**Neurodevelopmental Disorders**

**Presentation and Discussion Note**

**Tommy:  Clinical Neuroscientist, develops game for neuropsych development, VR classroom interest, assessment**

**A lot of his background is working in medical centers doing assessments looking at cognitive function, decision making, academic achievement and personality.**

**Neuropsych Assessment 1.0**

**The most important part is that these neuropsych  tests have been given millions of times with excellent standardization**

**Disadvantages of testing – these tests do not involve technological advances OR relevance to real-world functioning**

**Standardized testing is not keeping up with the technology.**

**Question: Neuropsych assessments grew out of the need to understand what was happening in the brain as far as difficulties, lesions, etc.**

**Answer: Role of Psychologist changed with the advent of brain scans to look more at real world functioning.**

**Neuropsych assessment 2.0 (past 30 years)**

**Used for return to play and deployment of military groups. These tests have millisecond timing accuracy, response/reaction times, and are reliable**

**WAIS-IV now on iPad – they are not very sophisticated but no stopwatch**

**Virtual classroom for kids with autism and ADHD – allows them to assess in an environment and then take them to the environment for real world validation**

**Most work is still in the lab stage. Becoming more affordable**

**Two types of Assessments**

**Construct Driven – i.e. Stroop test**

**Function Led – behavioral assessment i.e. Iowa Gambling Task**

**Works to make the environment multimodal including olfactory and auditory as well as visual and sensory/feeling. Still must have the paper and pencil type measures and also have EEG, eye-tracking and ANS.**

**Neuroscience Rationale – alerting, novelty, etc**

**ADHD kids – hot and cool executive functioning – DLPFC, IFC, dACC, SMA are cool, Hot, Lateral OFC, VM OFC**

**Neuropsych Assessment 3.0 – Conners or other classroom tests. Virtual reality based to assess real world classroom functioning. Can look at cold processing but also real world function (hot)**

**This gives us a lot more data than paper and pencil especially with eye tracking technology**

**Pilot test: compared neuropsych 1.0, 2.0, 3.0 with 10 ADHD kids and 10 TD kids**

**Conners 2.0 gave significantly fewer commission from 1.0; 3.0 gave more errors with ADHD kids but not TD kids, also slower response time with ADHD. Better data**

**Hyperactivity – picked up head, arm and leg movement – found ADHD kids had many more physical distractions than TD kids**

**ADHD Movement shows significant differences in a 10 minute computer task during task when recorded in VR situation**

**Control missed 1 out of 200; ADHD missed 51 out of 200 on average**

**Social cues from teacher aid kids with ADHD but not autism**

**New study just beginning: EmpowerU Webportal – this is a collaboration with Tommy and Lin that allows us to look at learning virtually**

**QUESTIONS:  Same behavioral presentation can have different neural situation – do you see that these tests can be used with adults as well as children? That is the big hope to make workspaces more conducive.**

**What is the next step in the classroom?  Hopefully, it will inform teachers so they can make accommodations that will truly help. Possibly SMART intervention. This is not a training instrument but gives parents/teachers more information**

**Are teachers given recommendations? No, just informed of student’s performance**

**Is the testing bilingual? Yes, it was not difficult to change audio files. Another future thought is to have the virtual teacher signing for hearing impaired students**

**Lin Lin   Media Multitasking**

**She read Tommy Parson’s work and felt it was very good as a foundational basis**

**Very important field because students may be bored, distracted or overloaded; teachers don’t know what to teach, are told what to teach and when and are overloaded preparing students for standardized testing**

**We are all multi-tasking; schools are no different and students are overloaded**

**Are we capable of multitasking? At best, limited; at worst, impossible**

**In the learning environment, multitasking alters brain’s learning processes**

**Without distraction the hippocampus was involved**

**With distraction, the striatum is involved but hippocampus was “busy”**

**Heavy media multitaskers performed worse on task switching than light media multitaskers**

**Human Multitasking: dual task, task switching, polychronicity**

**Some tasks you can easily do but others you cannot**

**Multitasking factors: culture, habit, impulse; conflicting needs over a short period of time; perceived efficiency; technologies**

**Cognitive load, tasks involved, expertise and automation, age and gender all make a difference in ability to multitask**

**Age and gender differences are still not very clear**

**Cognitive overload in teaching and learning: intrinsic load – new info, extraneous load – load from teaching/information, germane load**

**Media Multitasking and Expertise Study – 1. Read only; 2. Read with video playing; 3. Read and watch video to be ‘tested’ on both**

