



**ACTIVATE**  
ENHANCING COGNITIVE PERFORMANCE

## Activate™ Improves Executive Function & Dramatically Improves Learning in Elementary School Children

*2013-2014 School Year*

## THE GOAL

Activate is designed to improve **Executive Function (EF)**. The National Forum on Early Childhood Policy and Programs, the National Scientific Council on the Developing Child, and the Center on the Developing Child at Harvard University recently issued a working paper on EF stating: “...we aren’t born with the skills that enable us to control impulses, make plans, and stay focused....These skills develop through practice and are strengthened by the experiences through which they are applied and honed....Providing the support that children need to build these skills...is one of society’s most important responsibilities.” Fairfax Virginia Public Schools have made development of EF skills a primary, multi-year education goal of the system, both because of their importance for learning in school and for success in life after graduation. By improving EF skills such as attention and self-regulation in children with problems in these areas, Activate aims to help these children get more out of school and at the same time to improve the classroom learning environment for all children.

## ADOPTION OF ACTIVATE IN SCHOOLS ACROSS THE COUNTRY

We at C8 Sciences were very pleased to see the Activate program implemented in over 100 schools this year, from Florida, to Virginia, New York, New Mexico, Texas, Alaska and Hawaii. Some implementations started in late Spring as warm ups for the Fall, and some were for small numbers of children with special education needs. There were, however, several larger implementations in general classrooms in schools covering the full socioeconomic spectrum, and one full implementation with special needs students. In all, we saw highly significant improvements on “gold-standard” tests of EF. Data on standardized school-administered tests of math and reading were available from one of these four implementations, and these showed truly remarkable effects of Activate.

## THE “GOLD STANDARD” TESTS OF EF

Two tests are from the NIH Toolbox of tests created by an expert panel specifically for assessing EF in children, the Flanker test of focused attention and a test of working memory. The third test is the widely used Go/No-Go test of response inhibition. The key measure on the Flanker test is reaction time on trials with distracting information (incongruent trials). On the working memory test the key score is the total number correct. On the Go/No-Go test the key score is the percentage of times the child correctly inhibits responses on No-Go trials.

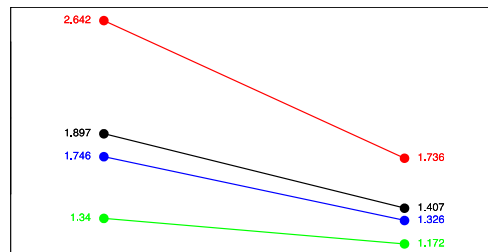
# IMPROVEMENT IN FOCUSED ATTENTION

2013-2014 School Year

## Flanker Correct Incongruent Average Reaction Time (only students with > 65% correct congruent percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

	1	2	3	4
Test	ALL	Grade 0	Grade 1	Grade 2
n	715	244	199	272
PValue	0	0	0.003	0.003

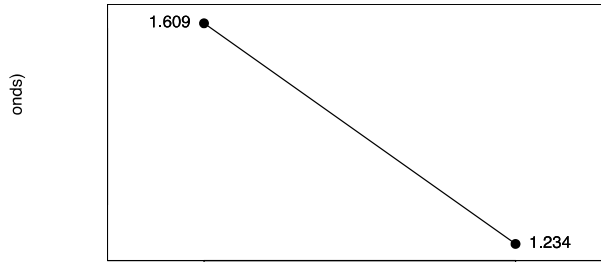


**Figure 1:** Highly significant improvements in Reaction Time in kindergarten, first and second grade students in a large urban school district. As expected, kindergarten children are slower than first graders, and first graders are slower than 2nd graders. This supports the validity of the classroom-administered tests. The average student showed a 25% increase in response speed.

