Middle School Brain Years
Critical Period for Critical Thinking

Sandra Bond Chapman, PhD

Chief Director,

Dee Wyly Distinguished Professor

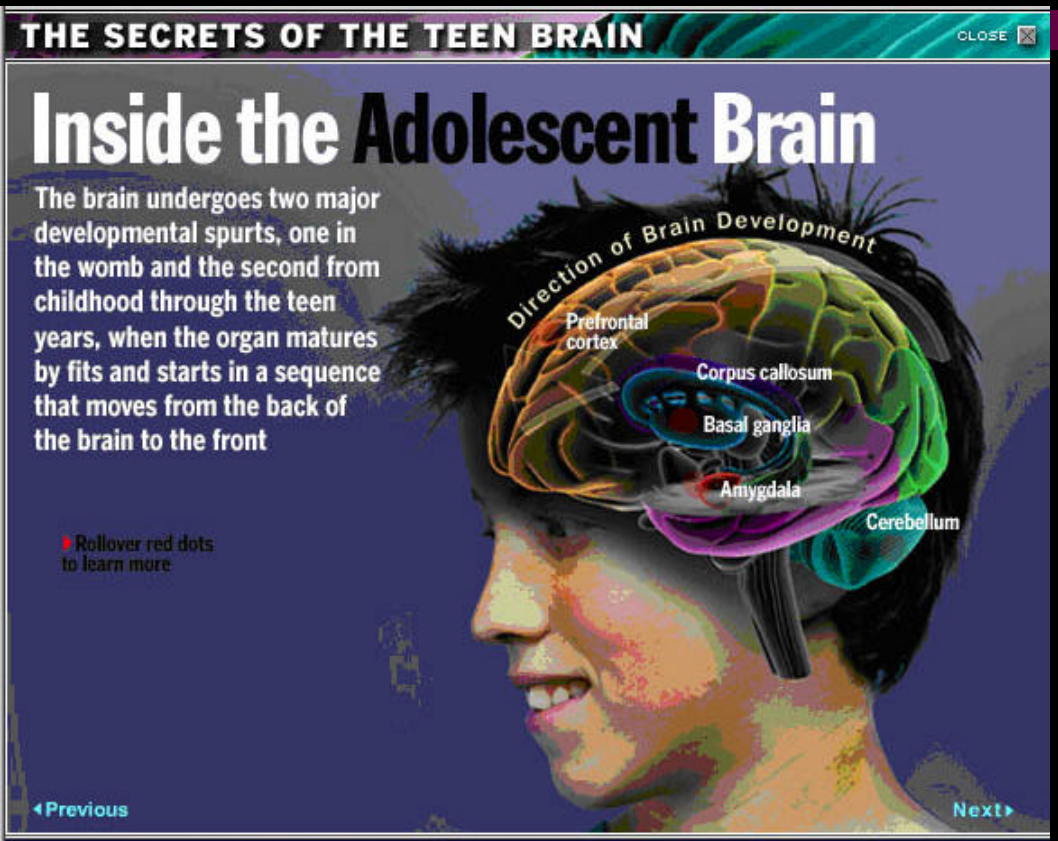
Behavior and Brain Sciences

centerforbrainhealth.org

214.905.3007

center for BrainHealth®
The University of Texas at Dallas

Science Reveals: Adolescence is a pivotal life stage to gain ability to:

