

## PROGRAM VALIDATION SUMMARY

### Program hypothesis

Weak cognitive skills, or mental processing skills, can make learning more difficult and lower academic performance. The weaker the relative ranking, the more likely academic performance will be lowered. Weak skills can be strengthened with appropriate cognitive skill training. Strengthening skills can help to improve academic performance with adequate post-intervention instruction. The BrainSkills online cognitive skill training program can significantly improve core cognitive skills with proper utilization.

Students with multiple weak skills should experience greater improvement. Students with moderately weak skills can improve, but the relative degree of improvement will likely be less because there is less room for improvement. For example, if a student scores at the 20<sup>th</sup> percentile level on a particular skill, it is reasonable to expect a 100% improvement to the 40<sup>th</sup> percentile level. However, if a student scores at the 70<sup>th</sup> percentile level, 100% improvement is not possible. Improvement to the 85<sup>th</sup> percentile is significant, but it only represents a 21.4% improvement in percentile ranking. Students with significantly weak skills are more at risk for academic under-performance. Weakness in any one skill can impact varying areas of academic performance especially when combined or clustered with other weak skills.

The BrainSkills Program is a series of procedures that train and strengthen certain core cognitive skills, such as attention, memory, processing speed, visual processing, auditory processing and logic and reasoning. The Program does not include any academic instruction. To experience the full potential of the program, students must train intensely and put in a sufficient amount of time on task. The recommended protocol is to train one hour per day, five days per week for 12-15 weeks. Some students may complete a targeted level of success in the program in less time, some may need additional time. The time frame for reaching program goals generally depends upon the starting skill level and intensity of the training schedule.

Weak skills generally make learning harder. Stronger skills generally make learning easier and faster. When weak skills are strengthened, a student's underlying capacity to learn is enhanced. Because BrainSkills does not teach any academic materials, student's need to receive adequate instruction after training to build any previously deficient academic skills or missing knowledge in order to show improvement on academic tests.

### Theory behind BrainSkills Program

The underlying theory of the BrainSkills program relies upon four critical elements: 1) there are several distinct cognitive skills that are foundational to human intelligence and learning, 2) weak cognitive skills make learning harder, whereas strong cognitive skills make learning easier, 3) weak cognitive skills can be strengthened with the appropriate cognitive skill training and 4) improved cognitive skills will lead to increased potential for improved academic performance.

The seminal work by John B. Carroll, *Human Cognitive Abilities: A Survey of Factor Analytic Studies* (1993), lays the foundation for understanding cognitive skills and human intelligence. Please refer to the following link for more information, <http://www.indiana.edu/~intell/carroll.shtml>.

Probably the most widely known model of human cognitive abilities is the **Cattell-Horn-Carroll theory of cognitive abilities (CHC theory)**, [http://en.wikipedia.org/wiki/Cattell-Horn-Carroll\\_theory](http://en.wikipedia.org/wiki/Cattell-Horn-Carroll_theory).

Relative cognitive skill scores are used to define relative intelligence. For example, someone with an IQ score of 80 is considered to be less intelligent than someone with an IQ score of 120. Lower cognitive scores are a pre-requisite for being classified for special education, among other criteria including academic underperformance. Although an IQ score is not a perfect predictor of academic performance, higher IQ is generally equated with better academic performance. There are many other factors that can influence academic performance other than IQ. IQ is a composite score which can mask the identification of individual weak skill scores which are limiting and lowering performance. For example, an IQ score of 100 could describe two entirely different learning capacities. One student can be average in each skill and do average work, whereas one student could be very high in some skills and very low in some skills but still have a composite score of 100. With the low skill scores impacting performance, the student may seem quite bright, but perform poorly.

BrainSkills conducted two studies comparing academic scores of 900 students with cognitive skills scores using the Gibson Test of brain skills. The SAT10 was used to measure reading skills in one group and the NWEA MAP was used to measure reading skills in the 2<sup>nd</sup> group. In both cases, students who scored in the lowest quartile academically also had one or more cognitive skill score in the lowest quartile 88% of the time compared to the NWEA MAP results and 97% compared to the SAT10 scores. The results demonstrated very high correlations between low academic reading scores using standardized tests compared to low cognitive skill scores.

Until fairly recently, the fields of neuropsychology and education believed that cognitive capacity was fixed past a certain age, generally thought to be early elementary or younger for some functions. A significant body of research within the last five to ten years has proven that the brain is plastic and can adapt at most any age. (Neuroplasticity, <http://en.wikipedia.org/wiki/Neuroplasticity>.)

The brain-training industry has blossomed in the past five years as a result of the studies on neuroplasticity. The industry has grown to over \$265 million in sales annually as of 2008 (SharpBrains annual report 2009). An internet search would likely yield over 100 companies offering online brain training programs. Most, if not all, vendors offer a wide variety of studies with varying degrees of scientific rigor demonstrating cognitive skill training efficacy. However, most of the studies are not peer-reviewed.

Conclusion—there is a significant body of evidence that intelligence consists of many component skills. These skills can be measured. Weak skills generally lower academic performance. Weak skills can be improved and academic performance can be improved with appropriate training.

### History of Development

Dr. Ken Gibson, founder of PACE, LearningRx and co-founder of BrainSkills is dyslexic. He dedicated his entire professional career (35+ years) to developing solutions to help students with learning limitations improve academic performance. As an eye doctor, he initially focused on vision-

related therapies. He expanded to other therapies to improve the range of effectiveness and settled on cognitive skill training as the primary clinical methodology.

He recruited a network of over 300 professional scientists (including psychologists) and educators to develop, research and test a clinical cognitive skill training and reading program. The program has been offered commercially since 1985 as the PACE (processing and cognitive enhancement) program and Master the Code (MTC) reading program. Over 15,000 students have been successfully trained. Pre and post testing has proven efficacy.

In 2002, Dr. Gibson created LearningRx to expand his cognitive skill training and reading program options. The LearningRx programs take the PACE/MTC work to a higher level and are delivered through dedicated franchised learning centers. There are currently over 60 centers nationwide. LearningRx pre and post tests all students using a variety of industry-standard assessments including the Woodcock Johnson III Cognitive Battery. Over 10,000 students have been successfully served. Cognitive skill and reading results by LearningRx lead overall published industry results. For example, LearningRx achieves twice the reading improvement in half the time as the industry recognized Lindamood-Bell reading program.

Dr. Gibson designed the clinical cognitive skill training program with the intension of creating a computer-delivered model. BrainSkills was formed to adapt and implement the clinical procedures in an online delivery format. The online program faithfully reproduces the same procedures used in the LearningRx clinics and has been adopted for use in the centers as a viable training option.

### Studies

Three studies have been conducted by LearningRx. The studies have been validated by outside educational review but have not been peer-reviewed. The most recent study was conducted with independent review using controls and pre and post testing using industry recognized standardized tests. Copies of the published studies are available.

The BrainSkills Program was released commercially the first part of 2009. Studies are underway. Preliminary results indicate significant cognitive skill and academic improvement. Several independent endorsements from schools are available.

### Conclusion

The BrainSkills Program was developed using a scientific research model. The clinical program is based upon a substantial body of scientific literature, was developed and tested extensively and used pre and post testing with industry-accepted standardized tests to validate results. The online program faithfully reproduces the clinical procedures. It underwent extensive testing in schools using pre and post testing. Additional studies using controls are underway.