

Interactive Science

Summative Research Overview

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Pearson strongly believes that its programs should be proven through scientific research to increase student achievement. As such, it contracted with independent research group PRES Associates Inc. to conduct a randomized, control trial of its *Pearson Interactive Science* program. The study was conducted in sixth-, seventh-, and eighth-grade classrooms over the 2010–2011 school year. This report summary presents the evaluation design and methods, an assessment of program usage and implementation, student performance results, and a discussion of the findings.

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The purpose of this study was to assess the effectiveness of the *Interactive Science* program in helping students attain critical science skills and document the usage and implementation of the *Interactive Science* program. The study employed an experimental randomized, control trial research design. That is, teachers or classes within each research school were randomly assigned to either use the *Interactive Science* program with their students (also referred to as the “treatment” group) or refrain from using the *Interactive Science* program (also referred to as the “comparison” condition). Teachers assigned to the comparison condition continued usage of their current core science program.

The study addressed the following overarching evaluation questions:

1. Does science ability improve as a result of participation in the *Pearson Interactive Science* program?
2. Do changes in science performance among *Pearson Interactive Science* students vary by types of students and levels of implementation?
3. Does using *Pearson Interactive Science* result in increased student achievement as compared to other types of science programs?
4. Do effects on student science performance between *Pearson Interactive Science* and control students differ across types of students or control programs?
5. Does participation in *Pearson Interactive Science* result in other positive outcomes (e.g., positive attitudes towards science, technology, etc.)?
6. What did users of *Pearson Interactive Science* think about the program?

Participants and Setting

PRES Associates recruited nine schools to participate in the study, including schools in AZ, KY, NV, NY, OH, and PA. The final analytical sample was comprised of 54 classrooms and 1,362 students. The study schools were members of public school districts located in rural, suburban, and rural areas. The study demonstrated variation in ethnicity, socioeconomic status as evidenced by eligibility for free/reduced lunch status, as well as a wide range of science ability levels as evidenced by previous year state science assessment data. Figure 1 presents the full study sample demographics broken out by school.

Figure 1: PRES Associates Pearson Interactive Science RCT
Sample Demographic Information

Student Demographics Distributions*

Characteristics		Control (n=634)		PIS (n=728)		Total (n=1362)		National
		Count	Percent	Count	Percent	Count	Percent	Percent
Gender ($\chi^2(1)=0.292$, $p=.59$)	Male	326	51.4%	385	52.9%	711	52.2%	50.2%
	Female	308	48.6%	343	47.1%	651	47.8%	49.8%
Ethnicity ($\chi^2(1)_{\text{minority}}=0.84$, $p=.36$)	White	494	77.9%	582	79.9%	1076	79.0%	55.0%
	Hispanic	45	7.1%	69	9.5%	114	8.4%	21.5%
	African American	50	7.9%	43	5.9%	93	6.8%	17.0%
	Asian	28	4.4%	28	3.8%	56	4.1%	5.0%
	Other	17	2.7%	6	0.8%	23	1.7%	1.2%
Grade ($\chi^2(2)=13.43$, $p=.001$)	6 th	202	31.9%	173	23.8%	375	27.5%	--
	7 th	218	34.4%	253	34.8%	471	34.6%	--
	8 th	214	33.8%	302	41.5%	516	37.9%	--
Subpopulations								
($\chi^2(1)=9.30$, $p=.002$)	Free/Reduced Lunch Status	85	60.3%	58	42.0%	143	51.3%	45.4%
($\chi^2(1)=1.48$, $p=.23$)	Limited English Proficiency	42	6.6%	37	5.1%	79	5.8%	9.6%
($\chi^2(1)=3.09$, $p=.08$)	Special Ed Status	56	8.8%	46	6.3%	102	7.5%	13.6%
($\chi^2(2)=5.11$, $p=.08$)	Low Science Level	131	20.9%	131	18.5%	262	19.7%	--
	Mid Science Level	280	44.7%	291	41.2%	571	42.8%	--
	High Science Level	215	34.3%	285	40.3%	500	37.5%	--

*Counts (and percents) do not include missing information. Ability level was determined by percentile standing on the TerraNova pretest. Students scoring at the top 33rd percentile were classified as high, students scoring at the bottom 33rd percentile were classified as low, and students scoring at the middle 66th percentile were classified as mid level.