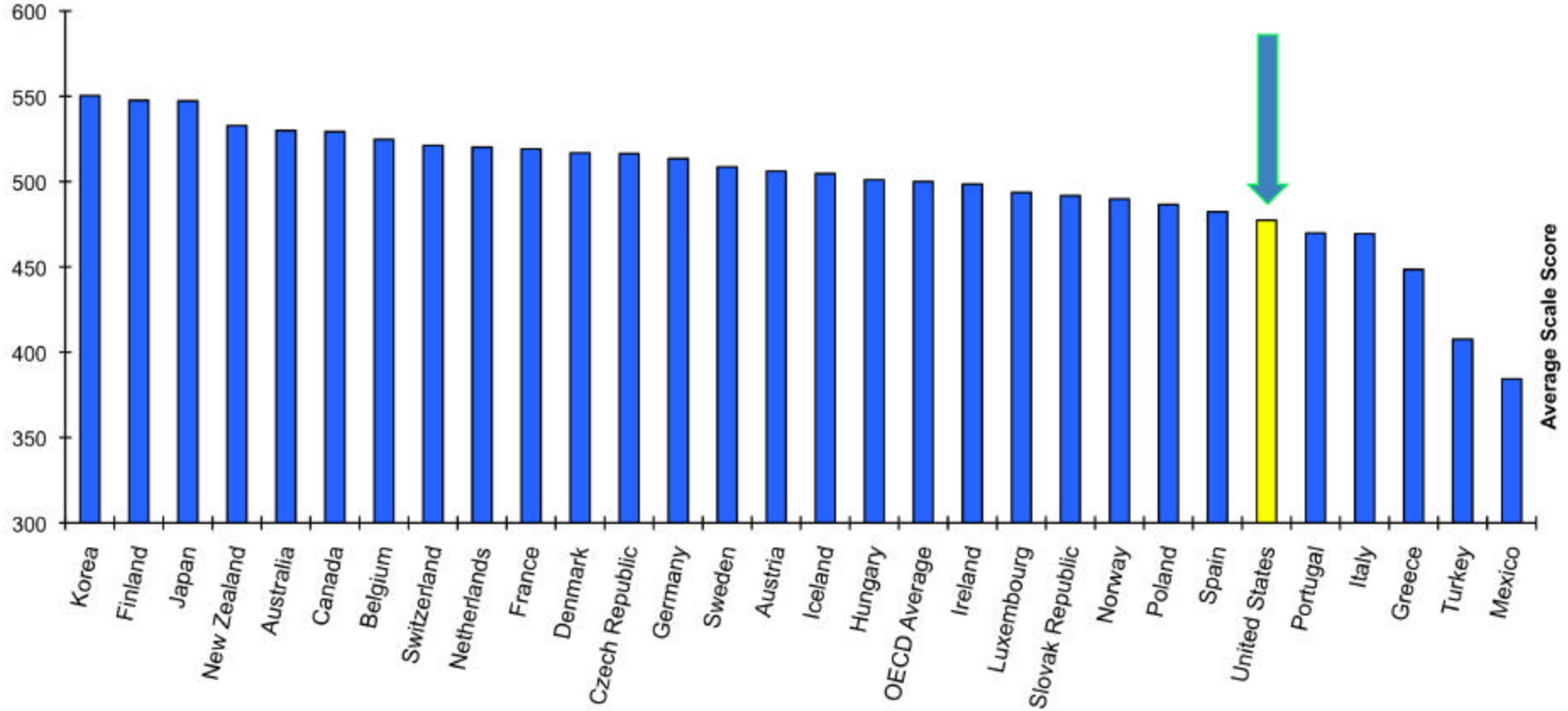


- Think for self
- Learn to use strategies
- Planning behavior
- Cognitive flexibility – fluid way to solve problem

The Dark Hole of Education

center for BrainHealth®
The University of Texas at Dallas

Critical Thinking: US Ranks 24th out 29 Developed Countries



Source: NCES, 2005, International Outcomes of Learning in Mathematics, Literacy and Problem Solving: 2003 PISA Results. (Program for International Student Assessment)

center for BrainHealth®
The University of Texas at Dallas

Goals

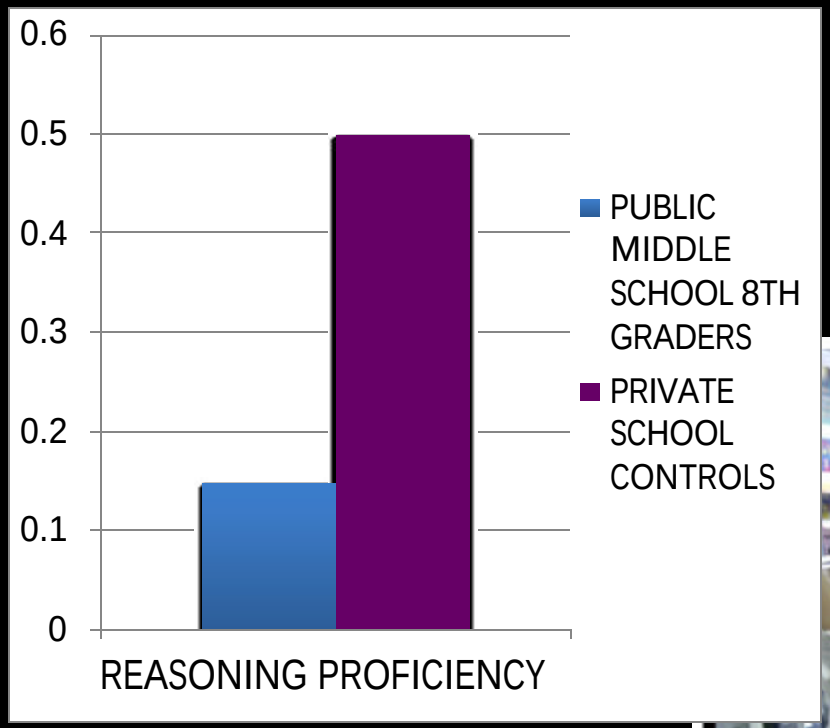
- To detect the prevalence of developmental stall in teen reasoning
- To seize the critical window of opportunity to train reasoning in teens
- To determine innovative ways to deliver training on a large scale bases
- To measure associated brain change, school performance, and other indices of cognitive function/learning potential