## Flanker Correct Incongruent Average Reaction Time (only students with > 65% correct congruent percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

Test	n	PValue
1 Grade 1	24	<b>0.021</b>

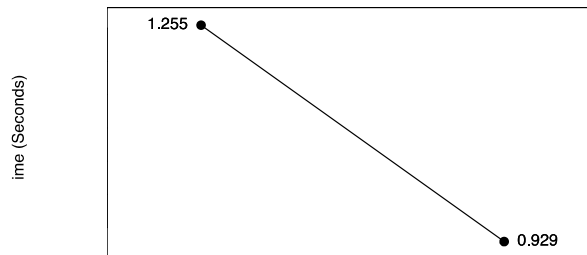


**Figure 2:** First graders at another school show almost identical scores and improvement as the first graders in the school district above.

## Flanker Correct Incongruent Average Reaction Time (only students with > 65% correct congruent percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

Test	n	PValue
1 Grades 3-6	21	<b>0.064</b>



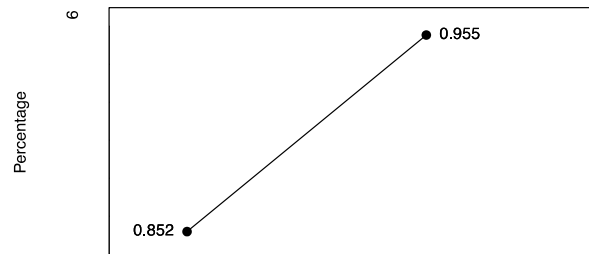
**Figure 3:** Older children at a private school for girls show faster response times than the younger children at the other schools, as expected because they are older, but show a similar 25% reduction in reaction time after Activate.

## Flanker Correct Incongruent Percentage

(only students with > 65% correct congruent percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

Test	n	PValue
1 Grades 2-5	29	<b>0.006</b>



**Figure 4:** Children with special needs, grades 2-5, show highly significant increase in accuracy on the difficult incongruent trials on the Flanker test. Their average reaction times were very slow for children their age and did not change.

# IMPROVEMENT IN RESPONSE INHIBITION

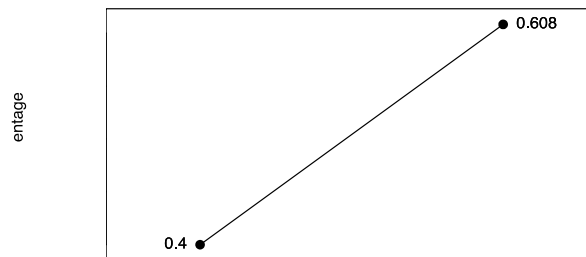
2013-2014 School Year

## GNG Correct No-go Trial Percentage

(only students with > 90% correct go trial percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

Test	n	PValue
1 Grades 3-6	16	<b>0.003</b>



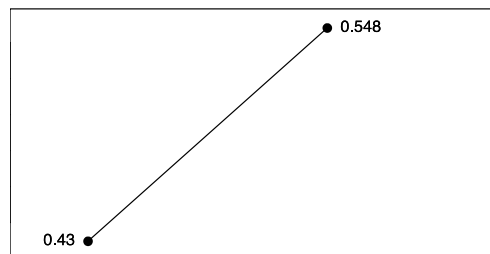
**Figure 5:** Children grades 3-6 at a private school for girls show a 50% improvement in ability to inhibit response on No-Go trials.

## GNG Correct No-go Trial Percentage

(only students with > 90% correct go trial percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

Test	n	PValue
1 Grades 2-5	18	<b>0.007</b>



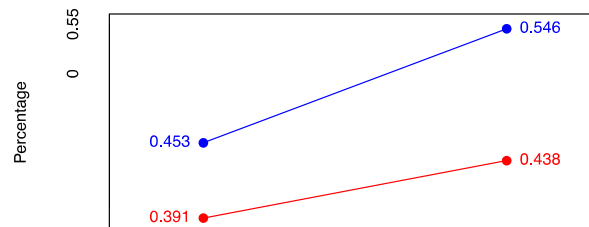
**Figure 6:** Special education children grades 2-5 also show significant gains in ability to inhibit responses on No-Go trials; 30% improvement.

