

Summary

Ross Elementary School in Topeka, Kansas (Ross), conducted a pilot study with BrainWare Safari during the 2009-2010 school year with students in 3rd through 5th grades. The objective of the study was to assess the impact of the program on the level of students' cognitive abilities and on their academic performance.

Previous published research has shown that students who use BrainWare Safari (BWS) experience significant improvements in their cognitive skills. A growing body of research is showing the connection between the development of cognitive skills and academic progress. Academic progress typically lags cognitive growth and the rate of gain in academic achievement is highly individual. Some students experience an immediate lift in academic scores, while others may have significant catching-up to do because they need to learn or re-learn material they missed

The pilot results show both significant cognitive development and progress toward academic goals during the 2009-2010 school year.

- Student performance on the cognitive skills tests improved an average of 1 year 10 months between the pre-test and the first post-test following their use of BWS. This level of cognitive growth is consistent with the results in the published research.
- On the second post-test, cognitive development for these students continued at an accelerated rate, resulting in total cognitive growth over the six months between the initial pre-test and the final test of 3 years 2 months.
- Results on the Kansas State General Assessments showed significant improvement between 2009 and 2010:
 - The percentage of students meeting or exceeding the reading standard increased from 56% in 2009 to 65% in 2010.
 - The percentage of students meeting or exceeding the math standard increased from 62% in 2009 to 72% in 2010.
 - The average reading score increased at each grade level, moving from below the standard in 2009 into the meets or exceeds range in 2010.
 - The average math score also increased at each grade level, staying in the meets or exceeds range.
- Comparisons of same-student performance on academic tests (3rd to 4th grade or 4th to 5th grade) show significant improvements in performance following use of BWS.

BrainWare Safari Usage

All of the 150 students in the 3rd, 4th, and 5th grades at Ross were provided with BWS accounts. On average the students completed 42 sessions of BWS over an 11-week period with an average of 4 sessions per week. This is consistent with the recommended usage of BWS, which is 3 to 5 times per week over a 10 to 12 week period. Studies have shown that significant impact on cognitive development can occur when used with the intensity of 30 to 60 sessions over 10 to 12 weeks.

Cognitive Assessment

Three Woodcock –Johnson Cognitive Battery subtests were administered to a random sample of students from the three grades. The tests were administered three times: Fall, Winter and Spring. Data were available for 20 students who took the tests at all three administrations, where parents signed a release form for the data. This group consisted of 7 third graders, 8 fourth graders and 5 fifth graders.

Three Test Administrations

- Fall -- Pretest before BWS
- Winter – 4 weeks after BWS complete
- Spring -- 19 weeks after BWS complete

The three tests used were:

- Decision Speed – measures semantic processing and processing speed
- Pair Cancellation – measures attention and concentration
- Visual Matching – measures cognitive efficiency in matching visual symbols

Analysis of Cognitive Test Results

The average cognitive improvement over the 4 months between the Winter and Fall tests (the period during which the students used BWS) was 1 year 10 months. This is comparable to the published study results for these same three tests¹ where average cognitive improvement was 1 year 2 months and 1 year 9 months for Phase I and Phase II, respectively. As in previous studies, all students improved their cognitive performance during the time they used BWS. The published study included a control group where the average cognitive improvement on these same three tests was 4 months.

Table 1: Cognitive Improvement on 3 WCJIII Tests	
Ross Fall to Winter	1.10 years.months
Published Phase I	1.2 years.months
Published Phase II	1.9 years.months
Published Control	0.4 years.months
Ross Winter to Spring	1.3 years.months

Continued cognitive development was demonstrated at the Spring testing (19 weeks after the post-test), with average incremental growth over Winter test results of 1 year 3 months. The students did not do any more work in BWS after the initial 12 weeks of usage. Overall, these students improved their performance on the three cognitive tests, following their use of BWS by 3 years 2 months in a period of less than 6 months (23 weeks). Figure 1 shows the physical age at the Spring test (blue line) and cognitive age at each of the three test administrations for each of the 20 students in this group.