center for BrainHealth
The University of Texas at Dallas

Middle School Brain Years Project

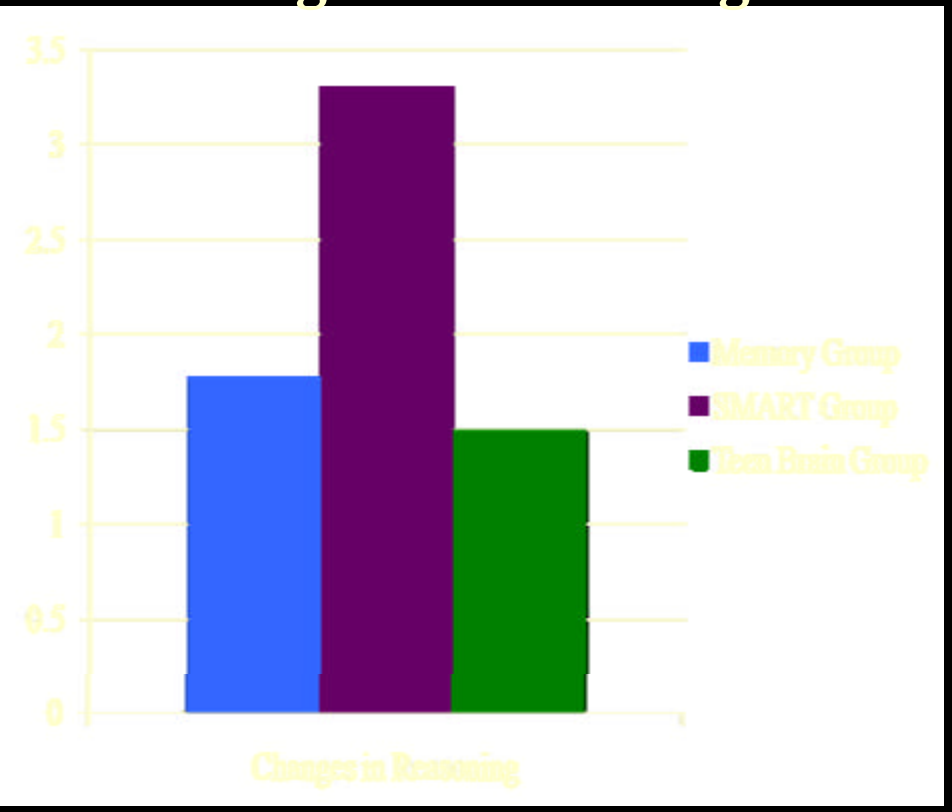
- 54 students in 8th grade assessed for reasoning ability
- Only 14% met age-based criteria for proficient reasoning ability
- Students randomized into 3 intervention groups (18 students/group: 10 boys, 8 girls)
  - 1 SMART Group
  - 1 Basic Memory Strategies Group
  - 1 Teen Brain Group

Performance Before SMART
(Strategic Memory and Reasoning Training)