## GNG Correct No-go Trial Percentage

(only students with > 90% correct go trial percentage)

Table : Testing for a Difference in NIH Pre- and Post-test Scores

	1	2
Test	ADHD	Typically Developing
n	29	26
PValue	<b>0.094</b>	<b>0.002</b>



**Figure 7:** Children with ADHD show lower response inhibition than typically developing children from the same school. This further demonstrates the ability of the classroom-administered C8 assessments to provide valuable information for schools. Both ADHD and typically developing children showed gains in response inhibition after doing Activate.

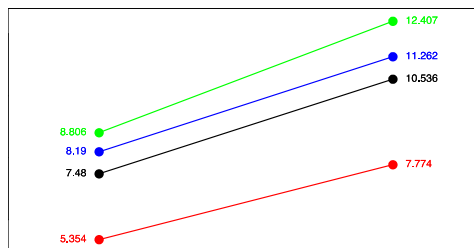
# IMPROVEMENT IN WORKING MEMORY

2013-2014 School Year

## Working Memory Total

Table : Testing for a Difference in NIH Pre- and Post-test Scores

	1	2	3	4
Test	ALL	Grade 0	Grade 1	Grade 2
n	679	226	195	258
PValue	0	0	0	0



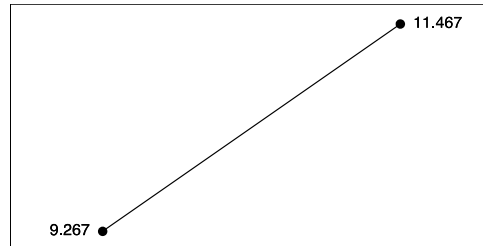
**Figure 8:** Highly significant improvements in Working Memory in kindergarten, first and second grade students in a large urban school district. As expected, kindergarten children have lower scores than first graders, and first graders have lower scores than 2nd graders. This supports the validity of the classroom-administered tests.



## Working Memory Total

Table : Testing for a Difference in NIH Pre- and Post-test Scores

	Test	n	PValue
1	Grade 1	15	<b>0.08</b>

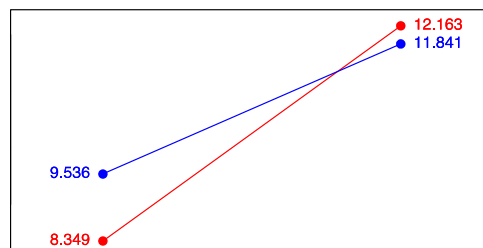


**Figure 9:** Working memory improvements in another first grade class.

## Working Memory Total

Table : Testing for a Difference in NIH Pre- and Post-test Scores

	1	2
Test	ADHD	Typically Developing
n	43	151
PValue	<b>0.012</b>	<b>0</b>

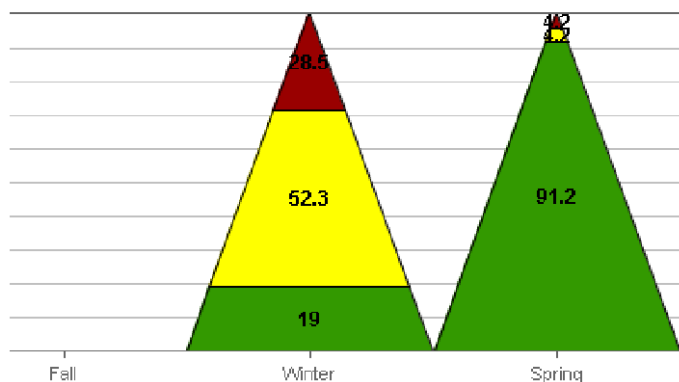


**Figure 10:** Children with ADHD have lower working memory scores than typically developing children from the same school. This further demonstrates the ability of the classroom-administered C8 assessments to provide valuable information for schools. Both ADHD and typically developing children showed gains in working memory after doing Activate.