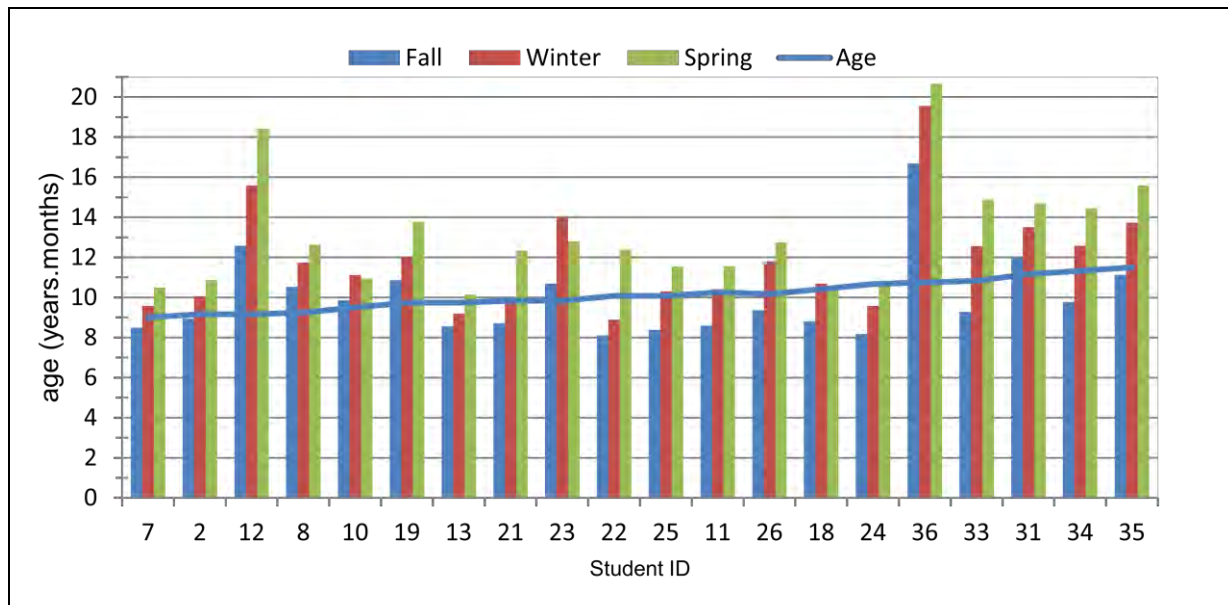


Figure 1: Individual Cognitive Improvement

1. Helms, D, Sawtelle, S.M. *A Study of the Effectiveness of Cognitive Skill Therapy Delivered in a Video-Game Format* Optometry & Vision Development 2007, 38(1).

All but three students continued cognitive development as shown by the Spring test results. For the three students whose performance decreased from Winter to Spring, the decrease was small in comparison to their original growth., yielding overall improvements of 13 months, 25 months and 20 months respectively over the less than 6 months following their use of BWS.

Kansas State Assessment Results

All children who take Kansas State Assessments receive a score which is a percentage correct and a performance category. One criterion to meet AYP for a K-8 school is that 83.7% (reading) and 82.3% (math) of its students meet or exceed the standard (the top three performance categories). Figure 2 shows the percentage of students at Ross in the top three categories in 2009 and 2010. In 2009, only 56% of the students at Ross attained the standard. In 2010 the number increased 9% to 62%. Math scores followed a similar pattern, with 65% of the students meeting the AYP standard in 2009, growing to 72% in 2010.

Although the state considers the percentage of students at or above standard in its AYP determination, it is difficult to make an assessment of progress only on that basis. The following analyses take a more granular view and look at performance by grade for the returning students