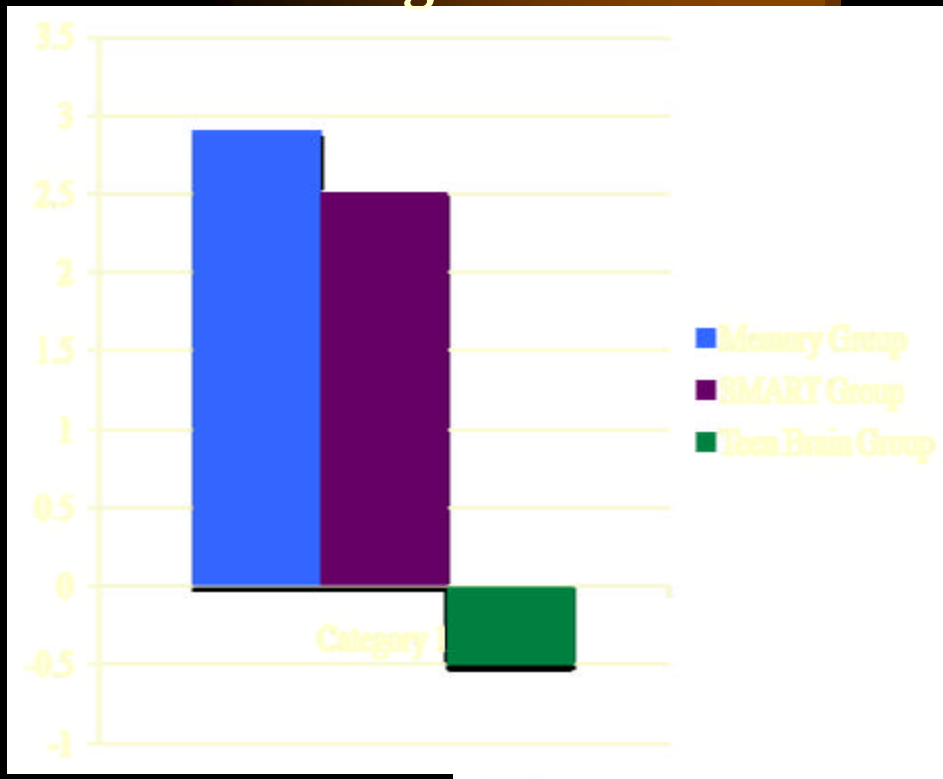


Post Program Change Scores for Gist Reasoning vs. Detail

Changes in Reasoning