Measures

Multiple measures were used to assess student achievement, program implementation, and student attitudes.

Evaluators selected the *TerraNova*, Third Edition Complete Battery Science test to measure changes in student science skills because of its broad visibility and acceptance in the field and high technical merit. The *TerraNova* is a standardized, norm-referenced assessment that is group administered. The science test consists of 40 multiple-choice questions measuring the following areas of science: Science Inquiry, Physical Science, Life Science, Earth and Space Science, Science and Technology, and Scientific Inquiry. Students were administered the science portion of the *TerraNova* Level 16, 17 and 18 tests for grades 6, 7 and 8 respectively. The pre-test was administered within one month of the start of school and the post-test was administered within one month of the conclusion of school.

Additionally, a supplemental assessment was developed that included fill-in-the-blank and constructed response test items. An item was first created that covered typical middle school concepts in Life, Earth, and Physical Science, and Science and Technology. Items were drawn from the item bank in order to customize the assessment for each grade level and school. The assessments were worth 50 points and contain 30 multiple-choice items, 10 fill-in-the-blank items, and 5 short answer items. The vast majority of items were drawn from released state science assessments, TIMSS, and NAEP, although in a very few instances, custom-developed items were embedded to measure content taught.

In order to measure program implementation and teacher perceptions, evaluators collected data through observations, surveys, and interviews with science teachers. Science teachers (treatment and comparison) also completed monthly implementation logs. The biannual classroom observations and interviews with classroom teachers provided critical insight into the nature of use and effect of the science materials used with treatment and comparison students.

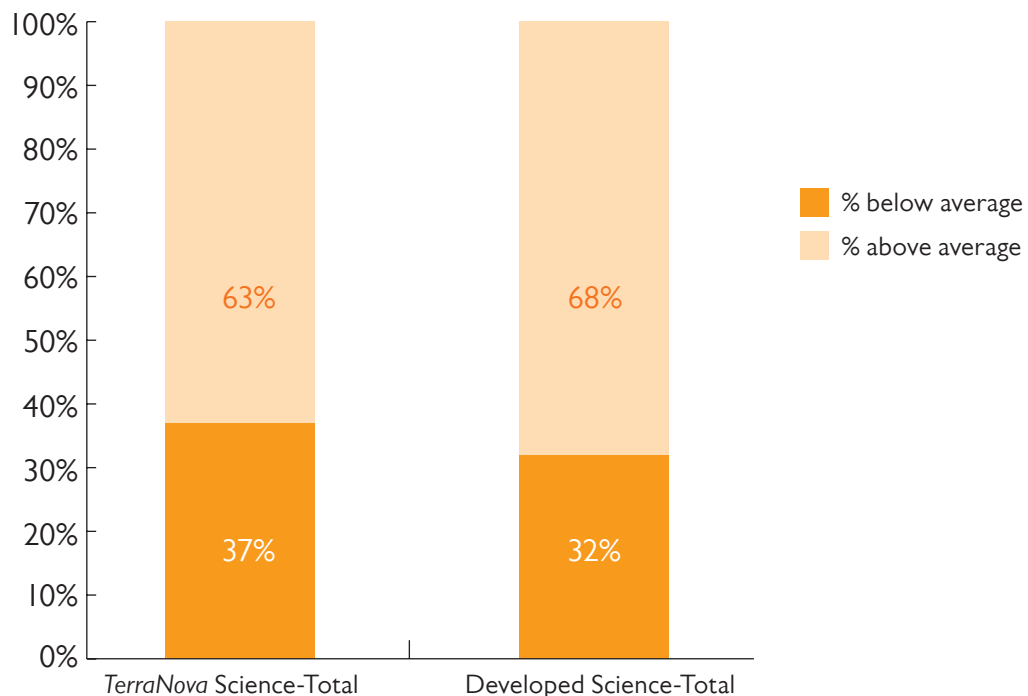
Additionally, student academic attitude surveys were administered in Fall of 2010 and Spring 2011. The survey was developed by PRES Associates with some items being developed by PRES Associates and others derived from additional measures with published reliability and validity. The survey primarily measured perceived science ability, enjoyment of science, perceived relevance/usefulness of science, and science- and school-related effort.

