Center for Disease Control, 2016)



# Study Impetus

- Quest for a shared conceptual framework for the social and affective dimensions of applied educational neuroscience to promote a positive classroom and school climate



# What is School Climate?

- “The learning environment created through the interactions of human relationships, physical setting and psychological atmosphere”

- (Perkins, 2006, p. 1)



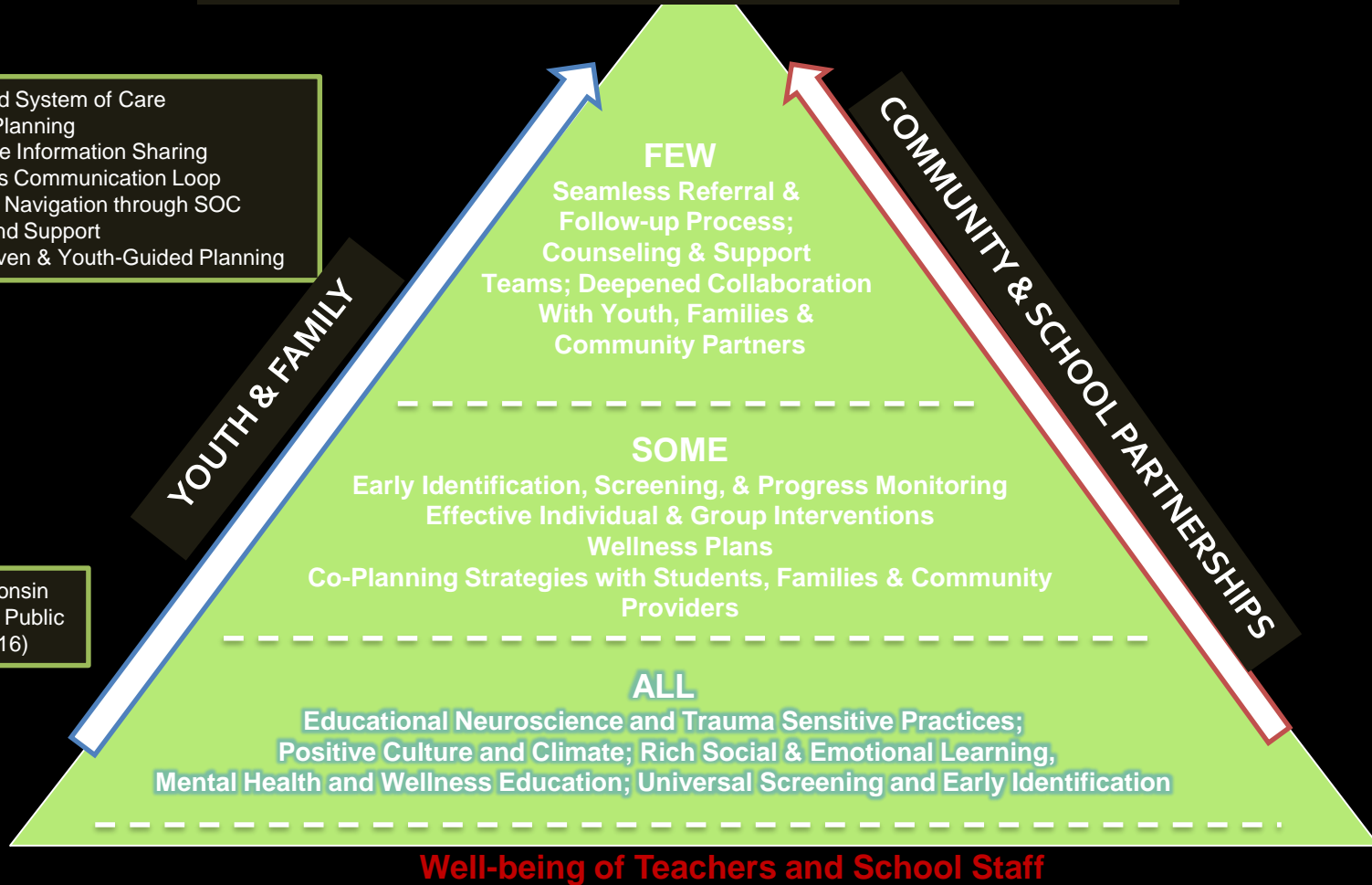


# Multi-Tiered System of Support (MTSS)

## Interconnected System of Care

- Strategic Planning
- Appropriate Information Sharing
- Continuous Communication Loop
- Supported Navigation through SOC
- Wraparound Support
- Family Driven & Youth-Guided Planning