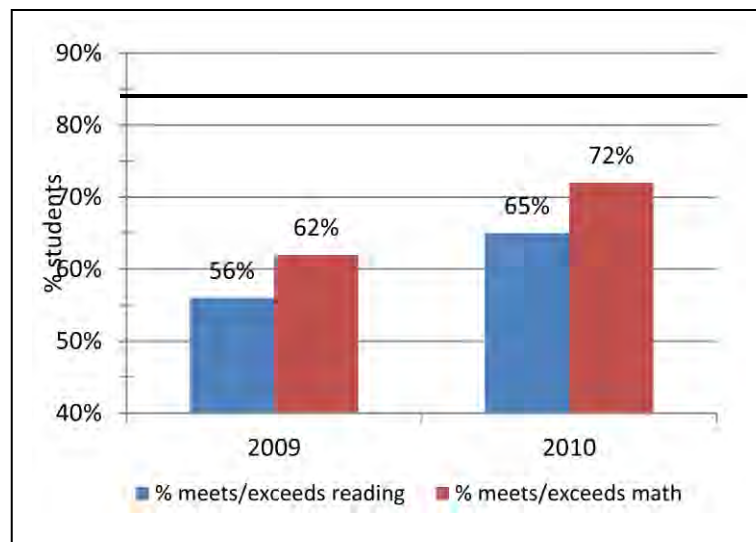


Figure 2: Percentage of Students Meeting or Exceeding Standards in Reading and Math at Ross

Year-to-Year Comparisons for Returning Students

Since changes in overall class performance from one year to the next can be due to class composition, it is helpful to look at the test results for students who attended Ross in both 2009 and 2010. Looking at same-student changes from year to year is a stronger indication of change due to cognitive development.

There were 42 students in Grade 3 2009 that returned to Ross in 2010 and took the reading and math general assessments both years. Of the 2009 4th graders, 29 students returned in 2010 and took the reading and math assessments both years.

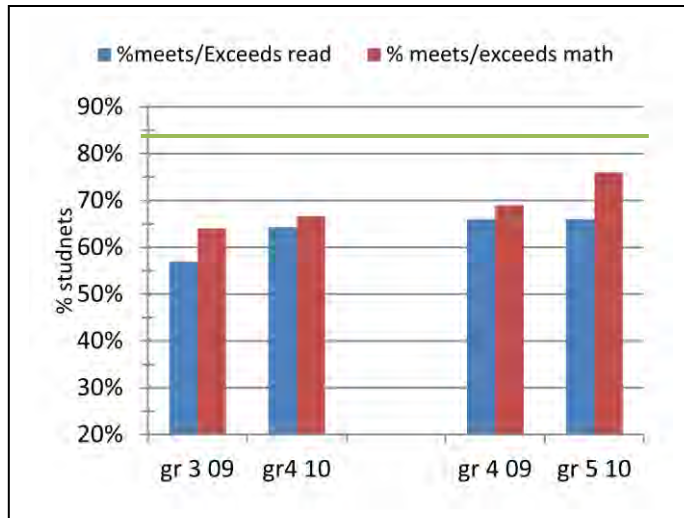


Figure 3: % Returning Students Meeting AYP

As show in Figure 3, the percent of students meeting the reading and math standards increased in 2010.

From grade 3 09 to grade 4 10, the year they used BWS, the percentage of students who met the AYP criterion increased from 57% to 64% in reading and from 64% to 67% in math. From grade 4 09 to grade 5 10, the percentage of students who met the AYP criterion in reading remained the same at 66%, while the math percentage changed from 69% to 76%.

Returning students' average scores also increased, as shown in Figure 4. Grade 3 2009 students had an average score of 64.4% -- 3% below standard. In Grade 4 2010, these same students improved their average score to 70.1% – 2% above the standard.

Grade 4 2009 students had an average score of 69% – 1% above standard. In Grade 5 2010, these students improved their average score to 71% – 3% above standard. The minimum score also improved from 25% to 34% for these students.

