



In the 2009-2010 school year, Pope John Paul II (PJPII) in Lecanto, Florida used BrainWare Safari for the first time, as an afterschool program. While they found that experience worth the effort, they also saw the potential for greater value by placing BrainWare Safari as part of the 3rd grade curriculum during the school day and evaluating the results with more than just observations from parents and staff.

In 2010-2011, PJPII allocated time in school and had a teacher dedicated to working with the students as they used BrainWare Safari. The students used BrainWare Safari January 2011 through May 2011 for 17 weeks. The nationally normed Cognitive Abilities Test (CogAT) was used to assess the students' cognitive abilities before (Pre-assessment) and following (Post-Assessment) their use of the program.

In previous research, use of BrainWare Safari has resulted in significant gains across all sections of the CogAT. The students in the 3rd grade at PJPII in the 2010-11 school year showed comparable gains in all areas. Improvements in CogAT scores indicate growth in the ability to reason with words, quantitative concepts and nonverbal (spatial) pictures which are indicative of academic and cognitive abilities.

BrainWare Safari Usage

A total of 21 students used BrainWare Safari in the 2010-2011 school year. Of those 21, 13 were pre- and post-assessed with the CogAT¹. The PJPII-2010 students used BrainWare Safari for 17 weeks, averaging 46 ± 5.2 days with a minimum of 39 and maximum of 59 and averaged 3 ± 0.3 sessions per week. They completed an average of 146 ± 17.6 levels with a minimum of 106 and maximum of 168. The average levels completed by third grade students, in prior studies, is 105 ± 16 with minimum of 55 and maximum of 168. Thus, the PJPII students completed on average a higher number of levels. The higher than average number of levels completed may be related to them using the program over a somewhat longer period of time (17 vs. 12 weeks) and may also be attributable to strong, supportive coaching helping to motivate them to persevere through the hard times.

CogAT

The CogAT is a widely used group-administered test of intellectual ability that is nationally normed and provides a percentile ranking either by age or grade. Using percentile ranking to evaluate progress allows us to see how the abilities of the students compare to others their age. A nationally normed sample means that it is representative of the entire population.

The CogAT provides a measure of developed abilities which reflect the overall efficiency of cognitive processes and strategies that enable individuals to learn new tasks and problems. The assessment consists of three subtests that measures students' abilities to reason with words, quantitative concepts and nonverbal (spatial) pictures.

The three subtests/four scores include:

- Verbal subtest measures the ability to remember, and transition sequences of English words, understand them and make inference and judgments.

1. Four had to be removed from the analysis for either missing data for the calculation of the age percentile or because the student attempted too few questions to receive a score. One was removed due to missing age percentile scores. Three either had BWS but no CogAT score or were missing one of the CogAT scores.

- Quantitative subtest measures understanding basic quantitative concepts, relationships essential for learning math. Tasks measure both the understanding of relational concepts and the student’s ability to discover relationships and to figure out a rule or principle that explains them.
- Nonverbal subtest measures reasoning using pictures and geometric shapes. It reduces the impact of language and appraises the ability to use cognitive resources in new situations.
- Composite score is calculated from the average of the three subtests. It is considered to be a good indicator of the overall strength of the student’s cognitive abilities.

Figure 1 shows the average pre- and post- CogAT percentile scores for the students at PJPII in the 2010-2011 school year.

The average increases in each area are 11 points in Verbal, 22 points Quantitative, 10 points Non-Verbal and 14 points Composite.

A district in South Carolina (SC) has been using BrainWare Safari and testing the students using the CogAT for three years, which allows for a comparison. Table 1 shows the SC and PJPII average increases.

These results are relatively consistent except for scores on the Quantitative subtest. The PJPII students experienced a much higher increase on this test. Further investigation is needed to determine if this is a trend for the school or if there was something unique with this group of students.

