Topics for Keynote Addresses and Workshops

If It's Your Job to Develop Young Minds, Shouldn't You Know How Their Brains Work?

The brain is not only the most complex organ in the human body, but this "three-pound universe" has also been described as the most complex object known to mankind. Understanding how the young brain learns will help educators design classrooms that are "Brain-considerate" – where we capitalize on the brain's natural inclinations for learning. Joseph Epstein stated that "We are what we read." Neuroscientists, however, would offer a differing viewpoint highlighting that "we are what we *experience*" instead.

Young learners create meaning from content through what they *do,* when they are actively engaged in sense-making and constructing internal visual models of their world (not necessarily through listening, textbooks and tests). The mind *becomes* what the brain *does*. Deploying teaching methods aligned with "how the brain works" will enhance the results of your instructional efforts, as well as the learning outcomes for young learners.

With the latest discoveries in cognitive science, the human brain is regaining its rightful place as the centerpiece for all conversations about learning in the contemporary early childhood educational environment.

What You Should Know About How the Brain Learns

We have 100 billion neurons (the "gray matter" consisting of neural cell bodies). Their primary purpose is to connect brain cells together into the circuits that represent who we are, what we know, and what we are capable of doing. Inside the brain, there are over 1,000,000 miles of nerve fibers (the "white matter" connections), with over one quadrillion connections that link neurons with one another. Through this process, we develop remarkable abilities for making sense of an ever-changing world. In his book *The Mind's Best Work*, Harvard educator David Perkins says, "Good thinking is a matter of making connections, and knowing what kinds of connections to make." Deep and long-lasting connections occur as a consequence of deploying effective brain-considerate instructional strategies.

Teaching skills and concepts in isolation, and independent of *how* they are connected to concepts from other subject areas does a disservice to both the learner and to the knowledge at stake. Our academic "silos" frequently prevent our students from appreciating the content-area linkages, the conceptual connections, and the shared vocabulary (the polysemous context-dependent words). Most important, the overarching educational goal is to teach students how to *think* and solve problems utilizing the contents of a robust "cognitive tool chest." When students learn *how* to put their knowledge to useful advantages, they enjoy learning and the accompanying "ah-hah" experiences that literally change neurological architecture.

The “Learning by Connecting” strategy fosters the development of long-term white matter connections in the brain. Students must actively *connect* key concepts *across* different academic disciplines, understanding that each discipline is part of the same “whole.”

From a biological perspective, enhanced learning is a matter of maximizing those brain connections for what we characteristically refer to has *knowledge*. In his book *Consilience,* Edward O. Wilson the father of “Sociobiology” observed that everything in our universe is related. By softening the borders between subjects, skills, concepts and academic disciplines, as we look for conceptual relationships, students navigate the academic world successfully. Academic subjects should not be delivered à la carte items on the knowledge menu, but rather as ingredients mutually enriched by one another.

It has been said that by the year 2020 the sum total of humankind’s knowledge will double every 73 days. The principles of human learning grounded in the cognitive neurosciences will survive this information explosion, only if we re-focus our attention on making connections across the disciplines. This presentation will highlight the brain-considerate principles and strategies for bridging cross-content understanding.

How the Human Brain Learns

Recognizing that there is no endeavor more vital to our future than educating young minds, pre-K to university-level faculty members and administrators should be well-versed on how the human brain “works.” Just as medical efficiency was enhanced once medical practice was grounded in biological science, effective educational practice should be informed by cognitive science. It is increasingly apparent that cognitive neuroscience should serve as one of the keys to successful classroom instruction.

Dr. James Appleberry predicted that knowledge and information will double every 73 days by the year 2020. Factual information multiplies exponentially and is quickly outdated. Teaching students via rote and memorization will not prepare them for an ever-changing world. However, the reliable principles of neuroscience will survive all tests of time. This presentation will highlight the application of brain-considerate strategies in the context of the contemporary educational environment.

The Neuroscience of Learning: What Works, What Last, and Why?

It has been said that the next great journey for humankind will not take place in intergalactic regions of *outer space*, but inside the inner space of the human brain. Neuroscience offers educators a window into the cerebral "inner space" of the biological mind. We find that movement and play not only relax the entire body-brain system, but they can enhance learning results for both children and adults. By merely standing up, we send 5% more glucose to the brain. Even better, movement increases that figure to 15%, which is a significant cognitive advantage. In this conversation about learning and the brain, we will discuss “what works, what lasts, and why” based on what we have learned recently about movement and the human brain from research.