**Results: the experts scored better than novice, all groups performed slightly better with background condition, all did worse in double test condition. Then looked at two different background conditions – 1. News 2. Sitcom – The two videos affected reading comprehension differently – the news interfered more severely. Performed best with news background but when told they would be ‘tested’, performed much worse with news background.**

**Note taking in the classroom – if students review notes after taking, they do better. Just taking notes may be distracting; Note taking on paper vs computer – no distraction – better with written notes, with distraction (auditory only) computer did best, all did worse with audiovisual**

**Gender and ADHD factors on media multitasking – girls with ADHD reported highest media multitasking, boys with ADHD reported lowest, TD moderate media multitasking**

**Learning and Research Paradigms – instrumental knowledge – empirical-analytical; Practical – interpretive; emancipatory knowledge – critical learning**

**Changing learning environments – game-bases, flipped classroom, etc…**

**Technology can be positive or negative**

**Our question: How do we design rich, interactive, and challenging learning environments using technologies in a positive way in the classroom?**

**Jacque Gamino – SMART middle school program**

**Center for BrainHealth – focused on healthy brain development, brain injury and disease looking across the lifespan, studies in brain injury, athletes, soldiers, alzheimers, stroke, teen reasoning**

**Focus on the frontal lobe – higher-order cognitive command center – planning, judgment, decision-making, emotions, reasoning, novel thinking**

**Frontal lobe integrity separates us from all other species**

**Education and wiring the brain – elementary school requires memorization, but kids begin to think that all learning involves memorization**

**Middle school – initiates deeper processing**

**High School – depth of processing increases**

**Information processing – top down vs bottom up**

**Elementary school is bottom up – focus on details, basics and memorization**

**Kids sometime continue to use bottom up well into adolescence causing them to overload working memory**

**Top-down pushes global gist-reasoning which requires synthesis of world knowledge with new facts**

**Bottom up – details without context**

**Top Down – context then details**

**Important aspect for teachers especially from middle school and beyond**

**Top down – synthesis of world knowledge, inferencing, beyond explicit facts, understand gist**

**Gist-based concepts continue to develop well into old age**

**Wisdom is really the ability to connect the dots and think in a global manner**

**Brain undergoes significant changes in adolescence**

**The most significant changes are in the frontal lobe**

**ADHD – at least 3-5% of kids diagnosed**

**TD kids gist-based concepts evolve much more quickly than ADHD kids**

**ADHD kids recall details at the same rate but cannot synthesize information as early as TD peers**

**Study with UTSW – ADD and ADHD kids – one on one, randomized into SMART training, others in Pay Attention program which taught kids to focus with distractions in the background. SMART taught top down processing and gist reasoning. SMART was better at teaching kids to determine the important/critical facts.**

**“No Rich Child Left Behind”  J**

**Wealth of information has not made kids smarter but has caused information overload as they don’t have the skills to block out the unimportant information**

**Went into DISD schools – memory strategy group, brain information group, SMART group**

**Nearly all of the kids in this low SES school looked like ADHD kids even though there was no diagnosis**

**The SMART group showed significant change. The other students did only slightly better.**

**Question: Are the tests exactly the same as the training? No, the tests are broad enough to challenge higher level skills. SMART program gets kids to think about higher level skills.**

**TAKS test scores from ’08 – ’09, same kids went from average score of 2200 – 2340**

**Returned to give SMART training to all students in the classroom. Low SES 8th graders ended up higher than private school controls.**

**Funding allowed them to go to 30 schools in DISD.**

**If you understand the big picture, you remember the important details as well**

**Kids from poverty improved almost to the point of students not in poverty**

**Expanded project even further and now have reached 30,000 students in several states.**

**Teach the Teacher model – teachers come for a week in the summer and are trained on SMART strategies.**

**Standardized testing improved significantly in Reading STAAR compared to kids without SMART trainging**

**SMART community schools that train all teachers, parents and entire school staff**

**Action Items:**

**How do we consider efficacy of measures in both near-future and far-future?**

**Teachers who are underperforming in the classroom and unable to support fidelity of SMART program**

**Outcome measures – consider whether there are shared outcome measures or principles that we could all agree are appropriate and show growth**

**Are there specific neurospsych assessments that would inform across different strategies/studies in classrooms? One would be the Stroop task, but need tests that are gold standard with reliable validity**

**There are a lot of reliable tests in education although they are not valid**

**Collecting data in a school district is messy, difficult and in the long-term really challenging to verify the validity of the implemented program**

**Language structure assessment would be a great way to focus on brain development in the early years.**

**Look at language level of materials in your research**