(Source: Wisconsin Department of Public Instruction, 2016)



# Research Problem

- Positive School Climate linked to improving student outcomes (Gerlach & Hopson, 2013; National School Climate Center, 2007)
- Applied educational neuroscience is sought as a potential practice pathway
- Unifying conceptualization of social and affective dimensions of educational neuroscience remains unformed



# Rationale and Significance

- Empirically-Informed Interventions for serving all youth, especially those impacted by stressors
- Building an Evidential Bridge: Linking Science to our heuristic ways of knowing
- Informing Education and School Social Work Practices



# Research Purpose

**To describe how practices, based on the social and affective dimensions of educational neuroscience principles, unfold in classrooms taught by teachers who espouse these principles**



# Research Questions

***(1) How do teachers, school administrators, and students describe educational neuroscience?***

***(2) What practices do teachers use in the classroom to apply educational neuroscience principles?***

***(3) How do students respond to these practices?***

***(4) What classroom interactions are associated with these practices?***



# **Theoretical and Conceptual Framework**

# Learning and Modern Attachment Theory

Right hemisphere neurobiological systems involved in processing emotion, stress modulation, and self-regulation

Nonconscious

Implicit interactions

Intersubjectivity



(Cozolino, 2013; 2014; Schore, 1994; 2013; Schore & Schore, 2008; Siegel, 2012)



