



Dr. Donna Hargens, Superintendent

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# **Program Evaluation 2012-2013**

## **Kentucky Science Center After-School Enrichment Pilot Program**

**Interim Report**

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# **Kentucky Science Center After-School Enrichment Pilot Program**

2012-2013 Interim Program Evaluation Report

## **Background**

This evaluation report describes the interim outcomes from year one of a science enrichment program conducted by the Kentucky Science Center in collaboration with the Jefferson County Public Schools (JCPS). This effort was funded by the JCPS and is aligned with the JCPS Strategic Plan Focus Area *Stakeholder Involvement/Engagement*, Goal3, *Parents, community, and partners enrich students' educational experiences and support their success and the following strategies:*

- 3.2: Increase the number of out-of –school hours,
- 3.3: Increase the number of community-based opportunities/experiences

Though gains in science proficiency for JCPS elementary students were made on the state assessment in science for 2012, JCPS still lags behind the state in proficiency (i.e., 55.3% vs. 68.8%, respectively). In fact, JCPS has a 5-year trend of lagging behind the state in science proficiency. Last year, JCPS elementary students gained 1% in proficiency while the state lost .7% in proficiency. The goal of the KSC pilot after-school enrichment program was to accelerate the science assessment growth for proficiency seen in 2012 for JCPS elementary students.

## **Program Design**

Five JCPS elementary schools participated in the pilot program: Byck, Cochrane, Foster, Mcferran, and Shelby Traditional. The free and reduced lunch rate for these schools ranges from 83.1% to 92.2% - the average for all JCPS elementary schools is 67%. Table 1 shows that all schools except Mcferran had a lower rate of proficient/distinguished students than the district average for science.

Table 1. Jefferson County Public Schools Kentucky's Unbridled Learning Assessment 2012 Next-Generation Learners (NXGL) Science Achievement

Elementary Schools	Total Students	Novice	Apprentice	Proficient	Distinguished	Achievement Points*
Byck	85	14.1	31.8	34.1	20.0	14.6
Cochran	55	25.5	50.9	21.8	1.8	9.8
Foster Traditional	114	23.7	39.5	28.9	7.9	11.3
Mcferran	115	4.3	33.9	40.9	20.9	17.4
Shelby	102	14.7	42.2	34.3	8.8	12.8
JCPS Elementary	7,316	12.3	32.3	36.3	19.1	15

\*The Unbridled Learning Assessment system awards 1 point for each percent of students scoring proficient or distinguished, 1/2 point awarded for each percent of students scoring apprentice, no points for novice students, 1/2 bonus point for distinguished that doesn't overcompensate for novice.

The after-school sessions were conducted on March 7, March 14, March 21, March 28, April 11, and April 18. A culminating event at the KSC for all students enrolled in the schools and their families was held on April 25<sup>th</sup>. Each session lasted 90 minutes at each school from 4pm to 5:30 pm and was led by a KSC educator. The culminating event lasted from 5-8pm at the KSC and was open to all students and families. Weekly activities were common across all sites but on a six week rotation, meaning that different activities were happening at each site weekly but students had the same set of activities by the final session. Sessions used an inquiry-based framework for instruction and demonstration that provided students to engage in specific scientific and engineering practices using a variety of learning modalities (e.g., kinesthetic, visual). Sessions also included a note booking component. Content addressed: (a) circuits, (b) adaptations, (c) force & motion, (d) states of matter, (e) erosion, and (f) food webs. The JCPS Director of Curriculum Management provided input to the KSC in selecting the content. Additionally, math skills of measurement, conversion, fractions and graphing were incorporated as well as the language arts skills of comprehending informational text, developing conceptual maps, developing arguments and speaking skills were integrated. The culminating event at the KSC provided students with hands-on stations connected to the science content and viewing of the IMAX film *Born to be Wild*.

### Evaluation

Session attendance, performance on a science content pre/post assessment, and student responses on a satisfaction survey provided formative evaluation data. Performance on the 2013 K-Prep assessment in science will provide summative data for this initiative. The research questions were as follows:

1. What would the student attendance rate be for an engaging content-based after-school program?
2. Would content knowledge significantly improve by the final after-school session?
3. Will participation in the after-school program lead to better performance on the 2013 K-Prep science assessment?
4. How would students report their satisfaction with the after-school pilot program?

