Brain Fitness Programs: Buy? (or Buyer Beware?)

Guidelines for Becoming an Informed Consumer of Brain Fitness and Working Memory Programs

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Parents and educators are hearing frequent reports regarding brain fitness/brain training research and programs designed to improve children's "weak cognitive skills", working memory, and even increase I.Q. How can parents and schools evaluate the claims made by the vendors of these programs? How can they separate information from misinformation and the scientific from the pseudoscientific? While new programs are always on the horizon and brain training research is still in its infancy, this paper will examine current findings regarding brain training and working memory programs. Parents and educators will learn the questions to ask and information needed to evaluate the merits of various programs as well as treatments not yet available.

Consider the experience of David and his parents:

When Mr. and Mrs. Jones met with Ms. Expert, the director of the Brain-Based Learning Center (BBLC), they explained that their son, David, a 4th grader, had a severe reading disability based on school district testing which they shared with Ms. Expert. As a result of this testing, David had begun receiving special education services in 3rd grade. Ms. Expert explained that David's district and learning center testing showed that, while he had above average ability, he had scored quite low in reading, working memory and attention. Ms. Expert emphasized that the center's "premier" 12-week cognitive therapy program and/or its working memory training program would improve David's working memory and hasten his progress in the learning center's research-based remedial reading program. Ms. Expert explained that the cost of the cognitive program was $5,000 which did not include the cost of the subsequent reading program. When Mrs. Jones expressed concern about the cost of this program, Ms. Expert stressed that the program would make David's learning easier and would strengthen his underlying weak cognitive skills (e.g., working memory, attention). With assurances that the cognitive program was based on the "most recent scientific research" and recalling many positive parent testimonials, the family agreed that David should begin the program immediately.

What Mr. and Mrs. Jones were not told:

- There is no peer-reviewed research or replicated study that substantiates claims regarding the BBLC cognitive therapy program.

- The same test of cognitive ability used for pre-testing will be used for post-testing after David's completion of the program. According to Kaufman, "Practice Effects refer to gains in scores on cognitive tests that occur when a person is retested on the same instrument….These gains are due to the experience of having taken the test previously…and they do not reflect growth or other improvement on the skills being assessed."[1]

[1] Kaufman, A.S. (2003) Practice Effects. http://www.speechandlanguage.com/clinical-cafe/practice-effects

- Larger practice effects are associated with shorter time intervals. With only 12 weeks elapsing between the pre-test and posttest, practice effects will likely result in higher scores. According to a recent meta-analysis, "…organizations may be able to minimize practice effects by using a minimum retest interval of at least one year."[2]

- Unqualified personnel will administer cognitive tests to David. (According to Riverside Publishing, publisher of the Woodcock-Johnson III® Tests of Cognitive Skills, "Graduate level training in cognitive ability assessment and a background in diagnostic decision-making are requisite.")[3]

- There is little or no research evidence that cognitive training transfers (generalizes) to improve a child's academic performance (e.g., reading, math). According to *Cogmed Research Claims and Evidence*, "…it is imperative that more data on reading and math outcomes be published before they are included in this analysis."[4]

- Raters (parents) will not be "blind". "When raters were aware that children were receiving WM training, they reported improvements (via parent rating scales). When raters were blind –did not know - condition assignment in a research study, they did not report improvements"[5]

- Consumers should "ignore testimonials". According to Daniel Willingham, Ph.D., "…one source of evidence that should not persuade you is testimonials – that is, first-person accounts from people who have used the product and swear that it helped."[6]

- "Over the past year…the idea that working-memory training has broad benefits has crumbled…."[7]

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[2] Hausknecht, J.P., Halpert, J.A., Di Paolo, N.T., & Moriarty Gerrard, M.O. (2007). Retesting in selection: A meta-analysis of coaching and practice effects for tests of cognitive ability. *Journal of Applied Psychology*, 92, 373-385 (p. 29)
http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1012&context=articles&sei-redir=1#search=%22Retesting+in+Selection:+A+Meta-Analysis+of+Practice+Effects+for+Tests+of+Cognitive+Ability%22

[3] Woodcock-Johnson III Tests of Cognitive Abilities: Examiner Qualifications
http://www.riversidepublishing.com/products/wjIIIAchievement/pdf/CogQuals.pdf

[4] Ralph, K. Cogmed Research Claims and Evidence: Version 2.0, Pearson, p. 35, from http://www.cogmed.com/research