# TRANSFER OF COGNITIVE SKILL GAINS TO HIGHER MATH AND READING SCORES

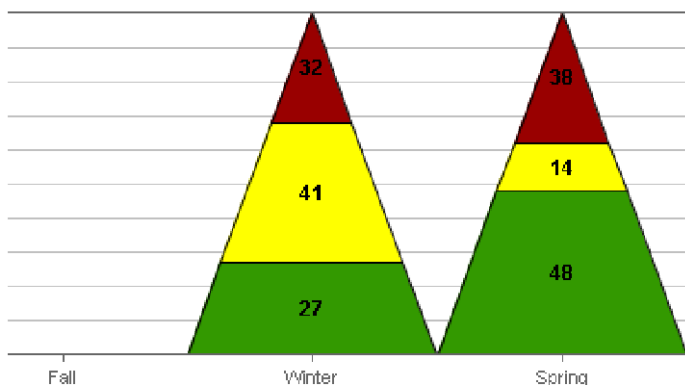
2013-2014 School Year

## Math Proficiency: Activate Class



**Figure 11:** AIMSweb test of math knowledge in a first grade class (49% free lunch) before and after Activate. Green shows percent of the class meeting standards, yellow is percent on the border, and red is percent dangerously below standards.

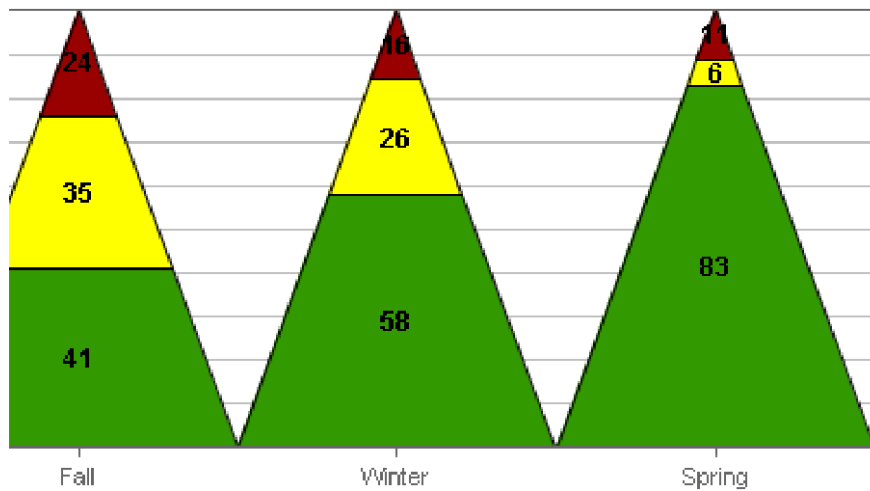
## Math Proficiency: Control Class



**Figure 12:** AIMSweb test of math knowledge in a first grade class (49% free lunch) that is from the same school as the Activate class in figure 11 but this class did NOT get the Activate program. This class did not get the Activate program. Green shows percent of the class meeting standards, yellow is percent on the border, and red is percent dangerously below standards.

Scores for the whole district, including schools in higher socioeconomic areas, were above those of the control class but well below those of the Activate class in Figure 11. District-wide, the percent of children in the “green” or proficiency range from winter to spring in school year 2012-13 went from 46 to 52%, and in school year 2013-14 from 45 to 63%. The 91% above proficiency seen in the Activate class (figure 11) is unprecedented in the district.

## Maze Reading: Activate Class



**Figure 13:** AIMSweb Maze test of reading skills in a third grade class (95% free lunch) before and after Activate. Green shows percent of the class meeting standards, yellow is percent on the border, and red is percent dangerously below standards. District-wide scores (including schools from more affluent areas) were 50%, 61% and 58% in the green (Fall, Winter, Spring), 26%, 20% and 23% in the yellow, and 24%, 18% and 18% in the red. The 83% in the green seen in the Activate class is well above the other schools in the district even though the Activate class was in a school in the economically poorest parts of the city.

*If you are interested in using the activate- cognitive cross training in your district please contact us at [info@c8schools.com](mailto:info@c8schools.com) or call us at 904-608-0493*