The JCPS evaluator and KSC program staff worked collaboratively in planning and creating the evaluation materials. The KSC educators maintained an attendance log for each session, administered the pre and post-test assessment, and satisfaction survey. The KSC developed and scored the pre and post-test assessment. The evaluator developed and analyzed the satisfaction survey, as well as analyzing the attendance and pre-post test data provided by KSC staff.

This report is considered interim because the K-Prep student-level results will not be available until the fall of 2013 at which time the report will be updated and finalized.

### Approach

Ten fourth grade students per site were selected by each school principal based on former K-Prep performance in reading – students categorized as “high novice”, “apprentice”, or “low proficient” were given priority status for inclusion since reading performance is typically highly correlated with science performance on assessment tests. There were a few requests from principals to deviate from this selection criterion, or to add an extra student, and those requests were honored. Principals gained parent/guardian permission for student participation. Participation was limited to those who had their own transportation since none was provided. Note that reading was selected as a correlate because students are tested for the first time in science at the end of their fourth grade year. Fifty-two students were initially enrolled in the after-school program (two schools selected 11 students). One of those students never attended a session and was never replaced.

The content pre-test was administered at the beginning of Session 1 with the post-test and survey administered at the end of Session 6. Attendance was taken during each session. All formative data was analyzed using descriptive statistics. The summative component of the evaluation will compare the pilot group to a comparable control group on outcomes for the K-PREP science assessment while controlling for confounding variables such as differences in socio-economic status or reading ability.

### **Results**

#### Attendance

***After-School Sessions.*** The overall rate of attendance for the after-school sessions for all schools was 77.72%. This equates to 363.75 total hours of enrichment for the 51 students. Attendance varied by session date as shown below:

- Session 1: 94.2%
- Session 2: 78.9

- Session 3: 74.1%
- Session 4: 73.1%
- Session 5: 73.1%
- Session 6: 73.1%

Attendance also varied by school with overall attendance for each school as follows:

- Byck: 59.2%
- Cochran: 81.8%
- Foster Traditional: 76.7%
- Mcferran: 88.6%
- Shelby Traditional 80.8%

Figure 1 shows the attendance rate for each school by session. Anecdotal reports to the evaluator described some students being “double booked” for activities toward the end of the KSC program and being pulled from the program to attend something else. This may account for the drop in attendance at some schools. Attendance at the Byck location declined markedly after the second session and fell to 40% during the final three sessions.

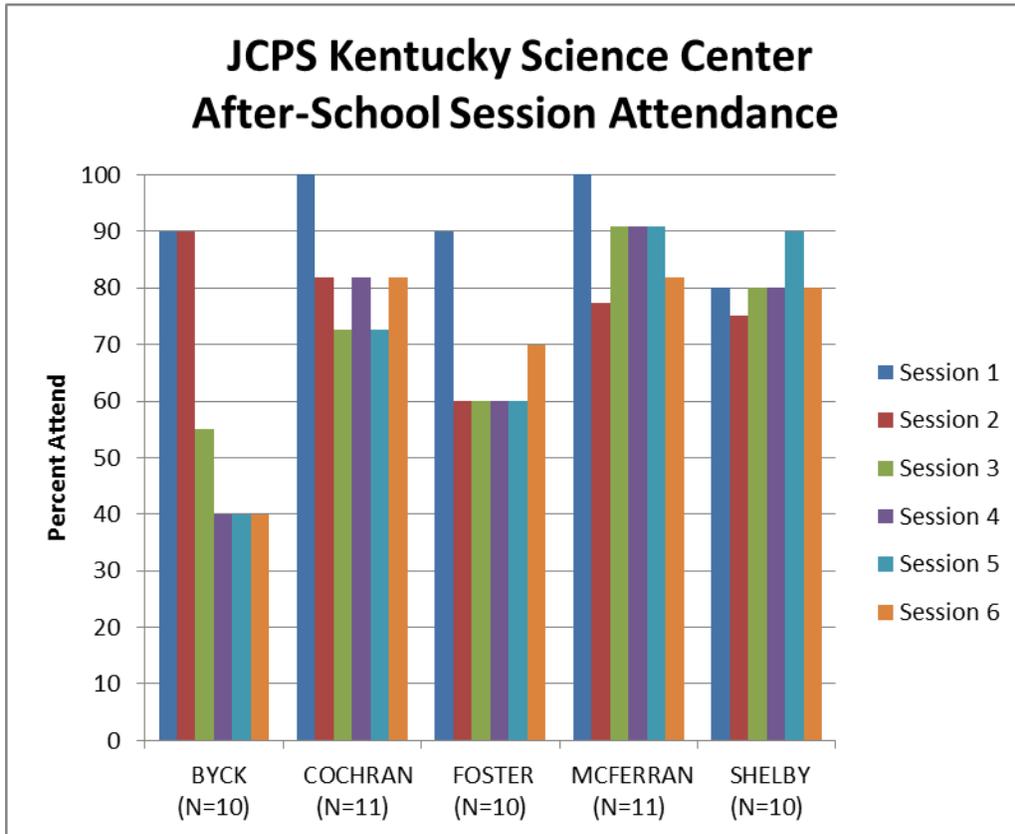


Figure 1. After-school session attendance data.