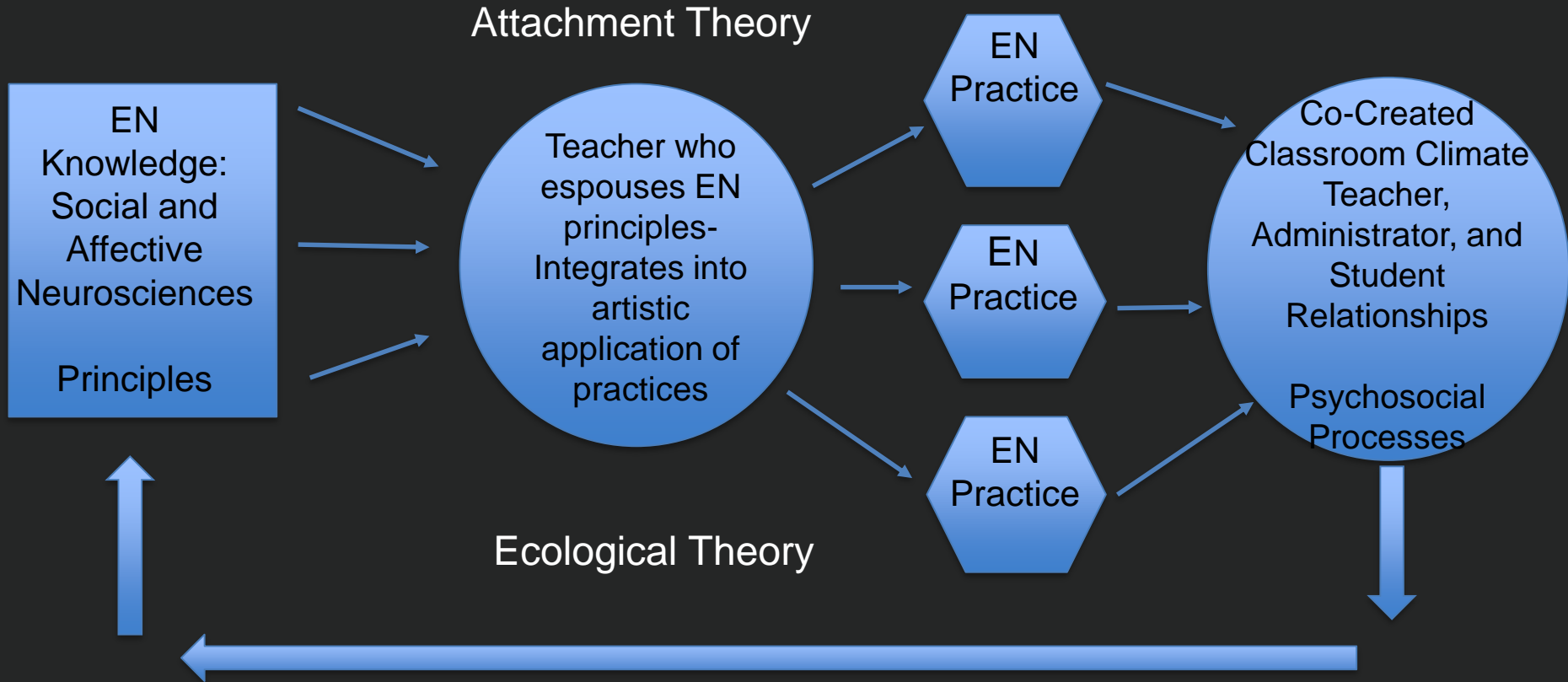


## Secure attachments=gateway to emotional regulation and learning

A word cloud shaped like a hand holding a heart. The heart is red and contains the words "I love you" and "I need you". The hand is black and contains various phrases of support and reassurance. The background is white.



# Conceptual Framework for Grounded Theory Study



# Research Design & Methods

# Methods

- Constructivist Grounded Theory (Charmaz, 2014)
- Classroom members will adapt to the shift in social processes and co-create new interpretive meanings
- Series of complex, evolving psychosocial interactions



# Participants and Data Collection

Three Midwest US general education classrooms where teachers espouse EN principles

Four phases of Data Collection:

Teacher (6), Students(41) and Administrator Interviews (2)

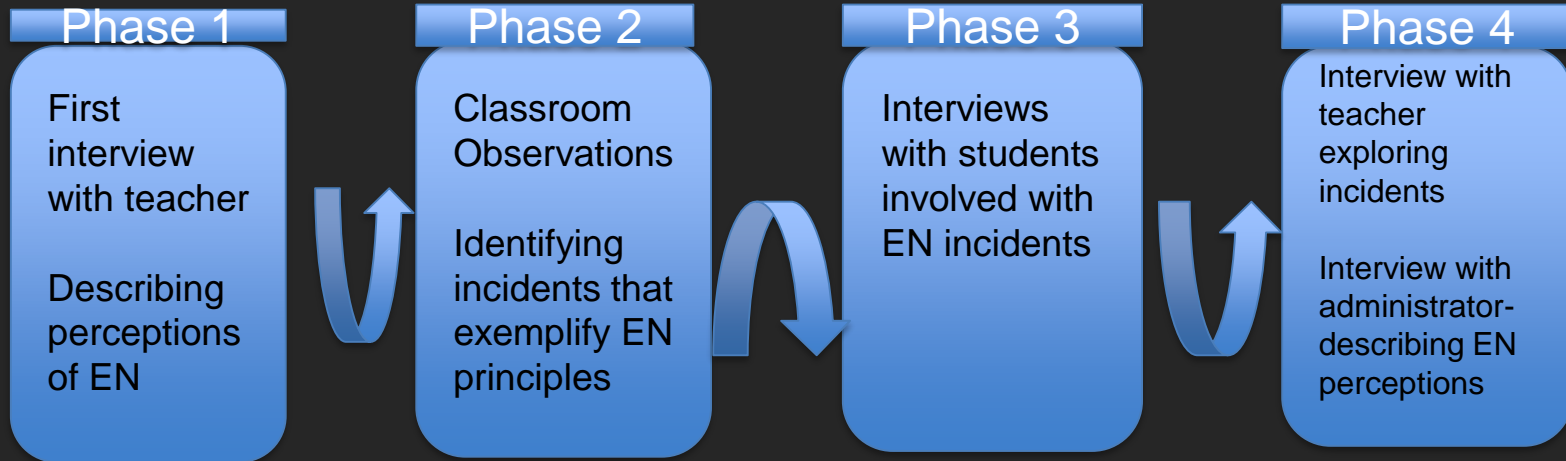
Classroom Observations (4)

Classroom Artifacts

Purposive Sampling Strategy (Padgett, 2008)