[5] Shipstead et.al. (2012) Is Working Memory Training Effective? (p. 13) *Psychological Bulletin*
http://www.gwern.net/docs/2012-shipstead.pdf

[6] Willingham, D.T. (2012) *When Can You Trust the Experts: How to Tell Good Science from Bad in Education*. San Francisco: Jossey-Bass. (p. 194)

[7] Cook G. (April 5, 2013) Brain Games are Bogus. The New Yorker. Retrieved from:
http://www.newyorker.com/online/blogs/elements/2013/04/brain-games-are-bogus.html

According to Dr. Bruce Pennington, "Ineffectual treatments for psychological and educational problems are harmful because they waste valuable time and money….As parents, educators, and health care professionals, we need to learn how to make good treatment decisions for the children entrusted to our care."[8]

The Problem:

- Children who struggle in school often have processing deficits (e.g., working memory,) or weak cognitive skills. Researchers and providers of commercial products are targeting these weaknesses with working memory or brain training programs. Parents and educators must be prepared to pose questions that will determine the validity of these programs and their claims.

The Bottom Line Questions for Parents and Educators:

- Parents: Are working memory and/or brain training programs an effective use of my children's time and my money? How can I help my child at home?
- Educators: Are working memory and/or brain training programs an effective use of our students' time and our district's financial resources? How can we separate the wheat from the chaff?

Who's Accountable?

- **Public School-Based Special Education Programs**
  According to Wayne Steedman, Esq., "Congress clarified that IEPs must include research-based methodology….IDEA 2004 creates new requirements for schools to use scientific research based instructional practices and interventions that are based on accepted, peer-reviewed research…."[9]

- **Commercial Programs**
  - According to Shipstead, et.al., "... providers of commercial products are not subject to peer review and can thus present results selectively, advertise through insinuation or make unsubstantiated claims."[10]
  - "Reputable medical journals require researchers to reveal possible conflicts of interest, such as when a researcher conducting a study also owns a company marketing the treatment being studied…."[11] Commercial interests have no such obligation.

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[8] Pennington, B.F. (2011) Controversial Therapies for Dyslexia. *Perspectives on Language and Learning*, 37(1), 7-8. http://www.onlinedigeditions.com/article/Theme_Editor%27s_Introduction/625317/59673/article.html

[9] Steedman, W. 10 Tips: How to Use IDEA 2004 to Improve Your Child's Special Education http://www.wrightslaw.com/idea/art/10.tips.steedman.htm#3

[10] Shipstead, Z. et. al. (Sept 2012). Working memory training remains a work in progress. *Journal of Applied (p .217) Research in Memory and Cognition, 1* (3) http://www.sciencedirect.com/science/article/pii/S2211368112000757

[11] National Resource Center on AD/HD (2008). C*omplementary and Alternative Treatments for AD/HD* http://www.help4adhd.org/documents/WWK6.pdf

Scientific vs. Pseudoscientific Claims & Characteristics

- **Science** "does not accept findings that have failed the tests of replication and peer review precisely because it wants to ensure that all findings in science are in the public domain." Stanovich and Stanovich 2003).[12] Characteristics of the scientific method:
  - Studies are peer-reviewed. (Stanovich, p. 7)
  - Studies are replicated. (p. 9)
  - Failures are sought and studied closely. (p. 16)
  - More is learned over time. (p. 26)
  - When new evidence contradicts old ideas, they are abandoned. (p. 13)
  - Any potential conflicts of interest are acknowledged in the published study.

- **Pseudoscience** "Proponents of untested and pseudoscientific educational practices will never point to cases where they "got it wrong" because they are not committed to public knowledge in the way that actual science is." (Stanovich) Characteristics of pseudoscientific programs:
  - Testimonials are aimed at the general public.
  - There are claims that the program is research-based but peer-reviewed studies regarding the suggested program cannot be produced.
  - There may be internal studies conducted by the vendor but results are not peer-reviewed, replicated or verified. (See "Peer Review in 5 Minutes"[13] and "Peer Review: Why?"[14])
  - Testing is subject to practice effects.
  - pre- and post-tests using subtests of identical cognitive (I.Q.) tests.
  - pre- and post-tests administered within a short time frame (e.g., 12 weeks)
  - Exaggerated claims (e.g., jump 3 grade levels in reading, "average gain in I.Q. is 15 points after 24 weeks of training, and 20 points in less than 32 weeks")[15]
  - Weak underlying cognitive/processing skills must be strengthened before skill instruction (e.g., reading) at a cost of several thousand dollars.[16]
  - There is no acknowledgement of potential conflicts of interests.
  - If research studies are cited, they may target older adults or those with mental illness (e.g., schizophrenia) and include few, if any, studies involving children.