**Family Night.** Attendance at the Kentucky Science Center varied by location. A total of 77 people attended the event (73 school attendees and 4 JCPS Central Office attendees). Considering that the event was open to all students and families enrolled at each school, attendance was light with 22 attendees who were from the schools but not directly involved in the program (see below):

- Byck: 9 attendees (2 KSC participants, 7 KSC family members)
- Cochran: 25 attendees (4 KSC participants, 9 KSC family members, 12 others)
- Foster Traditional: 14 attendees (2 KSC participants, 7 KSC family members, 5 other)
- Mcferran: 15 attendees (2 KSC participants, 8 KSC family members, 5 other)
- Shelby Traditional: 10 attendees (4 KSC participants, 6 KSC family members)

### Content Knowledge

**Pre-Post Assessment.** Students completed a pre-test (N=47) and post-test (N=30) on the content provided during the after-school sessions. Unfortunately, there was a large discrepancy in the number of students who had both a pre and post-test score, so analysis of knowledge gains was limited. Looking at the change from pre to post-test overall, there was a gain on the post-test for every test item (see Figure 2). The largest gain was for the item “What state of matter is Liquid Nitrogen?” where 29.8% of students answered the question correctly on the pre-test, compared to 73.3% answering the question correctly on the post-test. A sizeable pre-test (34% correct) to post-test (76.7% correct) gain was also made on the item requiring students to organize a series of organisms in the food chain. The data seem to indicate that students were still struggling with the concepts of behavioral and structural adaptations by the end of the pilot program. The overall percent correct for the pre-test was 37.2% and the overall percent correct for the post-test was 60%, a sizeable gain but a failing grade using conventional grading standards.