Performance Results

Results for All Pearson Interactive Science Users versus other Core Science Programs

Evaluators conducted analyses to examine how *Pearson Interactive Science* students performed in comparison to students using other core science programs. Results showed positive effects of the *Pearson Interactive Science* program. Students who used *Pearson Interactive Science* experienced significantly greater improvement in science on the Developed Science test than their peers using other core science programs at grades six, seven and eight. These results can be seen in Figure 2.

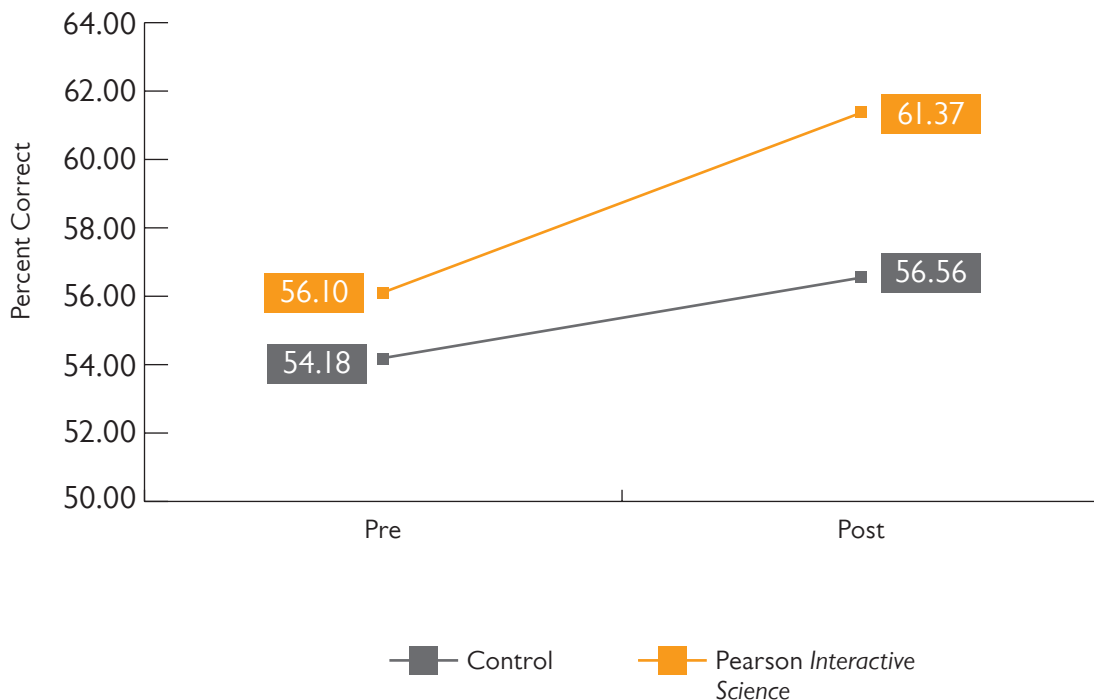
Figure 2: Percent of Pearson Interactive Science Students Above and Below Average Relative to Control Students: TerraNova and Developed Science Tests



These results are both statistically and educationally meaningful, as evidenced by small to moderate effect sizes ($d=.33$ to $.46$). These effect sizes translate to *Pearson Interactive Science* being 18 percentile points higher than control students on the Developed Science Test. Additionally *Pearson Interactive Science* students marginally significantly outperformed the comparison students and were 13 percentile points higher on the *TerraNova* science test.

Evaluators also conducted analyses on the *TerraNova* and Developed Science subtests and content areas. Overall, *Pearson Interactive Science* students were 11 to 20 percentile points higher as compared to the average of comparison students across subtests and content areas. Specifically, when tests for each *TerraNova* science content area were examined separately, results showed that when pretest performance was controlled for, significant differences were observed on the posttest for Scientific Inquiry and Science & Technology. *Pearson Interactive Science* students had significantly greater learning gains from pre- to post-testing on Scientific Inquiry and Life Science as compared to students using other science programs, $p<.05$. Results for Life Science are presented in Figure 3. Findings for the Scientific Inquiry subtest indicate that *Pearson Interactive Science* students outperformed control students in their ability to interpret data and their understanding of scientific methods and design.