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[12] Stanovich, P.J. & Stanovich, K. E. (2003). *Using Research and Reason in Education: How Teachers Can Use Scientifically Based Research to Make Curricular and Instructional Decisions*. (p. 15) New Hampshire: RMC Research Corporation. Retrieved from http://lincs.ed.gov/publications/pdf/Stanovich_Color.pdf

[13] Peer Review in 5 Minutes (2012) http://www.youtube.com/watch?v=cI2mxO9u0mo

[14] Peer Review¨Why? (2013) http://www.youtube.com/watch?v=Dcb60FKrBNk

[15] Hurley, D, (2012, October 31). The Brain Trainers. *The New York Times*. Retrieved from http://www.nytimes.com/2012/11/04/education/edlife/a-new-kind-of-tutoring-aims-to-make-students-smarter.html?pagewanted=al

[16] Gibson, K. (2012) Reading Instruction — Successful Programs are Built on Cognitive Foundations http://www.learningrx.com/reading-instruction.htm

Improving Children's Educational Performance: What We Know Works

- **5 pillars of Brain Health**: "We can summarize a lot of research by saying that there are four essential pillars (+ sleep[17]) to maintaining a healthy brain that functions better now and lasts longer."[18]

    1. Physical Exercise
    2. Mental Exercise
    3. Good Nutrition
    4. Stress Management
    5. Sleep: "Getting the recommended seven to eight hours each night can improve concentration, sharpen planning and memory skills...." "In fact, experts argue, sleep is emerging as so potent a factor in better health that we need a societal shift–and policies to support it–to make sleep a nonnegotiable priority."

- **The critical importance of early intervention**

    - "Of all children identified as learning disabled, 80% are primarily impaired in reading; 90% of these reading impaired children have problems with…decoding skills."[19]
    - "Children who are poor readers at the end of first grade almost never acquire average-level reading skills by the end of elementary school."[20]
    - "Second grade is broadly viewed as the children's last chance. Those who are not on track by third grade have little chance of ever catching up."[21]
    - Because some IQ subtests measure information learned from reading, poor readers will score lower on these subtests. Over years, the "gap" between poor readers and good readers grows.[22]
    - "Early intervention works. Thanks to a new generation of screening assessments, we can identify these students as early as kindergarten—and then invest in interventions for them….Once identified, these students can receive the assistance they need, and the downward spiral that

[17] The Power of Sleep (2014) http://time.com/3326565/the-power-of-sleep/

[18] Latham, C. (2007) Improve Your Brain Health Now: Easy Steps http://www.sharpbrains.com/blog/2007/04/11/easy-steps-to-improve-your-brain-health-now/

[19] Foorman, B. et.al., (1997) A Scientific Approach to Reading Instruction" (http://www.ldonline.org/article/6251

[20] Editors (2004) "Waiting Rarely Works: 'Late Bloomers' Usually Just Wilt" *American Educator* http://www.aft.org/newspubs/periodicals/ae/fall2004/editorssb1.cfm

[21] Snow C. e. et.al., (1998) Preventing Learning Difficulties in Young Children (p. 212) http://books.nap.edu/openbook.php?isbn=030906418X&page=212

[22] Wrightslaw (2008) What is the Matthew Effect? http://www.wrightslaw.com/info/test.matthew.effect.htm

results from weak early reading skills can be averted."[23]

- **Systematic, explicit, and intensive instruction**: "…the majority of children who enter kindergarten and elementary school at-risk for reading failure can learn to read at average or above levels, but only if they are identified early and provided with systematic, explicit, and intensive instruction in phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension strategies. Substantial research supported by NICHD shows clearly that without systematic, focused, and intensive interventions, the majority of children rarely 'catch up.'"[24]

- **Brains Change: Reading results in significant and enduring changes in brain function.[25]**
  - A 2008 peer-reviewed study by Meyler et.al. "demonstrated that intensive reading intervention leads to significant and enduring changes in brain function among poor readers, which correspond to demonstrable gains in reading."
  - "Any kind of education is a matter of training the brain. When poor readers are learning to read, a particular brain area is not performing as well as it might, and remedial instruction helps to shape that area up," Just said. A similar approach should apply to other skills." "…one year after instruction, their neural gains were not only maintained but became more solidified."
  - In a 2012 meta-analytic review of 23 working memory studies, Melby-Lervåg, M., & Hulme "found that the training isn't doing anyone much good."[26] According to Melby-Lervag & Hulme, "…there is good evidence from randomized trials that "conventional" forms of treatment involving the direct training of reading and language skills ARE effective. In the light of such evidence, it would seem very difficult to justify the use of working memory training programs in relation to the treatment of reading and language disorders."[27]

