WHEELHOUSE 1: MIND & BRAIN EDUCATION

Memory Systems: Working Memory

- What are the three memory systems operating in the classroom?
- What every teacher needs to know about Working Memory & Cognitive Load
- Three critical limits of Working Memory & Recognizing Working Memory issues
- Strategies to support students with working memory limitations (while supporting all students better)

Memory Systems: Long-Term Memory

- How are learning experiences, encoded, consolidated and retrieved?
- What are the three memory systems operating in the classroom?
- Types of Rehearsal & Memory
- Strategies to make learning "sticky"

The Adolescent Brain: Using superhero strengths and vulnerabilities to promote mental health & well-being

- Introduction to the Teen Brain
- The Social Teen Brain
- Teens & Risk
- Differences in teaching the Teen Brain

Attention in the Classroom

- What are the three systems of attention?
- Recognizing and diagnosing different attention issues
- Strategies: Different Types, Different Interventions
- The anatomy and evolution of attention.

Emotion Regulation in the Classroom

- Introduction to the Brain & Emotion
- What is emotion and where does it come from?
- Teaching Emotion Regulation
- Interconnectedness of Thought & Emotion

Motivation: The Science of Agency & Belonging

- Introduction to the Brain
- Growth Mindset, Autonomy, Competence and Relatedness to build agency in the classroom
- Flow Theory and the Importance of productive stress
- Strategies for before, during and after instruction
- Culturally Responsive Teaching and the Brain
- Stereotype Threat and motivation

The Science of Stress & Trauma Informed Teaching

- Introduction to the Brain and Stress
- Three Types of Stress and Practical Strategies for all Three:
  - Positive Stress
  - Negative Stress
  - Toxic Stress
- ACES, Trauma & Chronic Stress

How the EML Brain Learns: Using the science of language acquisition to support all learners

- Current research about how the brain learns language, with classroom-ready, field-tested strategies for teaching.
- How to better detect and diagnose language acquisition problems when they arise.
- The linguistic reorganization needed to acquire another language after the age of five.
- How STEM can provide great opportunities for equal access to learning.

Building Cognitive Schema through instructional Sequences

- How does the brain naturally build and deepen its conceptual understanding of the world and how can we build our instruction to support that?
- How can we use student prior experience as the foundation and springboard for all new learning?
- Practical teaching and learning strategies that move students from surface to deep to transfer
- Where do misconceptions come from? Why are they so persistent & pernicious.

WHEELHOUSE 2: SCIENCE INSTRUCTION

Introduction to the New State Standards *NGSS Approach*

- The Three dimensions & Performance Expectations
- The Eight Science & Engineering Practices (stations approach)
- What are Cross-Cutting Concepts?
- Why teach engineering & technology?
- Sequencing science instruction in ways that replace misconceptions and develop deep conceptual understanding
- The role of literacy & math

Science & Engineering Practices *for Secondary or Elementary*

We often do a series of 1-3 day workshops about implementing each of the following SEPs:

Practice 1: **Asking questions and defining problems**

- Using phenomena to inspire questions to drive learning
- Launch routines to illicit investigative questions (NGSX)
- Strengthen students' questions using the QFT Protocol
- Using literacy strategies to define engineering problems (Novel Engineering)
- Differentiating between the types of scientific questions in order to design investigations

Practice 2: **Developing and using models**

- When do we use models ? (Too big, small, expensive, dangerous etc.)
- Using Models like Scientists Use them (To Explain, To predict, To Test, To Improve etc.)
- Iteration - Critiquing & Improving Models
- Mathematical & Computational Models
- Modeling Progressions K-12
- Modeling in different science disciplines

Practice 3: **Planning and carrying out investigations**
- Different types of investigation require different planning models
- Scaffolding Tools & Approaches to build understanding of Investigation Design
- Designing Investigations
- Determining the type of evidence needed to explain a phenomenon or design a Solution
- Grade Level Progressions

Practice 4: **Analyzing and interpreting data**
- The Data Cycle (Planning, Collecting, Representing, Analyzing and Interpreting)
- Different Stories Different Graphs
- Certainty & Uncertainty in data (Scaffolding Strategies K-12 to move from visual to statistical models)
- Data Progressions K-12

Practice 5: **Using mathematics and computational thinking**
- Integrating Math & Science
- Mathematical & Computational Modeling
- Calculating Certainty & Uncertainty in Data
- Arguing from Mathematical Evidence
- Progressions K-12

Practice 6. **Constructing explanations** (for science) and designing solutions (for engineering)
- CER(J) Explanations
- Strengthening each component of the argument
- Scaffolding the development of written explanations (Highlighting, Graphic Organizers, Rubrics, Peer Critiques etc.)
- Moving from Drawn Explanations & Models to Written Explanations
- Progressions (K-12)

Practice 7. **Engaging in argument from evidence**
- Difference between the Argument & Argumentation + Centrality of Argumentation to all stages of science & engineering
- Scaffolding Strategies & Progressions
- Argumentation Protocols- The Tool should fit the Task (Card Sorts, Stay-Stray, Share-Trade, Agree Disagree Line)
- Strengthening Evidence & Reasoning

Practice 8. **Obtaining, evaluating, and communicating information** (incorporating literacy in science)
- Building A Culture of Talk (strategies for safety, belonging)
- Student Talk Protocols
- Evidence from Text & Active Reading Strategies
- Using Graphs to represent evidence
- Integrating Reading & Writing into Investigations
- Guiding Instruction vs. directing Instruction to elicit and deepen student thinking

The Cross-Cutting Concepts
- Cross-Cutting Concepts as lenses for Sense-Making during 3D learning
- Tools – Evidence Based Scaffolding Strategies to introduce, integrate and deepen thinking during investigations
- Progressions- Deepening thinking across grade-levels using the cross-cutting concepts
- Thinking Across Disciplines- Using the CCCs as tools for transfer and discovery

Elementary Science

Topic 1: The 5E Model of Instruction to build 3 dimensional lessons
Topic 2: Incorporating Science & Engineering into Your Literacy Lessons (e.g., Novel Engineering, Picture Perfect Science, Everyday Mysteries)

- Active Reading Strategies
- Scaffolding Explanation Writing
- Student Talk & Discourse Strategies

Problem-Based & Phenomenon-Driven Learning

- Choosing the right problem or phenomena
- Explore before Explain
- Designing Problem-Based Lessons
- Maintaining high content rigor while providing student choice
- Teaching across content/curricular lines
- Facilitating student collaboration (developing tools that work)

Fostering STEM Identity

- Explore the intersection of identity and science, technology, engineering and math
- Reflect on your own educational experiences and biases
- Investigate the impact of your STEM identity on your students
- Learn strategies to cultivate strong STEM identities in your students as well as yourself

WHEELHOUSE 3: NATURE AND ENVIRONMENTAL LITERACY

Summer Immersion Field Course

Every summer we offer a 3-day field experience for K-12 educators and their adult family or friends. This 3-day experience has a dual focus:

- To provide K-12 educators with an ecological and natural history experience that introduces them to local Colorado examples for science and social studies concepts they will be teaching in the classroom (e.g., ecology, botany, astronomy, history etc.).
- To introduce teachers to an environmental issue that is place-based and engage with that issue (e.g., invasive species, water management, etc.).

Teachers requesting re-licensure credit must follow-up by implementing a related activity with their students in the fall. The course also aims to lean heavily on "recreation" in the deepest sense of the word *re-creation*. More than ever, teachers need opportunities to be playful, be inspired and interact with peers on a heart level. Nature provides ample opportunities for this kind of healing and rejuvenation to occur.