Figure 1: Avg percentile points, per subtest/score

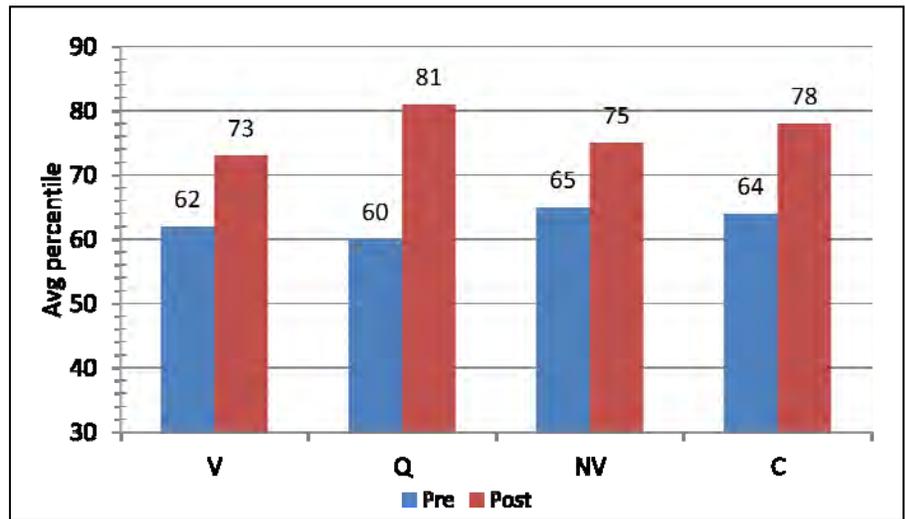


Table 1: Comparison to improvements seen in other studies.

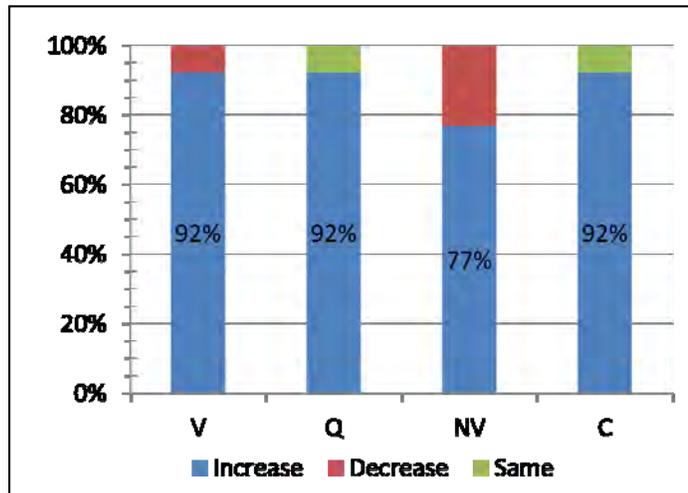
Year (n)	ΔV percentile	ΔQ percentile	ΔNV percentile	ΔC percentile
SC 2008 (64)	12 ± 16	9 ± 17	8 ± 17	11 ± 14
SC 2009 (257)	11 ± 18	8 ± 17	9 ± 19	11 ± 14
SC 2010 (236)	11 ± 20	9 ± 18	7 ± 19	12 ± 15
PJP (13)	11 ± 11	22 ± 21	10 ± 10	14 ± 14

It is fairly well-known that test-takers will fluctuate between administrations of tests, sometimes doing better and sometimes doing worse. When doing an intervention, another way to evaluate the results is to look at the percentage of students that increase, decrease or stay the same.

Figure 2 demonstrates the large percentage of PJPII students that increased their scores following their use of BrainWare Safari in the 2010-2011 school year.

These students exhibited 92% increase in Verbal, Quantitative and Composite scores and a 77% increase in No-Verbal scores. This is a striking result and most likely due to the students' succeeding further into the challenge of BrainWare Safari (completing more levels) than typical children the same age. This again suggests the impact and value of excellent coaching.

Figure 2: Percentage of students exhibiting change



Another striking aspect of the students' growth on the CogAT is the fact that the students' improvements extend to multiple test areas:

- 77% (10 of 13) students improved on all four subtests
- 8% (1 of 13) students improved on three subtests
- 8% (1 of 13) students improved on two subtests.
- 8% (1 of 13) students improved on one subtest.
- No student failed to improve on any subtest.
- In the PJP program, 11 of 13 students improved on at least three subtests .