[23] Editors, (2004) Early Screening Is at the Heart of Prevention, American Educator) http://www.aft.org/pdfs/americaneducator/fall2004/EarlyScreening.pdf

[24] Lyon, G.R. (2003) Reading Disabilities: Why Do Some Children Have Difficulty Learning to Read? What Can Be Done About It? *IDA Perspectives*, Volume 29, No. 2. http://www.wrightslaw.com/info/read.disability.lyon.pdf

[25] Meyler, A., Keller, T.A., Cherkassky, V.L., Gabrieli, J. D. E., & Just, M.A. (2008). Modifying the Brain Activation of Poor Readers during Sentence Comprehension with Extended Remedial Instruction: A Longitudinal Study of Neuroplasticity. *Neuropsychologia, 46* (10), 2580–2592. doi: 10.1016/j.neuropsychologia.2008.03.012 Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2598765/

[26] Cook, G. (April 5, 2013) Brain Games are Bogus. *The New Yorker*,**.** Retrieved from: http://www.newyorker.com/online/blogs/elements/2013/04/brain-games-are-bogus.html

[27] Melby-Lervåg, M., & Hulme, C. (2012) Is Working Memory Training Effective? A Meta-Analytic Review http://www.apa.org/pubs/journals/releases/dev-ofp-melby-lervag.pdf

- "Those who read a lot will enhance their verbal intelligence; that is, reading will make them smarter…. We often despair of changing our students' abilities, but there is at least one partially malleable habit that will itself develop abilities—reading!"[28]
- "…education seems the most broadly and consistently successful cognitive enhancer of all. The steady rise in IQ scores over the last decades is thought to be at least partially due to education."[29]

- **Assistive Technology (AT) and Accessible Instructional Materials (AIM)**
  - "…although dyslexic children will improve their accuracy, deficient fluency continues to be a concern at all grade levels, and increasingly so as children move up into middle and high school and then into postsecondary education."[30]
  - "Fluency forms the bridge between decoding and comprehension."[31]
  - "The most consistent benefit of text-to-speech (TTS) text-reading technology is that it enables slow readers to read faster."[32]
  - "93% of students with learning disabilities reported that reading was easier, less stressful, and less tiring with text readers. 91% of students said they were able to increase the time they could sustain attention to reading." (Elkind, K. & Elkind, E., (2007)

Other possible explanations for improvements in working memory or weak cognitive skills:

- Expectancy Effects: "…when people participate in training programs, they genuinely believe they are getting better, whether or not that is true."[33] According to Boots, et. al (2013), "Researchers, reviewers, and editors should no longer accept inadequate control conditions, and causal claims should be rejected unless a study demonstrably eliminates differential placebo effects."[34]

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[28] Cunningham and Stanovich (2001) What Reading Does for the Mind, *Journal of Direct Instruction*, Vol. 1, No. 2, pp. 137–149 Retrieved from http://www.csun.edu/~krowlands/Content/Academic_Resources/Reading/Useful%20Articles/Cunningham-What%20Reading%20Does%20for%20the%20Mind.pdf

[29] Neuroeducation: Top Findings to Update Education and Learning http://sharpbrains.com/blog/2013/12/03/neuroeducation-top-findings-to-update-education-and-learning/

[30] Shaywitz S. et.al., (2008) The Education of Dyslexic Children from Childhood to Young Adulthood *Annual Review of Psychology. 59:451–75.* http://brainvitge.org/papers/shaywitz2008hl.pdf

[31] Shaywitz, S. (2003) Overcoming Dyslexia: A New and Complete Science-Based Program for Reading Problems. Knoff.