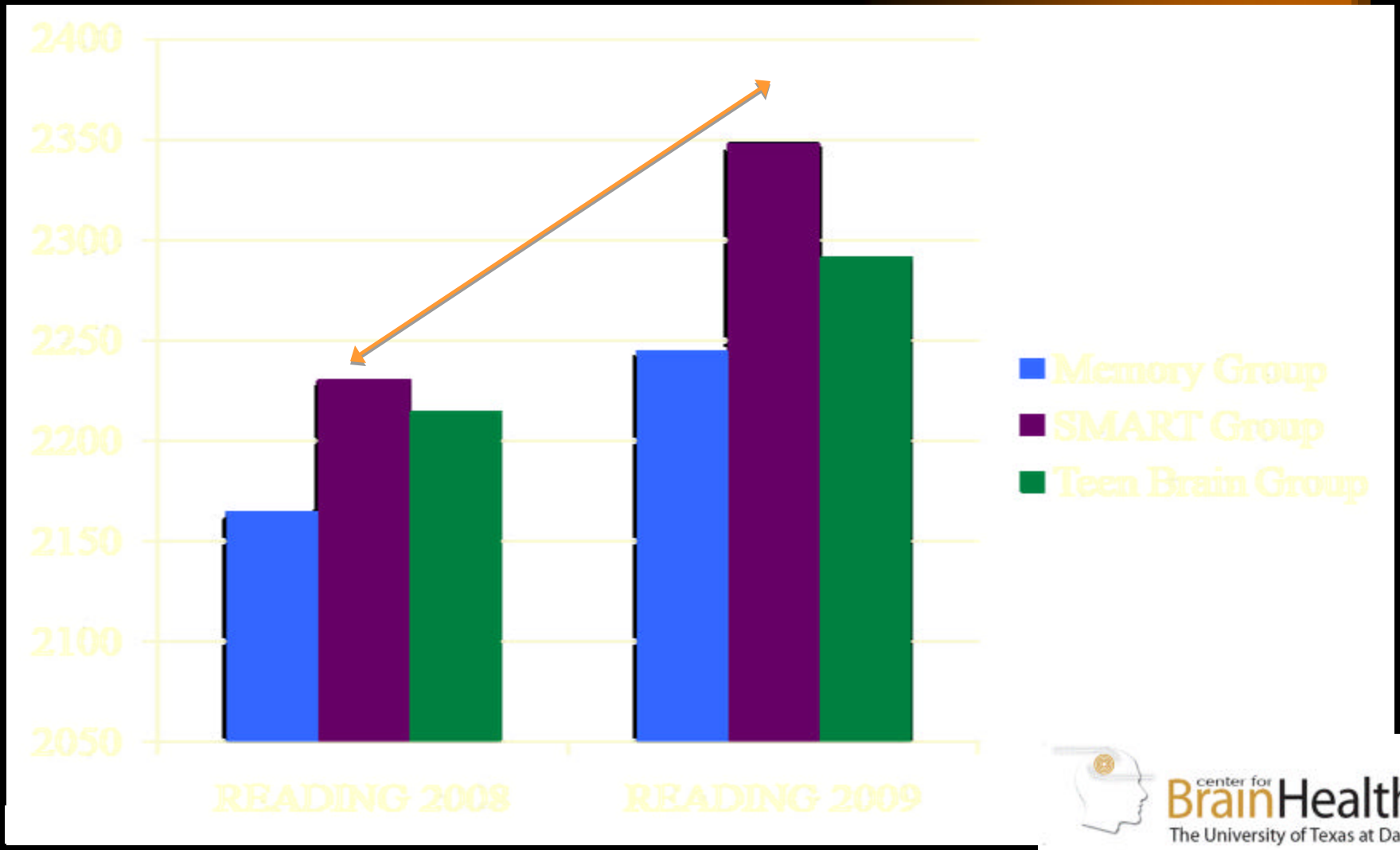


Changes in Detail



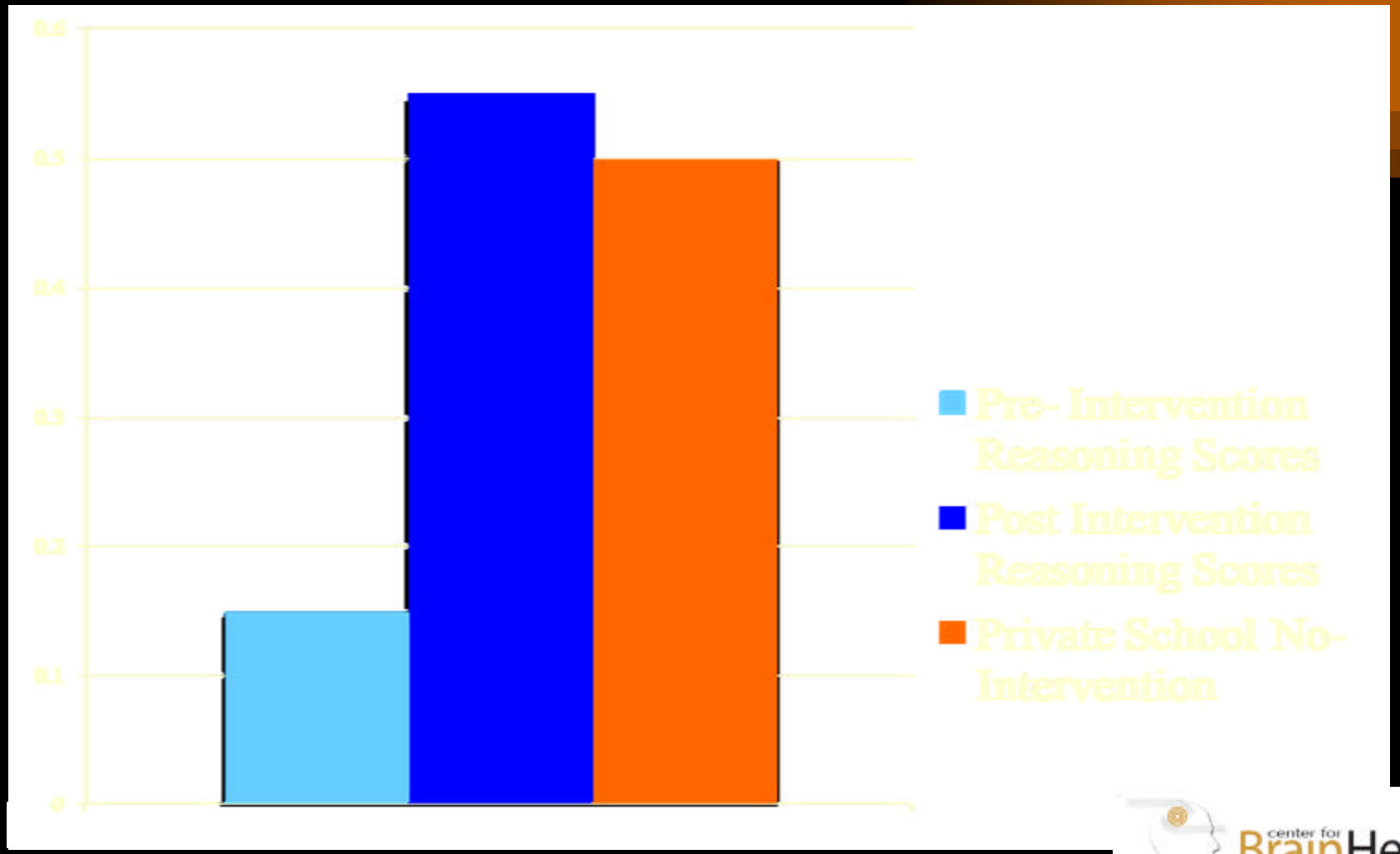
center for BrainHealth®
The University of Texas at Dallas