Figure 3: TerraNova Life Science Pre-Post Performance of PIS and Control Students



Results for Subgroups: Pearson Interactive Science versus other Core Science Programs

Evaluators examined if there were differences in performance between different subgroups of *Pearson Interactive Science* students and students using other science programs, subgroup effects were analyzed. Specifically, differences between PIS and control students in the following subgroups were examined: grade, gender, minority status, free/reduced lunch status, special education status, English Language Learner status, science ability level, and type of control program. Results by student subgroups showed that there were no significant subgroup effects. *Pearson Interactive Science* students and those using other science programs performed similarly at post-testing after controlling for pretest performance.

Pearson Interactive Science Implementation

Pearson Interactive Science teachers implemented the program during core science instruction in grades six to eight over the course of one school year. Three levels of implementation (low, moderate, and high) were assigned for teachers' implementation of key *Pearson Interactive Science* components. Overall approximately 82% of classrooms were exposed to key *Pearson Interactive Science* program components with moderate to high fidelity. These results can be seen in Figure 4.

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Level of Pearson Interactive Science Implementation	Completion of Key Program Components
High	80% or higher consistent completion of PIS components= 7 classes
Moderate	60%–79% consistent completion of PIS components = 16 classes
Low	Less than 60% of goals met = 5 classes

Participant Feedback

Student Attitudes

In addition to providing evidence of efficacy, PRES Associates investigated other outcomes associated with use of the *Pearson Interactive Science* program. A student survey was developed to primarily measure perceived science ability, enjoyment of science, perceived relevance/usefulness of science, and science- and school-related efforts and aspirations. Additionally, students were surveyed on satisfaction with their science program.

Results showed that *Pearson Interactive Science* was associated with positive student attitudes. Approximately 80% of *Pearson Interactive Science* students reported enjoying the program with the majority reporting they would like to use the program again next year. Students felt the program was easy to understand, engaging, and well-organized. They generally rated *Pearson Interactive Science* as better than their prior science program.

Pearson Interactive Science students felt the consumable student edition provided them with useful information to learn and understand science which was facilitated by the Lab Zones and visual representations. Students using *Pearson Interactive Science* felt the program helped them make connections between science, real world applications, and other subject areas. Students using other science programs felt more strongly about their science abilities and indicated that their science program prepared them to do well in state/national tests and future science courses to a greater extent than treatment students.

Teacher Attitudes

The teacher response to the *Pearson Interactive Science* was overwhelmingly positive. Approximately 87.5% of *Pearson Interactive Science* teachers reported enjoying the program. The majority of teachers also reported they would like to use the program during the following school year. While teachers noted a variety of specific program components they like best, three emerged as favorites for many teachers: 1) consumable student edition, 2) lab activities, and 3) online digital path. Teachers reported that they really liked that students could write in their student edition and actively participate and interact with the text. They also liked the student ownership aspect of the consumable student edition.

Teachers using *Pearson Interactive Science* reported being better prepared to teach various science content areas from fall to spring. Additionally they reported that they engaged in more activities designed to assist in problem-solving skills and tended to emphasize test taking skills, science review, and inquiry skill concepts to a greater extent than comparison teachers. The vast majority of *Pearson Interactive Science* teachers felt the program helped students make connections between science, real world applications, and other subject areas. Comparison teachers generally had higher perceptions about their programs' assistance with differentiated instruction, progress monitoring, lesson preparation, and pacing.

Conclusion

The breadth and depth of research that supports this program provides evidence that *Pearson Interactive Science* is effective at increasing student science achievement. In addition, independent evaluators found that *Pearson Interactive Science* students statistically outperformed students using other core science programs. Teachers and students using *Pearson Interactive Science* reported satisfaction with the program. In sum, scientific research indicates that the *Pearson Interactive Science* program is an effective and useful science program for both teachers and students.

About PRES Associates, Inc.

Planning, Research & Evaluation Services (PRES) Associates provides comprehensive research and evaluation services designed to give clients the useful, objective, and accurate information required in a results-oriented world. Specializing in the fields of education and human services, PRES Associates was founded in 1999 and brings over fifteen years of experience in educational and human services research and evaluation to the firm. PRES Associates staff members have conducted numerous projects in the governmental, non-profit, and for-profit sectors. Learn more at www.presassociates.com.

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