**K-PREP Results (TBD).**

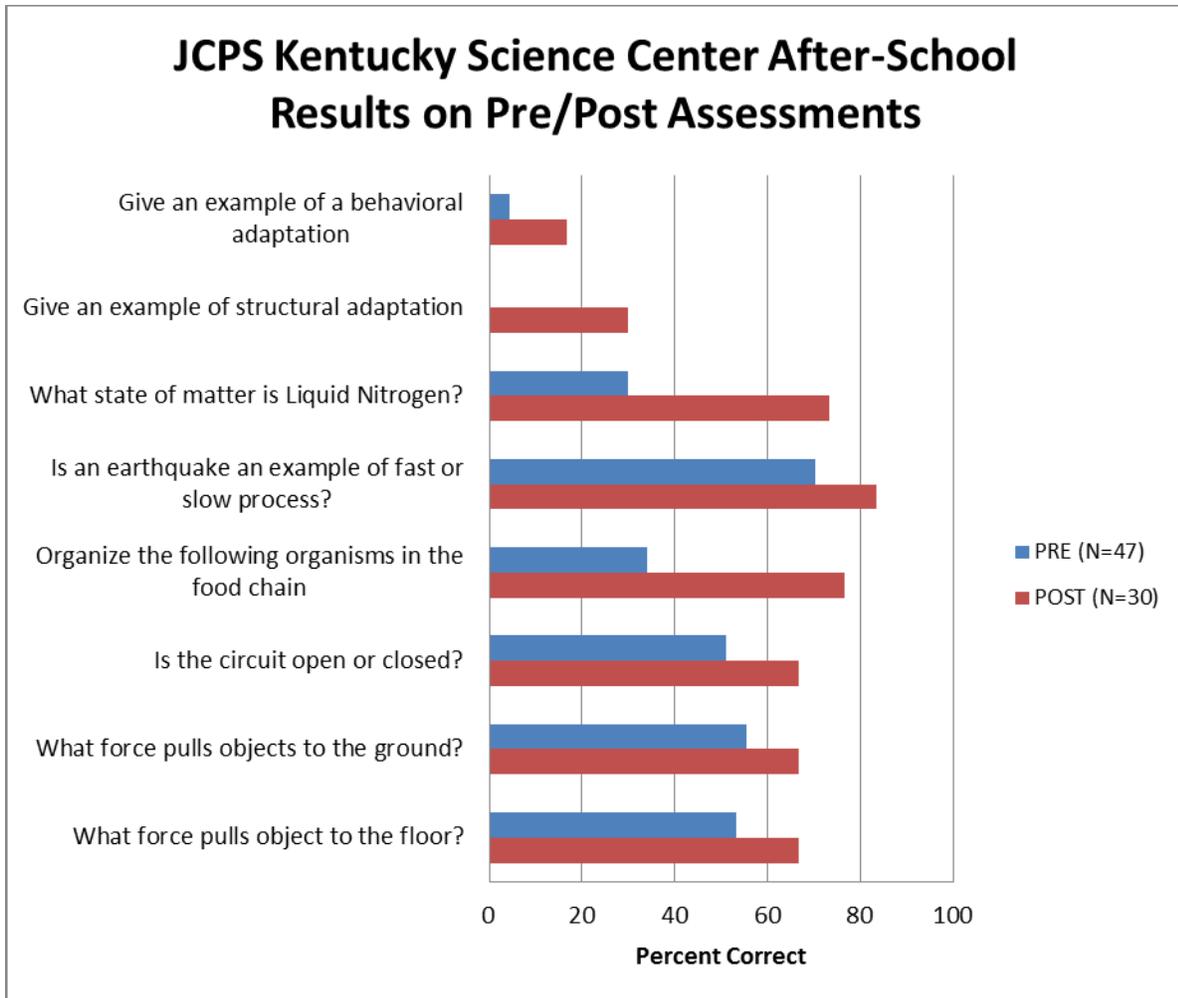


Figure 2. Pre/Post Test Assessments on science content.

Program Satisfaction

All students attending the last session (N=33) completed a survey which contained the following questions:

1. How interesting were the sessions overall?
2. How many opportunities did you have to actively participate in the sessions?
3. How many opportunities did you have to ask questions in the sessions?
4. Would you recommend this program to a friend?
5. Please tell us two of your favorite things about this program (open-ended item).
6. Please tell us how we can improve the program for next time (open-ended item).

Unfortunately, schools varied by location in terms of the number of student who completed the survey: (a) Byck (N=4), (b) Cochran (N=8), (c) Foster Traditional (N=5), (d) Mcferran (N=9), and (e) Shelby Traditional (N=7). The low number of surveys from Byck and Foster make it difficult to compare responses between sites. Responses from the student survey were overwhelmingly positive. The data in Figure 3 show that nearly 97% of the students responded agreed that they found the sessions to be either very “Interesting” (33.3%) or “Extremely Interesting” (63.6%).