Change in TAKS Reading Test 2008 vs. 2009



center for BrainHealth®
The University of Texas at Dallas

Outcome After SMART Training in 54 Students



center for BrainHealth®
The University of Texas at Dallas

Middle School Brain Years:
$6 Million from State Legislature

Goals:

- Assess 6,000 children/teens
- SMART Training in 1,000 children/teens
- Brain imaging/Analyses
- Convert Test of Strategic Learning (TOSL) measure to computer version
- Provide web-based feedback for schools
- Train specialists in administering the program

Progress To Date:

- Implementing program in Middle Schools
- 650 Assessments (7-8th graders)
  - Post SMART Assessment Total 450
- Reasoning Training
  - 450 completed
  - 206 in process
- Imaging Study
  - 30 students

Vision

For Texas to become national leader in Reasoning achievement

- Scalable protocol to train strategic reasoning
- Web-based tutor program where teachers and students learn together
- Virtual Reality classroom with students learning through personal ‘avatars’
- Facebook application to monitor maintenance of strategic reasoning skills

MIDDLE SCHOOL BRAIN YEARS
PROGRESS REPORT

THE PROBLEM

- Rapidly declining reasoning and critical thinking skills in the U.S.
- In 1983, the U.S. led all other developed countries in higher-order reasoning skills. By 2003, the U.S. ranked 24 out of 29
- Particularly dire in Texas; one-third of Texas high school students will drop out
- More than 50 percent drop out in urban Texas school districts
- More than half of Texas high schoolers fail the short-essay portion of TAKS

SCIENCE

- Research at the Center for BrainHealth reveals that learning facts by rote uses posterior brain regions, whereas reasoning uses frontal brain networks
- Brain undergoes more change during teenage years than any other time except the first two months of life
- Middle school is the optimal period to train complex reasoning and critical thinking skills

HISTORY

- Dr. Sandra Bond Chapman and Dr. Jacquelyn Gamino developed a curriculum to help adolescents with ADHD, Strategic Memory and Reasoning Training (SMART)
- After testing, they learned that even students without ADHD benefited greatly from the program
- This led to the creation of the Middle School Brain Years program
- A pilot study in Spring 2008 in Dallas ISD's Rusk Middle School was so successful, the program received funding from the Texas Legislature to research on a larger scale

THE PROGRAM

- Strategic Memory and Reasoning Training (SMART) program
- Teaches students how to think strategically
- Offers techniques for uncovering deeper meaning and discarding irrelevant information
- 10 sessions given over one month, 45 minutes each, by a Center researcher

INITIAL RESULTS – DALLAS ISD PILOT

- 54 eighth-grade students from Rusk Middle School
- Critical reasoning skills tested before the program – 85 percent did not meet age based criteria for passing
- Divided into three groups of 18
- All 54students received 10 45-minute sessions –in either rote memory training, brain health information and tips or the SMART program
- Four weeks later, SMART participants showed a 30 percent improvement in reasoning scores; their peers in the other groups did not improve significantly
- 100 percent of the SMART participants passed the reading portion of TAKS, 38% were commended (as compared to 17% of the same students commended in 7th grade)

OUTREACH GOALS FOR THE BIENNIUM

- From 2009-2011, the program will measure strategic reasoning skills in 6,000 students across North Texas.
- Of those 6,000 who are assessed, SMART training will be administered to 1,000 students.
- Of the 1,000 who receive SMART , 75 students will undergo brain imaging studies to measure frontal lobe changes/development comparing before and after SMART training (150 total brain imaging studies)
- The BrainHealth team will monitor the adolescents who have undergone SMART training to determine if the gains hold or if 'booster' training is required.