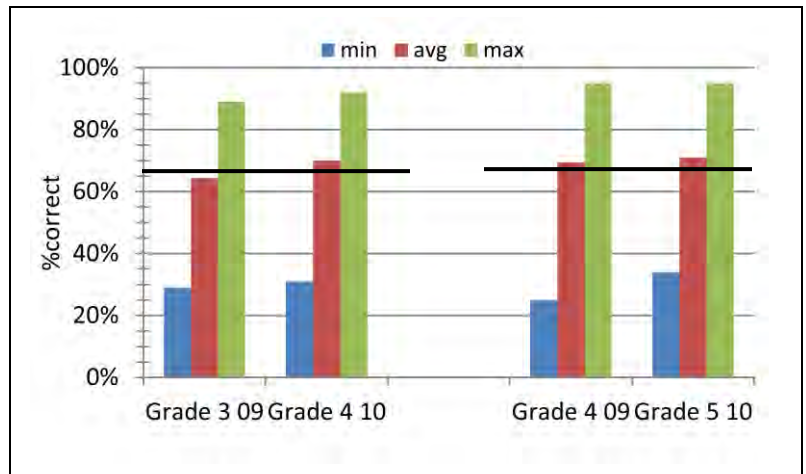


Figure 4: Comparison of Returning Students -- Reading

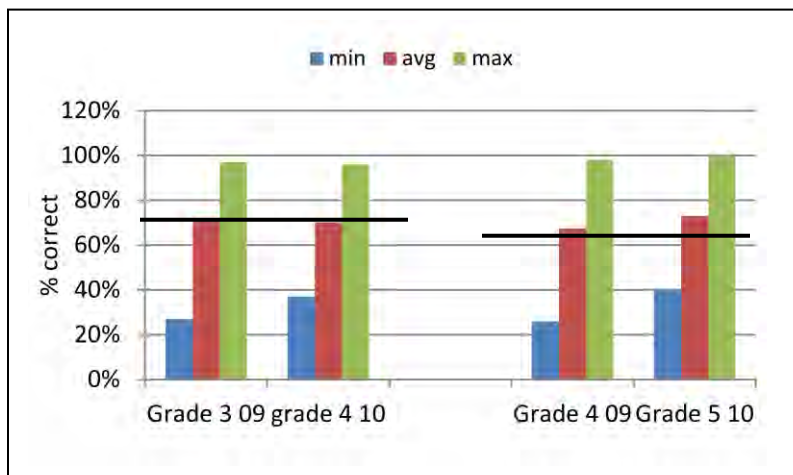


Figure 5: Returning Students Average Score – Math

Returning students' average math scores also increased, as show in Figure 5. The students in Grade 3 2009 had an average score of 71.4% -- 1% above standard. Performance for these same students improved in 2010 to 7% above standard, with an average score of The minimum score rose from 27% to 37%.

The 2009 4th graders had an average score 67.5% – 4% above standard. Performance for these students improved to 73% – 11% above standard in 2010. The minimum score rose from 26% to 40%.

Highlights of Individual Student Progress

Grade - Subject	Key Changes
Grade 3 2009 – Grade 4 2010 Reading	<ul style="list-style-type: none"> • Of 11 students in Academic Warning in 2009, 2 moved up to Approaches Standard and 2 moved up to Meets Standard in 2010. • Of 7 students in Approaches Standard in 2009, 5 moved up to Meets Standard and 1 moved up to Exceeds Standard in 2010
Grade 4 2009 – Grade 5 2010 Reading	<ul style="list-style-type: none"> • Of 6 students in Academic Warning in 2009, 1 moved up to Approaches Standard in 2010. • Of 4 students in Approaches Standard in 2009, 3 moved up to Meets Standard in 2010.
Grade 3 2009 – Grade 4 2010 Math	<ul style="list-style-type: none"> • Of 10 students in Academic Warning in 2009, 4 moved up to Approaches Standard and 1 moved up to Meets Standard in 2010. • Of 5 students in Approaches Standard, 2 moved up to Meets Standard.
Grade 4 2009 – Grade 5 2010 Math	<ul style="list-style-type: none"> • Of 6 students in Academic Warning in 2010, 2 moved up to Approaches and 1 moved up to Meets Standard in 2010. • Of 3 students in Approaches Standard, 2 moved up to Meets Standard. • Of 6 students in Meets Standard in 2010, 5 moved up to Exceeds and 1 moved up to Exemplary in 2010.

Conclusions and Recommendations

This study confirmed the beneficial effects of BWS use at Ross Elementary. Students experienced accelerated cognitive growth, consistent with previous research, following their use of the program. This study further demonstrated that the acceleration in cognitive growth persists in the period following use of the program, even though the students are engaged in no specific ongoing cognitive training.

Academic performance of the students at Ross also improved significantly following students' use of BWS. The fact that same-student growth is seen indicates that the improvements seen were related to use of the program rather than to class composition.

Ross Elementary should consider institutionalizing the use of BWS for all 3rd grade students as well as all students new to the school. The results suggest that a broader implementation in other schools within the district could extend the benefits of cognitive development and improved academic performance to a larger population of students.