# Data Collection and Analysis: Four Stages

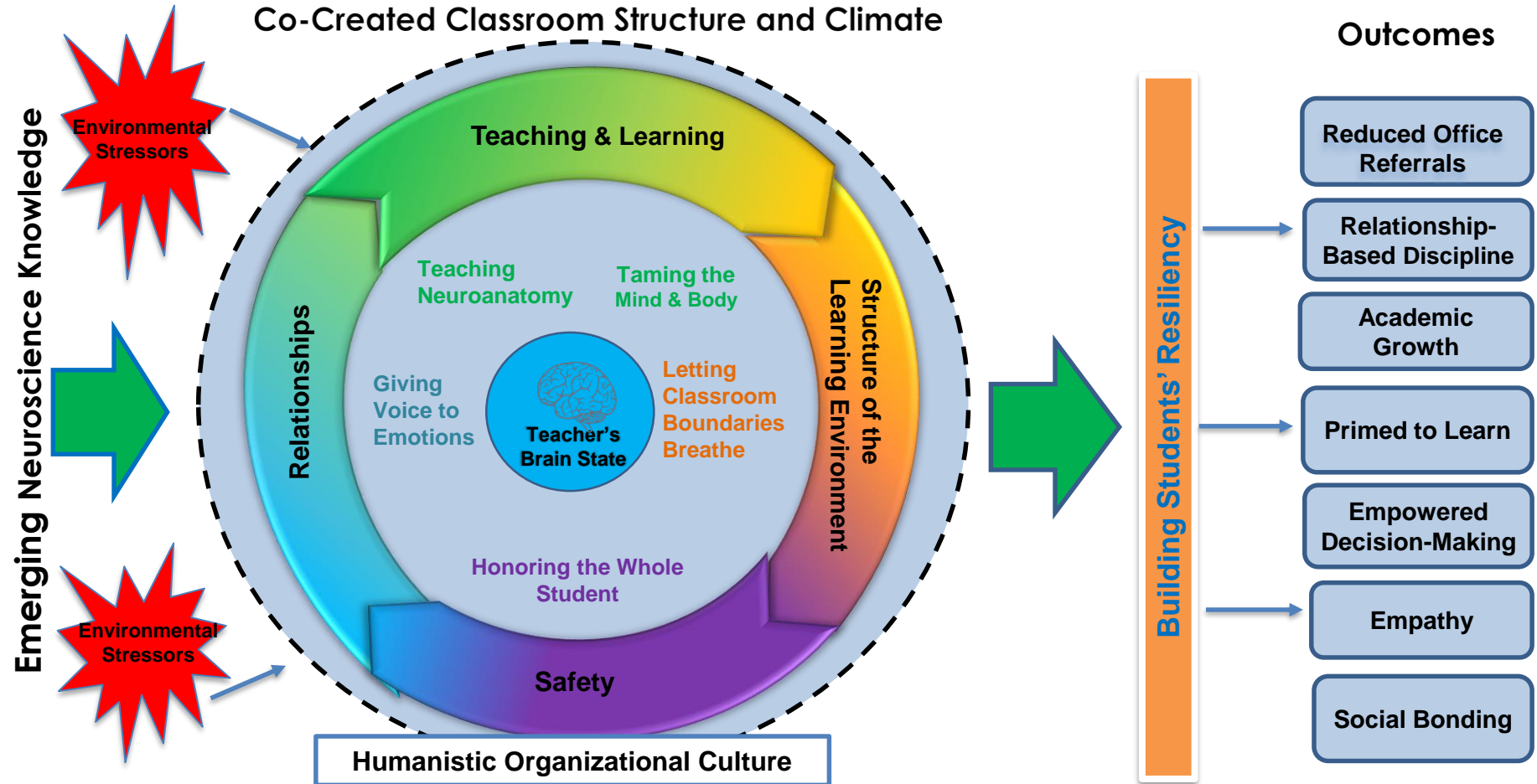




# **Findings and Recommendations**



# Model for Applied Educational Neuroscience Practices



# Environmental Stressors

Trauma

Past  
Suspensions

Economic  
Strains

Language  
Barriers

Transitions

Family  
Strains

Previous  
Learning  
Challenges





# **Co-Created Classroom Structure and Climate**

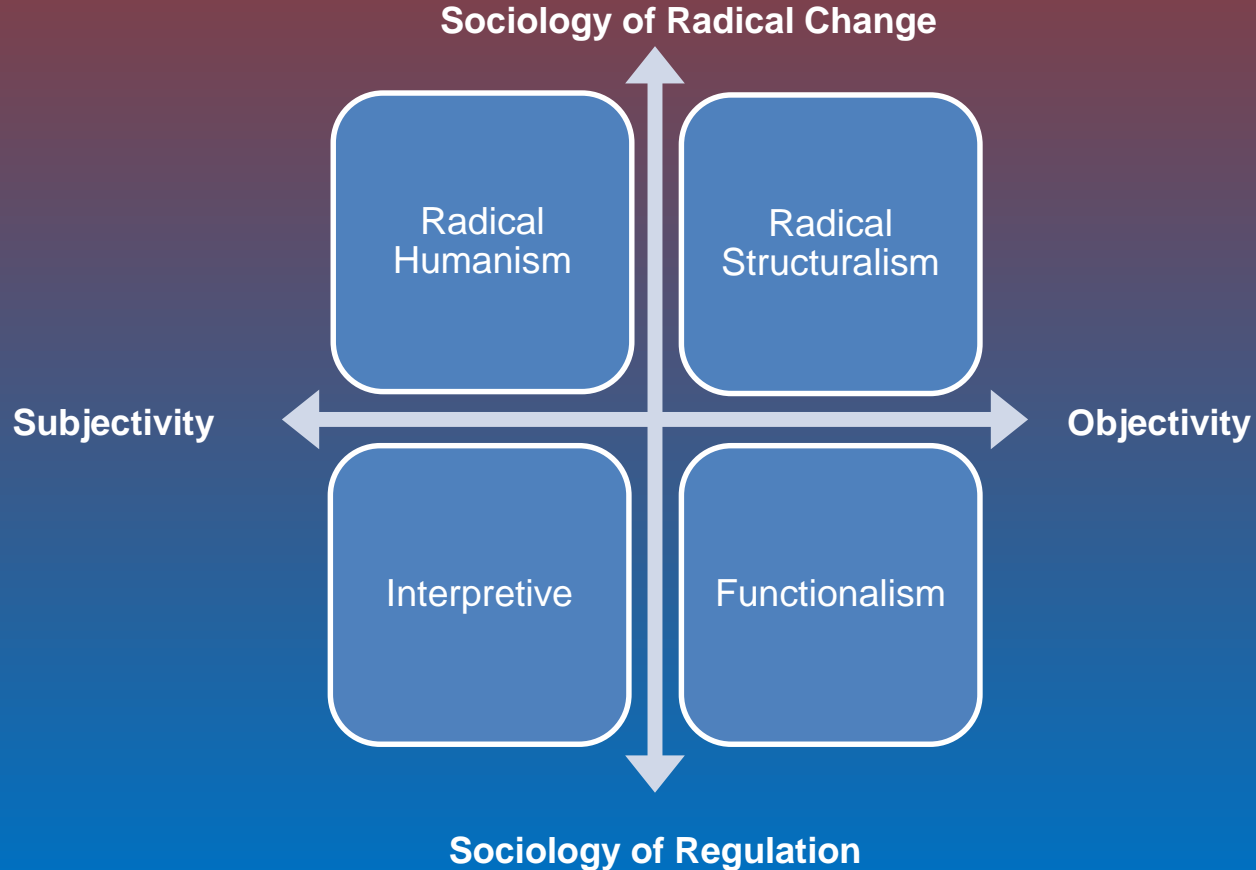
# Humanistic Organizational Culture

*“I think you probably would see administrators who are not comfortable with teachers using flexible seating in the classroom....we have teachers who have ellipticals in their classroom. A lot of administrators would probably question that more or kinda say no, that’s gonna be distracting for students, rather than kind of giving the teacher the autonomy to try out [new things].*

~School Administrator



# Burrell and Morgan Framework (1979)



# Teacher Brain State

*“I’m a better teacher, because I’m aware of what happens. I’m aware of my own neuroanatomy, and it’s not something I was aware of. I knew some things instinctively, but I didn’t know about my pre-frontal cortex and my emotional brain and so...teacher brain state impacts all the brains in the classroom. So if I’m not mentally prepared or healthy or happy, then neither will the 30 kids in my classroom.” ~5th Grade Teacher*



