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
What is Educational Neuroscience?
Environmental Factors

Neurosciences

Psychology

Education

Educational Neuroscience

(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)

<table>
<thead>
<tr>
<th>Principle</th>
<th>Practice</th>
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<tr>
<td>Problem-Centered</td>
<td>Issue driven research determines disciplinary insight and instructs methodology</td>
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<tr>
<td>Holistic &amp; Synergistic Inquiry</td>
<td>Issue is assessed holistically and iteratively, generating integrated knowledge</td>
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<td>Transcendence</td>
<td>Conceptual frameworks transcend disciplinary parameters to provide real-world solutions</td>
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<td>Emergence</td>
<td>New Conceptual and methodological frameworks</td>
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<td>Innovation</td>
<td>Researchers build new conceptual, methodological, and theoretical frameworks</td>
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<td>Flexibility</td>
<td>Openness to new ideas and willingness to adapt</td>
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A Transdisciplinary Science
WATER
“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

Symbolism

Relationship

Art Education
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
Art Therapy

Neuroscience

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*

- EN knowledge is relevant pathway
- Need for holistic learning focus
- Transdisciplinary and needs bi-directional knowledge flow
- Emotional regulation is key learning skill

Research Needs

- Stress and Learning
- Translational Research
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)
Interconnected System of Care
• Strategic Planning
• Appropriate Information Sharing
• Continuous Communication Loop
• Supported Navigation through SOC
• Wraparound Support
• Family Driven & Youth-Guided Planning

FEW
Seamless Referral & Follow-up Process;
Counseling & Support Teams; Deepened Collaboration With Youth, Families & Community Partners

SOME
Early Identification, Screening, & Progress Monitoring
Effective Individual & Group Interventions
Wellness Plans
Co-Planning Strategies with Students, Families & Community Providers

ALL
Educational Neuroscience and Trauma Sensitive Practices;
Positive Culture and Climate; Rich Social & Emotional Learning,
Mental Health and Wellness Education; Universal Screening and Early Identification

Well-being of Teachers and School Staff

(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
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)
Learning occurs amid various attachment patterns

Safe connections align with the neurobiological processes that support learning

Secure attachments = gateway to emotional regulation and learning

(Cozolino, 2013; 2014; Schore & Schore, 2008; Sousa & Tomlinson, 2011)
Conceptual Framework for Grounded Theory Study

Attachment Theory

Teacher who espouses EN principles - Integrates into artistic application of practices

EN Practice

EN Practice

EN Practice

Co-Created Classroom Climate Teacher, Administrator, and Student Relationships

Psychosocial Processes

Ecological Theory

EN Knowledge: Social and Affective Neurosciences

Principles
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

Phase 1
First interview with teacher
Describing perceptions of EN

Phase 2
Classroom Observations
Identifying incidents that exemplify EN principles

Phase 3
Interviews with students involved with EN incidents

Phase 4
Interview with teacher exploring incidents
Interview with administrator-describing EN perceptions
Findings and Recommendations
Model for Applied Educational Neuroscience Practices

Co-Created Classroom Structure and Climate

- Teaching & Learning
  - Teaching Neuroanatomy
  - Taming the Mind & Body
  - Letting Classroom Boundaries Breathe
  - Honoring the Whole Student
  - Giving Voice to Emotions

- Structure of the Learning Environment
- Humanistic Organizational Culture
  - Safety

Emerging Neuroscience Knowledge

- Relationships

Outcomes

- Reduced Office Referrals
- Relationship-Based Discipline
- Academic Growth
- Primed to Learn
- Empowered Decision-Making
- Empathy
- Social Bonding
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)

Sociology of Radical Change

- Radical Humanism
- Radical Structuralism

Sociology of Regulation

- Interpretive
- Functionalism

Subjectivity
Objectivity
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.”

~5th 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.”

~4th Grade Teacher
“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.”

~5th 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.”

~5th 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.”

~5th 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.”

~5th 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.”

~4th 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.”

~4th 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.”

~5th Grade Teacher
# Climate Variables

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<th>Structure of the Learning Environment</th>
<th>Safety</th>
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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.”

~5th 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.”

~5th Grade Student

Social Bonding:

“We are a neuroscience family!”

~5th 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.”

~5th Grade Student
References


References