Experience: The Brain's Most Powerful Influence

Although a famous author once said, "you are what you read," evidence-based research from cognitive science informs us instead that "you are what you experience." Our past experiences not only shape who we become, they also literally shape the very architecture and processing idiosyncrasies inside each human brain. While some behaviors are genetically predetermined, others are experience-dependent. To the brain, practice does not make "perfect." Instead, repeated practice makes *"permanent"* neural circuits that preserve memories of what we have experienced, and determines our future learning capabilities. It has been said that knowledge and information will be doubling every 73 days by the year 2020. The mountain of available factual information increases daily, but specific facts are easily forgotten. However, our experiences will determine our thinking and behavior for a lifetime.

How the Young Brain Develops

It has been said that the next great journey for humankind will not take place in *outer* space, but within the *inner* space of the human brain. The latest brain research permits childcare providers and educators a better understanding of what occurs inside the walls of the human cranium, also referred to as the cerebral "inner space" of the biological mind.

All childcare providers and parents should be familiar with the brain science behind early development. Whatever role you play in the life of a developing child, is a key role in the world's most awesome responsibility, which is educating our next. This presentation will focus on recognizing the most important indicators of healthy child development.

Phenomena-based Science and Language Development

Contemporary surveys reveal that "boring" is the most dominant single-word description that students give for education. In our technology-rich and highly-visual world, student engagement and achievement are enhanced through exciting phenomenon-based learning (PhenoBL), where they examine real-life scenarios, which are investigated through a wide interdisciplinary lens. According to Vygotsky, language grows out of interactions with objects and with others. Through these social-experiential learning interactions, language competency develops quickly, naturally, and deeply.

Current research tells us that the human brain learns best when it digests information that is intriguing and relevant. In PhenoBL, the student investigations, discoveries, conversations, questions, and explanations build vocabulary, conceptual knowledge, and critical thinking. As a result, Pheno-BL has been implemented throughout Finland, a country consistently recognized as among the world's highest achieving nations.

Participants in this workshop will learn how to merge the CCSS E/LA standards and the Next Generation Science Standards into brain-considerate phenomenon-based learning experiences.

Why Is Hands-On Learning More Powerful Than Technology?

During embryogenesis, the sense of touch is the first to develop in a fetus. Later, touching objects and being touched by others are essential experiences for healthy child development. Despite the recent advances in technology, hands-on learning is not optional for brain development. The multisensory experiences of touching, feeling, dialoguing, and seeing allow pediatric populations to learn about the object-filled world around them. These are compulsory experiences that cannot be substituted by representations on a screen. Instead, neural crossroads link the senses together permitting us to see in the "mind's eye" (imagine) that which we have touched, shaping some of the most essential circuits in a child's brain that will be used later for merging with language, reading, and abstract thinking. Although children enjoy the color, movement, stimulation, and immediate feedback derived from technological devices, the 10 digits on the human hands are the original "digital devices" by which children learns best.

Developing Academic Language through Student Engagement in Science

Research has found that approximately 13% of our students are auditory learners, who learn best by listening to others (typically the teacher). We are also aware that the most dominant contemporary teaching method deployed in schools is direct instruction, which likely does *not* meet the learning needs of 87% of our students. According to David Perkins at Harvard University, the human brain learns best when students can use their language skills while engrossed in active learning experiences.

Developing Academic Language in the Context of Learning

The recent advances in neuroscience give educators a new window into how the human brain learns language. The 19th and 20th century premises upon which language is still taught warrant re-examination and revision based on the research from the past decade. Yet our distant history continues to haunt contemporary classrooms.

While there are an infinite number of well-grounded teaching methods for language, some "brain-antagonistic practices still dominate our schools despite this rising reservoir of knowledge from cognitive science. Educators should become acquainted with *why* some teaching approaches are uniformly successful, while others lead to both teacher and learner frustration. *How* the human brain "works," how it learns language, how it makes the transition from informal to academic language for all basic understanding for today's classroom practitioner.

This presentation will highlight the following:

- How the human brain learns - effective learning strategies for all students
- How the Human Brain Learns Best: Knowledge is Making Connections
- The role of language in school: Moving from social-informal language to formal language, and from formal language to academic language mastery in the context of doing (not just reading)

Developing Academic Language through Science and STEM

Research has found that approximately 13% of pupils in an average classroom are auditory learners, who learn best by listening to others (typically the teacher). Consequently, we know that the dominant teaching method used in most schools is likely *not* meeting the learning needs of 87% of our students. According to David Perkins at Harvard University, the human brain does its best work when students are learning language by *doing*, not by passively listening to others use it.