# EN Practice 1: Teaching Neuroanatomy

*“Well, last year, we weren’t good students...this year, we came to X’s room, and we were just wild and just like wildcats, and she said, ‘No, we’re not gonna do this; we’re gonna need some attention breaks.’ But it’s like we have a blank slate in our mind, like what is an attention break, like what? And so she started to teach us about neuroscience and the importance of it, and we’ve learned so much because we were really rough and (pause), we figured that out cuz we are feelers who think....we’ve learned how to calm our bodies.”*

~5<sup>th</sup> Grade Student

*“It’s part of what we teach them in the beginning of the school year, is that your brain is not the same as somebody else’s, and doing these coping strategies is helping your brain find new pathways to success and all that. So we do explicitly teach that.”*

~4<sup>th</sup> Grade Teacher





## EN Practice 2: Giving Voice to Emotions

*“I do lessons the whole first week of school....why feelings come before thinking, so the kids get a really strong understanding of how we feel first. We talk about all of those emotions that we do feel....we make it very clear that we feel first and it’s ok-whatever way we do feel-we talk about perception.”*

~5<sup>th</sup> Grade Teacher



# EN Practice 3: Honoring the Whole Student

*“A lot of these kids just want to be heard and so they want someone to listen to them, and there’s time for that in the first quarter, and we do a lot of that. And, then I see it pay off in a lot of ways.”*

~5<sup>th</sup> Grade Teacher

*“Normal teachers don’t let us do this-they don’t let us take a lap if we get mad. They tell us to calm down. They don’t think about what’s going on in our brain. They don’t think about how mad we are, how mad we can get, especially if you’re, like our age going through puberty and stuff. You get really mad; you get really scared. Everything happens; your amaygdala goes off; you get alarmed and crazy and stuff. Ms X lets us take a lap, go get a drink of water, when it’s convenient for us.”*

~5<sup>th</sup> Grade Student



## EN Practice 4: Taming the Mind & Body

*“When I got mad, I would just shut myself down, and then I would take it home. But now I take deep breaths, or I take a lap around the school and before I get angry and transfer that into my group work and stuff.”*

~5<sup>th</sup> Grade Student

*“We talk about brains need to be reset, need to become calm, and we have each child practice...and you know, it’s like if you need a refresher and time to get back to your best self is how we try to frame it.”*

~4<sup>th</sup> Grade Teacher



## EN Practice 5: Letting Classroom Boundaries Breathe

*"I like having a choice, because that helps me-like think what's best for me....We always have a variety. We come back to our favorites, but there's always a variety, and I think it's really just helped me with my learning experiences this year."*

~4<sup>th</sup> Grade Student

*"Even walking into other fifth grade classrooms in our building-this year the space looks different....the lighting throughout the day looks different. We have exercise bikes; we have a lot of space, so I do flexible seating so that we have space to work on the floor, or we have some different options so that we're comfortable. I give the students a lot of choice on where they wanna sit or how they complete activities or who they work with."*

~5<sup>th</sup> Grade Teacher



# Climate Variables

**Relationships**

**Teaching &  
Learning**

**Structure of the  
Learning  
Environment**

**Safety**



## Building Students' Resiliency

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graph LR; A[Building Students' Resiliency] --> B[Office Referrals:]; A --> C[Academic Growth:]; A --> D[Empowered Decision-Making:]; A --> E[Social Bonding:];
```

### Office Referrals:

***“From the beginning of the year to the end of the year, it was a significant decrease. There were certain students who were getting office referrals really frequently that by the end of the year I was never having a conversation with them.” ~School Administrator***

### Academic Growth:

***“For a lot of these kids, this is the first year where they’ve been in a classroom where they feel successful.”***

**~5<sup>th</sup> Grade Teacher**

### Empowered Decision-Making:

***“I always thought that I wasn’t gonna be successful in my life, but now I just realize that I’m gonna be successful for once in my life.”***

**~5<sup>th</sup> Grade Student**

### Social Bonding:

***“We are a neuroscience family!”***

**~5<sup>th</sup> Grade Student**

# Discussion

1. Adds to our theoretical understanding of applied educational neuroscience practices in the classroom setting
2. Builds upon existing school climate research
3. Addresses unexamined aspects of EN, including self-regulation, stress and learning
4. Contributes to a transdisciplinary approach for EN





*“I love how we talk  
about the brain.”*

~5<sup>th</sup> Grade Student



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