PROGRESS TO DATE - MIDDLE SCHOOL BRAIN YEARS INITIATIVE

- The SMART program has been implemented in eleven middle schools:
    - Thomas J. Rusk
    - E.B. Comstock
    - W.H. Gaston
    - T.C. Marsh
    - George Bannerman Dealey
    - John B. Hood
    - Armstrong Middle School
    - Coppell East Middle School
    - Coppell North Middle School
    - Coppell West Middle School
- In total over 650 students in 7th-8th grades have undergone strategic reasoning assessments since September 2009.
- During the first quarter, 450 students have completed the SMART program (with pre and post testing) and an additional 206 students are currently enrolled.
- 30 students have participated in the Brain Imaging add-on study.
- Additional Project Progress:
    - Booster sessions provided for five schools to encourage continued use of learned strategies.
    - Computerized assessment tools – development in progress
    - Computerized booster application – development in progress

Center for BrainHealth Plan Could Reduce Drop Outs

By Bill Zeeble *KERA*
December 17, 2009

Texas leaders hope to attack the state's troubling drop out problem with a pioneering program that's already showing promise in Dallas. The Middle School Brain Years program was demonstrated in a Dallas classroom this week and KERA's Bill Zeeble was there.

A small group of 7th and 8th graders in DISD's Dealey International Academy are discussing a short work by Russian writer Tolstoy. But the real lesson here involves the teaching method. In the last legislative session, lawmakers ok'ed $6 million to partially fund this brain development program designed by the Center for BrainHealth at UT Dallas. It exercises the problem-solving frontal lobes still developing in 6th, 7th, and 8th graders. This program teaches students how to learn, improving both their skills and odds of graduating. One of the program's designers, Dr. Jacquelyn Gamino, is teaching.

Dr. Gamino: When we used these practices, do we find this stuff in the text we're working with?

Student: Sometimes. Not always. You have to get the gist you have to use your frontal lobes to sort of, like, you have to sort of infer by the text there but it doesn't really, like, tell you right away. The stronger your frontal lobe is, like the smarter you'll get.

Dr. Gamino: Exactly, exactly. And what does that make us as adults? If we have strong fontal lobes in middle school, Nikola, what does that mean we can do better?

Student: We'll be able to answer questions better, infer better because once you get older your frontal lobes don't develop as much so they stay how they are. So if you strengthen, they'll stay strong all your life.

When this program was first tested on DISD 8th graders at Rusk Middle School, results impressed researchers. Before the program, 85 percent failed the critical reasoning test. Afterwards, 78 percent improved. The Middle School Brain Years program teaches students to eliminate unimportant parts of a literary passage, then connect what's left to understand the author's intent. Students say they've applied the basic method in math and science classes, too.

Tricia Hilgart: It really helped me a lot, because it was more challenging and I like challenges and stuff.

Albert Lipscomb: It helped me do it better and mostly these were kind of new to me. It's kind of helped me with my classes.

Texas Lt. Governor David Dewhurst sat in on the class and liked what he saw. He says the future of Texas depends on educated students, and this plan will help, especially for those at risk of dropping out. He does not believe the low figures reported by the Texas Education Agency.

Lt. Gov. Dewhurst: We see data from the TEA indicating that we've got a drop out rate of one or two percent, but we all know that's impossible. When we talk to high school principals in cities all around the state of Texas, we're hearing from teachers and principals that too many of our young people are dropping out.

State Senator Florence Shapiro, a former high school teacher, chairs the Senate Education Committee. She says middle school has been considered by many teachers as lost years, when student hormones are raging, making classes tough to teach. She says it's time to rethink that.

Sen. Shapiro: As we look and drill down at our drop outs, we see we lose those students in middle schools. That's when they've checked out mentally. This is a golden opportunity to look closely at that middle school age.

Sen. Shapiro and other lawmakers hope to see the Center for BrainHealth program spread to other middle schools across Texas. She says it won't solve the drop out problem, but it could sure improve it.

The University of Texas at Dallas