[32] Elkind, K. and Elkind, E. (2007) Text-to-Speech Software for Reading, International Dyslexia Association, Perspectives, Summer 2007, vol. 33, no. 3, http://www.resourceroom.net/readspell/ida_texttospeech_Elkind.asp

[33] Cook G. (2013) Brain Games are Bogus. *The New Yorker*. April 5, 2013

[34]"The Pervasive Problem with Placebos in Psychology: Why Active Control Groups are not Sufficient to Rule Out Placebo Effects" http://pps.sagepub.com/content/8/4/445.full.pdf

- Raters not "blind". "When raters were aware that children were receiving WM training, they reported behavioral improvements (via parent and teacher rating scales). When raters were blind to condition assignment, they did not report behavioral changes".[35]
- "One of the basic principles of human cognition is a tendency to seek evidence that conforms to our expectations, and ignore anything that is dis-confirmatory (confirmation bias) and the feeling of discomfort that results from holding two conflicting beliefs (cognitive dissonance)."[36]

Expert Consensus on Brain Health (Cradle to Grave): Issued by the World's Top Cognitive Scientists at the 2008 and 2013 Brain Health Summits, co-sponsored by Stanford University[37]

- "Apprehension about the future leaves many people looking for magic bullets that will prevent our minds from failing us, and some makers of "brain boosting" products are all too happy to claim they have magic bullet solutions.
- "...because the brain-training industry is completely unregulated and its quasi scientific claims are not vetted by any third party, prospective consumers face the challenge of separating wild claims from serious science."
- "…No intervention to date has shown that once undertaken it can reduce the rate of cognitive decline over several years or decades."
- "Before settling on a particular method and investing time and sometimes money in a particular product, consumers need to consider hidden costs beyond dollars and cents: every hour spent doing solo software drills is an hour not spent hiking, learning Italian, making a new recipe or playing with your grandchildren."
- The Good News! "Physical exercise is not only a low-cost and effective way to improve your health but also an important key to improving brain fitness. Scientists have found that regular aerobic exercise...helps to support formation of new neural and vascular connections."

The Role of the Skeptic

- "By exercising healthy skepticism, you place the burden of proof on the researcher, where it belongs."[38]
- According to Shipstead et.al., "WM training is an area of cognitive psychology in which the general public has clear interest. Thus the role of the skeptic is not simply to provide peer review, but also a mechanism through which the public can receive the other side of the story."[39]

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[35] Shipstead et.al. (2012) Is Working Memory Training Effective? http://www.gwern.net/docs/2012-shipstead.pdf

[36] Shipstead et.al. (Sept 2012) Cogmed working memory training: Does the evidence support the claims? *Journal of Applied Research in Memory and Cognition*, 1 (3) http://www.sciencedirect.com/science/article/pii/S2211368112000629

[37] Expert Consensus on Brain Health (2013) co-sponsored by Stanford University and Max Planck Institute for Human Development http://longevity3.stanford.edu/brain-health-conference-2013/

[38] Carpenter, B.L. (2006) The Good, the Bad, and the Unscientific: Evaluating Education Research. *National Charter Schools Institute. 1-8.* *http://www.gvsu.edu/cms3/assets/8D75A61E-920B-A470-F74EFFF5D49C6AC0/forms/boardmembers/resources/the_good_the_bad_and_the_unscientific.pdf*

- These programs are "actively marketed to school systems and to the parents of children with developmental disabilities…. Due to the cost to tax payers and consumers, it is our opinion that demonstrating the validity of this program is of the utmost importance….The availability of detailed contrary opinions allows for informed purchasing decisions….How can the buyer beware if the buyer does not have access to the appropriate information ahead of time?"[40]

- "We would like to underscore their (Shipstead et.al.) comments on the need to establish whether the training methods that have been developed really do have the potential to deliver educationally significant gains in academic progress."[41]

Conclusions and Recommendations

- "The most accurate description of the state of WM training is that the fundamental techniques remain a work in progress."[42]

- According to Shipstead et.al., "Although we and others have expressed doubt about the general state of WM training, we do not rule out the possibility that WM training could be made effective. The largest issue seems to be that, while there is logic to WM training (increase WM and improve related abilities), this literature is still struggling to find a theory. Specifically, it is important that research move beyond the desire to show that broad change can be realized through a month of training on a limited set of tasks."[43]

The bottom line about "train-the-brain" programs[44]

- "We don't yet know how to train cognitive skills in individuals with LD or AD/HD."