We learn academic language best while actively engaging in evidence-based discourse and dialogue (argumentation) serving as the instructional centerpiece, where the development of academic language occurs in the context of doing, rather than listening. This approach is a drastic departure from traditional 19th and 20th century educational delivery. In this seminar, we will focus on *how* the human brain "works," how it learns language, and how it makes the transition from informal/everyday language to academic language easily and effectively.

Reengineering Classroom Instruction to Highlight STEM Throughout the Day

The most effective way to incorporate STEM into daily instruction is by identifying where and how the current school curriculum lends itself towards STEM and ST^{2}REAM (science, technology, thematic instruction, reading, writing, engineering, art/visualization, and mathematics) in the classroom. Many of the Common Core Reading/Language Arts and Mathematics standards reinforce elements of the ST^{2}REAM approach to STEM instruction. Innovative STEM applications guarantee student engagement. Content from other the entire curriculum can be linked together with real-world challenges that provide a thought-provoking, stimulating, and memorable student learning.

Play and Science Together

Jean Piaget was fond referring to play as the "serious business of childhood," although play relaxes the entire body-brain system, which makes learning easier for both children and adults. Play involves explorations, trial-and-error, discovering systems, making connections, searching for viable explanations, participating in discourse about what's right, what's wrong, and why, which are all similar to what scientists do. Scientists apply the strategies they have found to be productive in their problem-solving endeavors and abandon the more fruitless ideas, just as children do when they are learning about the world around them.

Play encourages the production of emotional memories, which are among the strongest memories of all. Deep and long-lasting learning begins with positive emotional engagement. For all learners, cognition begins with emotions serving as the primary drivers of attention. It is neurophysiologically impossible to learn something that the brain has not pay attention to beforehand, but it all begins with emotions. When children learn in a fun and engaging context, they are often so swept up in the challenge, excitement, and enjoyment that they are oblivious to a ringing bell. The positive emotional intensity brought on by the excitement of playing, learning, and discoveries generates nonstop "Ah hah!" moments in the classroom. Antonio Damasio describes these learning conditions as the maximal harmonious states, where young

minds are operating at higher levels of speed, ease, and efficiency collectively sponsoring an increase in new memory formation.

It should come as no surprise to elementary school teachers that students gravitate towards nearly any opportunity to engage in active science experiences. Young learners are easily absorbed in their own thoughts and reflections as they try to understand science. They should be similarly immersed in learning how to read and write effectively in science, how to use mathematics in science, and how to utilize the wealth of today's available resources in order to validate and support their explanations in science. If we are not making science engaging, challenging, and fun for children, then we may be closing the window on learning in science for a lifelong.

Access and Equity for All Students

We often hear educators declare, "I teach algebra," (or another academic subject). However, more accurately, you teach *students* not disciplines. Today's students arrive at our classroom doors with an increasingly broad range of backgrounds and a correspondingly wide range of learning needs. Our instructional focus is taking a radical turn away from the old model of planning instruction for a homogenous group of students who we "teach by telling." In its best moments, that model could not be stretched to cover the contemporary classroom diversity. Futurist Alvin Toffler said that we must "learn, unlearn and re-learn" our craft in order to be effective teachers in 21st century classrooms. We have a choice: Teach students how *we were taught* or teach students how *they learn,* recognizing that "one size" does not fit all learners, and candidly conceding that it never really did. We cannot choose the students we want, but we can choose the methods by which we reach the students we get.

Developing Early Literacy through Active Learning Experiences

A growing body of research indicates that competency in reading, writing, speaking, and listening turns out to be among the strongest of all predictors of success in school and life. The window for effectively mastering language skills remains open during the early years of life and formal education. Cognitive neuroscience also tells us that early deficits lead to still *more* deficits, which often become increasingly more difficult to overcome each subsequent year. The most effective remedy we have found is early intervention that offers a wealth of active language production experiences where students use language while in the context of *doing*, not merely *listening* to language. "The one who does the work does the learning," plays itself out in classrooms were a highly-verbal (talkative) teacher continues to refine his/her language skills instead of the students. This workshop will highlight how language is most effectively developed through active learning classroom experiences.