On average, the PJPII students improved their composite CogAT score from the 64th percentile to the 78th percentile. With a nationally normed test, it is also interesting to determine whether the improvements extended across levels of ability or if it was effective for just a singular group of students. With the CogAT we can use the composite score, which represents overall abilities, to calculate the percentage of students in each grouping from 0-9th percentiles (0's), 10-19th percentiles (10's), 20-29th percentile (20's), etc. for both pre-assessment and post-assessment and evaluate how the percentages change.

Figure 3: Percentage students in each percentile ranking, composite

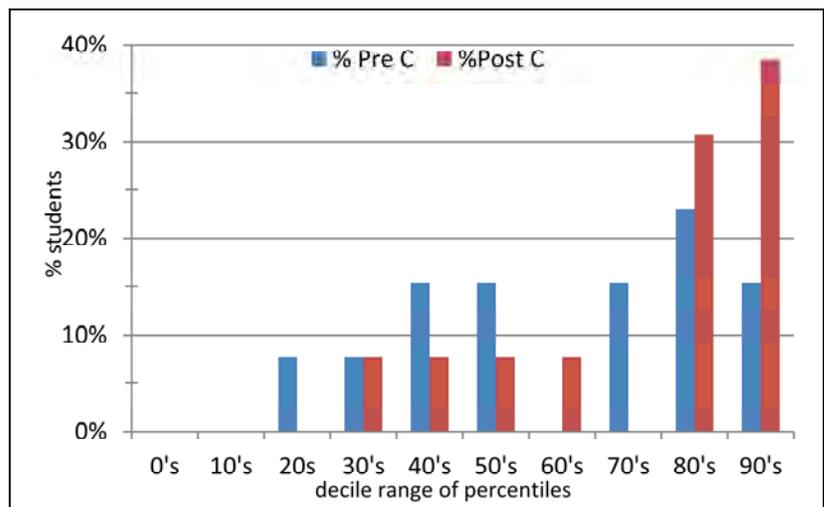


Figure 3 shows the percentage of students in each decile ranking, based on their composite scores. The composite score is the one score that is believed to be the best representation of the overall ability of the student, since it is calculated from the three subtests.

These results demonstrate the broad-based achievements of a grade-level intervention in developing the underlying cognitive skills with increases in the percentage of students in the upper decile ranges and a decrease in the lower percentile ranges. Additional notable changes are that there are no students below the 30th percentile on post-assessment and the increase from 15% to 38% in the 90th percentiles.

Additional results

There were four students² who are not included in the analysis since on pre-assessment they did not answer enough questions on the Quantitative subtest to receive a score. Three of these students did receive a score on the quantitative subtest on post-assessment (see Table 2). These results demonstrate growth in other areas even for students who were unable to be included in the group analysis. All of

Table 2: Students who received no Quantitative score on pre-assessment

ID	Pre V	Post V	Pre Q	Post Q	Pre NV	Post NV	Pre C	Post C
143	27	75	--	89	35	95	--	91
112	33	40	--	45	35	60	--	45
119	45	60	--	8	17	50	--	33

these students scored in the lower percentiles on pre-assessments on the two tests they were able to complete. On post-assessment, two (ID 143 and 112), were able to complete more questions on the quantitative test, scoring in a similar range to their other scores.

Conclusions

The third graders using BrainWare Safari at Pope John Paul II in the 2010-2011 school year to develop their foundational cognitive skills have shown remarkable improvement on the CogAT tests of Verbal, Quantitative, and Non-Verbal abilities and also the Composite score of overall ability with average scores in the four areas ranging from 10 to 22 percentile points.

92% of students increased their Composite score on post-assessment, the score representative of their overall cognitive abilities. 85% increased on at least three of the subtests. The broad-based applicability of BrainWare Safari was also evident looking at the improvements in scores across the full range of abilities, with no student ranked below 30th percentile on post-assessment, and the percentage ranked at the 90th percentile or higher growing from 15% to 38%.

The cognitive growth of the students is very consistent overall with, and slightly better in the Quantitative area compared to previous study results in other schools. The program achieved excellent fidelity to the recommended protocol and higher than expected completion of levels of the program.

2. One student did not receive a quantitative score on either pre- or post-assessment, although there was no indication that two few questions were attempted on post-assessment.