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[39] Shipstead, Z. et.al. (2012) Reply: "Working memory training remains a work in progress" *Journal of Applied Research in Memory and Cognition*, 1 (3) http://www.sciencedirect.com/science/article/pii/S2211368112000757

[40] Shipstead et.al., (Sept 2012) Cogmed working memory training: Does the evidence support the claims? *Journal of Applied Research in Memory and Cognition*, 1 (3), 185-193. Retrieved: http://www.sciencedirect.com/science/article/pii/S2211368112000629

[41] Gathercole, S.E. et. al., (Sept 2012) Commentary: "Cogmed training: Let's be realistic about intervention research". *Journal of Applied Research in Memory and Cognition* http://www.sciencedirect.com/science/article/pii/S2211368112000733

[42] Shipstead et.al., (Sept 2012) Reply: Working memory training remains a work in progress, *Journal of Applied Research in Memory and Cognition*, 1 (3) http://www.sciencedirect.com/science/article/pii/S2211368112000757

[43] Shipstead et.al. Sept 2012) Cogmed working memory training: Does the evidence support the claims? *Journal of Applied Research in Memory and Cognition*, 1 (3) http://www.sciencedirect.com/science/article/pii/S2211368112000629

[44] Horowitz. S. (April 2013) So You're Thinking About Train-the Brain Therapies. National Center for Learning Disabilities (NCLD) http://www.ncld.org/types-learning-disabilities/what-is-ld/cure-ld-therapy-research-train-the-brain-therapies

- "We cannot say which individuals will benefit from these types of training, whether the benefit transfers to real-life situations, and whether any benefit realized will last over time."

- "Unless studied carefully, we cannot attribute any changes we see in individuals to the use of these types of programs."

- While those who disagree with the conclusions of Melby-Lervag, Hulme and Shipstead et. al. and describe them as "premature", it is our opinion (Schultz and Cook) that it's premature to aggressively market these products to parents and schools when Cogmed itself states, "one finds that there have been few studies to utilize academic outcome measures….it is imperative that more data on reading and math outcomes be published before they are included in this analysis."[45]
- This is especially important since we KNOW what DOES work:
    - 5 Pillars of Brain Health:
        - Physical exercise
        - Mental exercise
        - Good nutrition
        - Stress management
        - Sleep
    - Early Intervention
    - Systematic, structured and multisensory literacy instruction
    - Reading – both in and out of school
    - Assistive Technology (AT) and Accessible Instructional Materials (AIM) to access the general education curriculum to meet state standards and and keep pace with peers.
- "Collectively, meta-analytic results indicate that claims regarding the academic, behavioral, and cognitive benefits associated with extant cognitive training programs are unsupported in ADHD."[46]
- "CWMT (Cogmed Working Memory Training) should not be considered a viable treatment for children with ADHD."[47]

A Final Word to Parents and Educators

- Parents:
  As parents, you cannot afford to waste your children's time and your money on ineffective treatments. We hope you're now ready to carefully scrutinize programs advertised to improve your child's academic performance and life prospects, and encourage those working with your children to do the same. In the meantime, at home, immerse your children in language. Talk with them. Read to them. Read with them – daily.

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[45] Cogmed Research Claims & Evidence Version 2.0, Pearson, p. 35, http://www.cogmed.com/research

[46] Rapport, et.al. Working Memory Study (2013) http://curry.virginia.edu/uploads/resourceLibrary/CLC_RapportOrbanKoflerFriedman2013.pdf

[47] Chacko, et.al., Working Memory Study (2013) http://www.ncbi.nlm.nih.gov/pubmed/24117656

- Educators:
  We encourage you to keep an open mind, but apply the standards we have identified as you scrutinize programs that claim to improve your students' academic performance and life prospects. As professionals committed to employing or recommending programs that are based on strong scientific evidence, we cannot afford to waste our student's time and our district's money on ineffective treatments.

David Revisited:

David completed the cognitive therapy program at the Brain-Based Learning Center and scored very well on the program's post-test. His parents then made an appointment with Dr. Wise, an independent school psychologist and asked that he evaluate David to identify his remaining needs and make recommendations regarding his future educational programming. Mrs. Jones shared David's 3rd grade school-based evaluation as well as the pre-/post-test results of the Brain Based Learning Center's cognitive therapy programs. Testing by Dr. Wise determined that David had made very limited gains in working memory and attention. This psychologist also pointed out that David's apparent improved cognitive skills in the Brain Based Learning Center's post-testing was largely a result of practice effects since David was pre- and post-tested on the same test administered only 12 weeks apart. Dr. Wise also shared that he had found no peer-reviewed studies regarding the effectiveness of the learning center's cognitive therapy program. He recommended that David begin systematic, explicit, and intensive research-based reading instruction delivered with fidelity by a well-trained teacher. Dr. Wise also recommended Assistive Technology (A.T.) and Accessible Instructional Materials (A.I.M.), along with other accommodations, to allow David to access his grade level curriculum (e.g., social studies and science), to build his independence and to keep pace with his peers as he continued instruction to improve his reading skills.

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