Social Emotional Learning: Linking Emotions and Formal Education

In both education and in social science, a guiding principle for assessing human motivation and behavior has always been that one could be either intellectual or emotional -- a binary choice. However, contemporary cognitive research informs us that understanding and managing one's emotions can significantly impact his/her classroom learning, goal-setting, perseverance, decision-making, empathetic and productive social interactions, conflict resolutions, as well as normal human development, which are all factors contributing to academic success. Some would say that they are *determining* factors, not just contributors. Today, we refer to them collectively as the components of social and emotional learning (SEL). While the social aspect of learning has been undeniable for decades, we are now also acknowledging that the *emotional* element of learning governs if, why, how, and when student achievement flourishes or remains elusive for many youngsters.

One of the guiding principles in educational psychology tells us that maximizing student learning and engagement, hinges on a student's perception of whether or not he/she is able to navigate safely within a positive and supportive school climate that is committed to his/her well-being. Cognitive development can be stunted when fear, stress and anxiety describe a school's general climate. Similarly, cases of extreme emotional deprivation or stress can result in psychogenic dwarfism in children ages of 2 and 15, where physical growth is severely curtailed due to emotional neglect and long-term stressful living conditions.

Recent research has shown that there is consistently a correlation between academic performance and SEL learning spaces with physically and emotionally safe environments for students. Teachers benefit, students benefit, and student achievement improves. For the past two decades, several of us have proposed the formula that "emotions drive attention, attention drives learning, and learning determines memory." It is worth noting that in every classroom (1) all learning is a *social* experience (transpiring between students and teachers, as well as between and among students) and, (2) all memory formation is initiated by *emotions*. Lectures do not necessarily precede learning – – it is one's emotional connections to the lecture that lead to learning.

Most importantly to all stakeholders in American education, SEL addresses the competencies and skills that we will need to cultivate in our students, if we want them to be successful as global citizens and adults in a 21st-century interconnected world. Parents, educators, administrators, staff members, and community partners must work collectively to elevate SEL into the daily school experience of every child with as much importance as we have granted the "3 R's," since the latter explicitly depend upon the former.

Brain-STEM: Merging STEM, Common Core, and the NGSS

The human brain learns by making relevant connections, which is why cognitive scientists contributed to the development of the Common Core, the Next Generation Science Standards, and STEM education. Today's educators are undertaking the unprecedented challenge of digesting and implementing these three reform initiatives simultaneously, but in isolation. STEM is best delivered via a "ST^{2}REAM" model where Science, Technology and Thematic instruction, Reading/LA, Engineering, Art and Mathematics are conjoined through

meaningful interdisciplinary learning experiences. The acronym STEM should stand for "Students and Teachers Enjoying every Minute" of the school day, because content is finally connected and the content suddenly makes sense!

S.T.^{2}R.E.A.M. – A "Brain-considerate" Model for Student Learning

Once our students leave school, they often discover that real-world problems are almost invariably solved through an adaptable transdisciplinary process focused on the nature of a problem. It is not limited by the artificial constraints imposed by the content-area boundaries of any single subject area. Instead, solutions typically come by way of simultaneously utilizing our accumulated knowledge and skills from *all* of the S.T.^{2}R.E.A.M. (Science, Technology, Thematic instruction, Reading/Language Arts, Engineering, Art and Mathematics) disciplines. Combined, S.T.^{2}R.E.A.M. is not merely a collection of academic disciplines, but instead represents an instructional approach that mimics how professionals solve local and global challenges, where all of our cognitive resources converge to serve our "applied human knowledge." The defining goal of formal education is not the *accumulation* of knowledge, but an understanding of the *applications* of knowledge.

If we hope to cultivate students who can solve problems in the future, then we must reorganize our educational delivery approaches to match the thinking processes regularly deployed by contemporary innovators and problem solvers. The S.T.^{2}R.E.A.M. model embeds student learning in active long-term investigations that are experience-rich, language-rich, and print-rich.

According to several sources, "…no one has delivered more STEM keynote addresses and seminars at state, national, and international conferences" than our presenter, Neuroscientist Kenneth Wesson (see attached brief bio). Participants in this workshop will learn how to merge the CCSS E/LA standards, the California ELD standards, and the Next Generation Science Standards into engaging, brain-considerate, student-centered learning.

Creativity and Innovation in the Classroom

Humankind has transitioned from the agricultural age to the industrial age to the information age. We are now well into the second decade of the "Innovation Age," yet creative thinking remains the bridesmaid to "standardized" thinking in most schools. However, according to the Global Entrepreneurship Monitor, there is an inverse relationship between high test scores and entrepreneurship/creativity. Moreover, creativity ("CQ") turns out to be three times more accurate as a predictor of lifetime accomplishment than IQ. The students who learn how "to play with ideas" to generate *newer* ideas are destined to accomplish far more than their less creative classmates.

