Educational Neuroscience and the Future of School Innovation

A Presentation at the National Association of Independent Schools Annual Conference

February 2020

As you get ready for today’s collaboration:

Think about your school’s strategic initiatives. Where would you like to innovate?

Go to www.menti.com and use the code 23 98 05
The CTTL’s mission is to create and innovate in the field of Mind, Brain and Education Science research to allow teachers to maximize their effectiveness and students to achieve their highest potential.
Research informed practice: how we are doing compared to how we think we are doing.

A big dog that thinks it is a small dog.

A big dog that knows it is a big dog.

A small dog that knows it is a small dog.

A small dog that thinks it is big dog.

**Neuro-Educational Competence Index (NECI)**

**Self-reported knowledge and competence score**

What’s it going to take to get here?

Other schools

St. Andrew’s

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**Neuro-Educational Competence Index (NECI)**

**Self-reported knowledge and competence score**
Workshop Learning Objectives:
After completing this workshop I will . . .

● Understand the educational neuroscience research that every teacher and school leader should know today.

● Be able to evaluate my school or program’s mission and strategic thinking through an educational neuroscience framework.

● Have research-informed action steps for innovation that you can take back to your school or program.
Innovation in education or not?

Artificial intelligence
Change of a school’s daily schedule
Charter Schools
City as School
Classroom and space redesign
Data driven decision making
Doing away with Advanced Placement Courses (AP)
Flipped Classroom
Gender neutral bathrooms
Internships
Mastery Transcript
One-to-one laptops
Personalized Learning
Teaching strategies alongside content
Virtual reality
Whole Child School experience
WHAT DID WE MISS?
Why do schools innovate or Innovate?

Stay competitive
Gap in curriculum or program
Funder inspired
Prepare students for their future
Does knowing more about the research behind how the student and adult brain learns, works, changes, and thrives lead to greater innovations by teachers, schools, and school districts?
Steam Engine Moment – Technology (& Research) and Need

LEGACY
We are the first generation to understand how the brain learns and thrives.

How has teaching changed as a result?
How did research inform this schedule?
Mind, Brain, and Education Science

- Multi-Cultural Education
- Technology Integration
- Social & Emotional Learning
- Design Thinking
DIRECT INSTRUCTION vs. PROJECT BASED LEARNING

Project Follow Through

Cognitive Load Theory

Kirschner, Sweller & Clark

Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching
38% of feedback resulted in negative outcomes

Do you know what good feedback looks like?
**HOW SHOULD I STUDY?**

*Improving Student Achievement*

**Table 4. Utility Assessment and Ratings of Generalizability for Each of the Learning Techniques**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Utility</th>
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<tbody>
<tr>
<td>Elaborative interrogation</td>
<td>Moderate</td>
</tr>
<tr>
<td>Self-explanation</td>
<td>Moderate</td>
</tr>
<tr>
<td>Summarization</td>
<td>Low</td>
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<tr>
<td>Highlighting</td>
<td>Low</td>
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<tr>
<td>The keyword mnemonic</td>
<td>Low</td>
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<tr>
<td>Imagery use for text learning</td>
<td>Low</td>
</tr>
<tr>
<td>Rereading</td>
<td>Low</td>
</tr>
<tr>
<td>Practice testing</td>
<td>High</td>
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<tr>
<td>Distributed practice</td>
<td>High</td>
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<tr>
<td>Interleaved practice</td>
<td>Moderate</td>
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*Dunlowsky et al. (2013)*
Step 1: Select and read one article. Look for MBE vocabulary.

Step 2: Find a reading buddy and discuss the article.

Step 3: What would it take for you to produce an article for your school’s version of Think Differently and Deeply?
List of factors affecting student achievement, Hattie 2018

1. Collective teacher efficacy
2. Student expectations
3. Response to intervention
4. Student efficacy
5. Teacher clarity
6. Feedback
7. Direct instruction
8. Verbalization and questioning
9. Teacher-student relationships
10. Parental involvement
11. Writing programs
12. Computer programs
13. Homework
14. Classroom management
15. School leadership
16. Teacher education
17. School culture
18. School resources
19. Parent-teacher conferences
20. Peer tutoring
21. Mentoring
22. Tutoring programs
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Big 3 in MBE to get you on the pathway to innovation
Mind, Brain & Education Science (MBE)
What three things should **all** teachers, students & parents know about the learning brain?
Teachers are brain changers
(and can change their own brains)

Neuroplasticity:
The lifelong ability of the brain to change its organization as a result of experiences.
What three things should **all** teachers, students & parents know about the learning brain?
“‘Downshifting’ is a metaphor often used to describe how negative emotions cause us to process in our emotional center and lose focus on higher order thinking.”

Dr. Mariale Hardiman, JHU
## Adverse Childhood Experiences (ACEs)

<table>
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<tr>
<th>ABUSE</th>
<th>NEGLECT</th>
<th>HOUSEHOLD DYSFUNCTION</th>
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<tr>
<td>Physical</td>
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<td>Mental illness</td>
</tr>
<tr>
<td>Emotional</td>
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<td>Domestic violence</td>
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<tr>
<td>Sexual</td>
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<td>Divorce or Separation</td>
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<td>Incarcerated relative</td>
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<td>Substance abuse</td>
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<td>Alcoholism</td>
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Belonging Mindset > Growth Mindset
What three things should **all** teachers, students & parents know about the learning brain?
Eliminate neuromyths

TRUE – Research suggests we SHOULD do or believe this

FALSE – Research suggests we should AVOID doing or not believe this
1. Robustly supported by research evidence

2. Likely to have an impact

3. Doable

4. Impact is likely to be worth the effort

The Placemat — a common language & framework
An MBE-informed innovation journey

3 Stories
Influence of CTTL/MBE at Viewpoint School

- Competency-based faculty growth in Folio
- Commitment to Professional Development
- Chief Innovation Officer; shift in hiring criteria
CTTL Academy: MBE Language & Content (x4)

- MBE-aligned Individual Goals
- MBE-PLCs
- MBE-oriented evening Faculty Meetings
- MBE-informed practices: DEI, Classroom, Coaching, Residential
- MBE-based Collective Faculty Efficacy

TABOR ACADEMY
MBE-spurred Innovation
MBE Professionalizes the Profession of Teaching

- CTTL Academy
- Faculty led MBE professional learning
- MBE shared teaching and learning strategies
- Action research plans – using MBE strategies that work
- Partnership with Kristin Gagnier, Johns Hopkins University
- Marketing Collective Efficacy of MBE
- Challenges
MBE Needs Assessment

(1) Innovation
Where are there areas of challenge, interesting questions, or potential for growth?

(2) Strategies
What MBE strategies might help bridge this gap?

(3) Goals
What would success look like?
High quality professional development does this:¹

- Has a greater effect on student achievement than other school interventions
- Closes the effectiveness gap between novice & experienced teachers
- Improves retention problems
- Is a cost-effective intervention for improving student outcomes.

But needs this:²

- Focus on helping real students
- Based on robust evidence
- Includes collaboration & expert challenge
- Is sustained & iterative
- Is mindful of teachers’ limited time

And only 1% of pd meets this bar

DOES YOURS?

¹ Wellcome Trust (2020)
² Teacher Development Trust (2015)
Science of Teaching and School Leadership Academy
July 19-22, 2020

500+ public & private school educators from 23 states and 10 countries since 2017

www.thecttl.org

www.neuroteach.us