Art, Creativity and the Human Brain

We are now well into the "Innovation Age," but creative thinking is still taking a backseat to "standardized" thinking in many of our schools. However, according to the Global Entrepreneurship Monitor, there is an inverse relationship between high test scores and entrepreneurship/creativity. Moreover, creativity ("CQ") turns out to be three times more accurate as a predictor of lifetime accomplishment than IQ. The students who learn how "to play with ideas" to generate *newer* ideas are destined to accomplish far more than their less creative classmates. Creativity, innovation, and art are inextricably interconnected. For 21st century success, our students must learn inventive thinking, and art is among the most powerful means by which we make thinking visible. It has even been said that good poetry "paints pictures in the mind." If poetry at its finest paints pictures, then what is art at *its* very best? In this conversation, we will explore the power of art and visualization.

Developing Curious Minds and Creative Thinkers for the 21st Century

Dynamic changes are occurring at unprecedented rates in a world that is information-rich, highly visual, and interconnected "flat" necessitating more flexible, adaptive, and innovative thinking than ever before. Today, we are exiting the "Information Age" and entering the "Innovation Age," where inventive minds will be at a premium. Yet, creative thinking is still superseded by "standardized" thinking in many of our schools, due to an over-expanded preoccupation with assessment scores. Moreover, creativity ("CQ") turns out to be three times more accurate as a predictor of lifetime accomplishment than IQ. Our economic future as a nation is linked to CQ more than it is to IQ. According to the Global Entrepreneurship Monitor, there is an inverse relationship between the high test scores that a nation produces and it's entrepreneurship and creativity. For 21st century success, our students must learn to think rather than to just remember what they were told. They will be called upon to solve problems that do not exist yet. Only the creative thinkers will be able to "see" the solutions.

The students who learn how "to play with ideas" in order to generate *newer* ideas are destined to accomplish far more than their less creative classmates. Creativity, innovation, art, and visualization are inextricably interconnected. It has even been said that good poetry "paints pictures in the mind." If poetry at its finest paints pictures, then what is imagination at *its* very best? In this conversation, we will explore the power of creativity and visualization.

Understanding School Shootings and What We Can Do to Stop Them

On February 14, 2018, Stoneman Douglas High school (FL) unenthusiastically joined the notorious list of schools where students and teachers have been senselessly slaughtered. Some commentators pronounced that "it's too soon" for us to engage in another debate about gun control and proposals to put an end to the all-too-frequent campus shootings. For 17 distraught Florida families, it is now entirely too late.

School shootings are of greatest concern for two reasons. First, they occur more frequently in the United States than any other developed country on the globe. Second, they always involve defenseless young victims, who seldom have had any previous interaction with their killers and with whom the killer has no known grievance whatsoever. Educational institutions are now the 2nd most at-risk location for mass killings in the US.

Collectively, school shootings have prompted several questions in search of honest and creative answers:

1. What do we know about the legal weapons used most often, and how do we keep them out of a shooter's hands?
2. What have we learned about *who* is most often a school attacker?
3. What proactive measures can we take to reduce or eliminate the growing numbers of school shootings?

In this session will explore the contemporary "best answers" to these three critical questions.

Developing 21st Century Learners in 21st Century Safe Schools

Over the past millennium, humankind has transitioned from the Agrarian Age to the Industrial Age to the Information Age, and now to the *Innovation* Age. During the past two centuries, American educators instructed students on the "3 R's" as a means of adequately preparing them for a role in an industrial economy. In 2005, the 21st century skills initiative was launched to recalibrate our educational goals and to match the needs of our contemporary "interconnected, flat, and technology-driven" world, where everything had changed immeasurably, accept our schools. Today, corporate and educational leaders are nearly unanimous that the "Four C's" (critical thinking, communication, collaboration, and creativity) should supersede the "3 R's" in getting our students ready for the future rather than the past.

Equally important, learning 21st century skills and competencies must take place safe school environments. College and career readiness has become the new mantra of most educational institutions. However, our students' ability to learn these new competencies will be compromised the school environments are not safe places to for them to learn.

This workshop session will focus on how to make your schools can become "21st century safe schools," where our new academic goals converge with plans for safe "learning spaces."