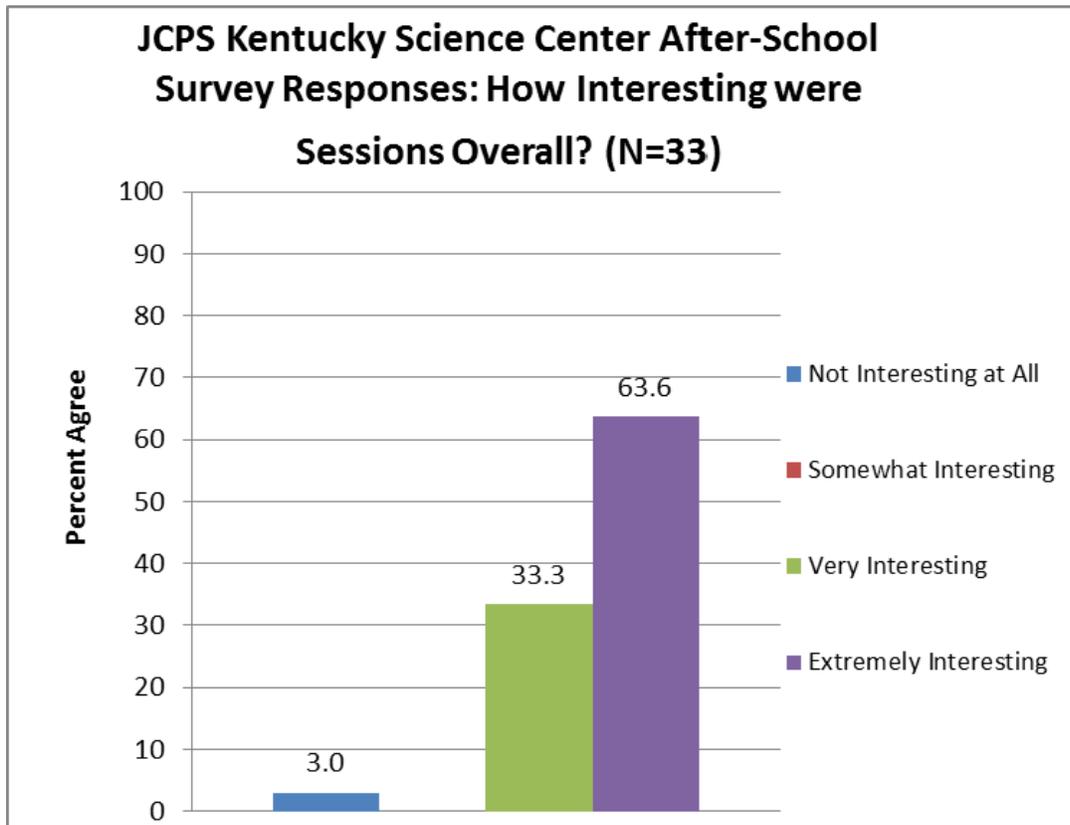


Figure 3. Student ratings of session interest level.

Most students indicated that they had ample opportunities to ask questions during the sessions with 75.7% of students reporting they had either “Lots of Opportunities” or “Constant Opportunities” to ask questions while 24.2% of students reported they had either “Some Opportunities” or “No Opportunities” to ask questions (see Figure 4).

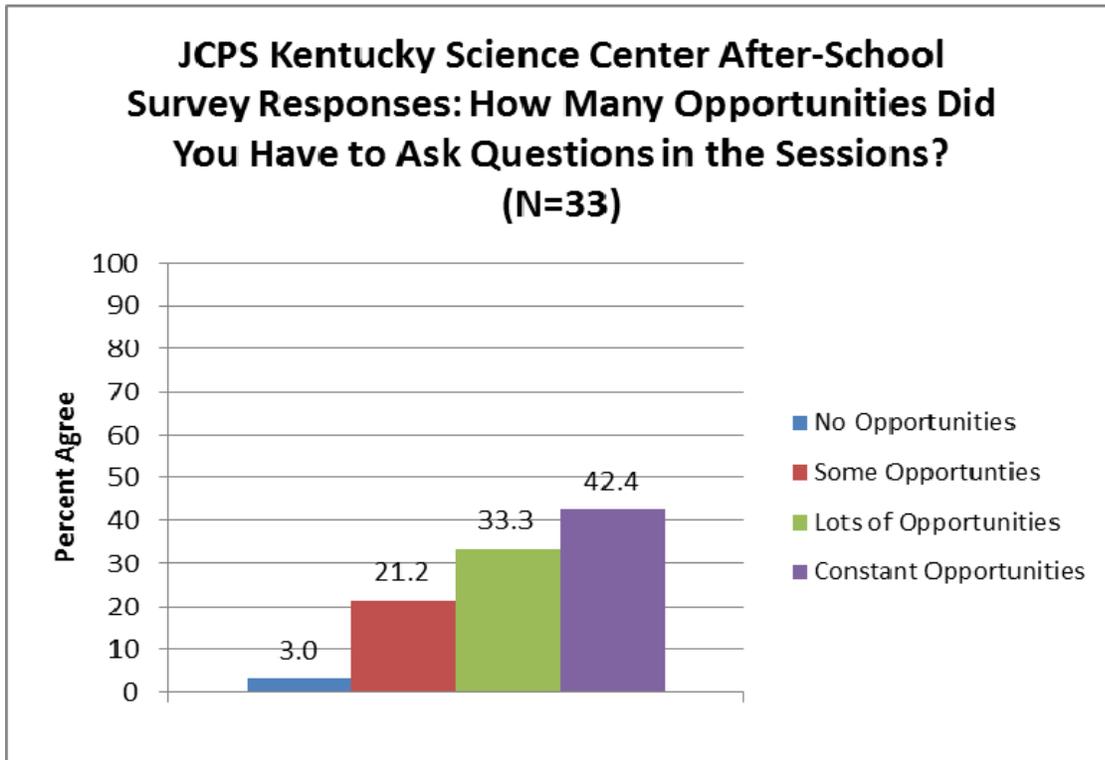


Figure 4. Student ratings of opportunities to ask questions during sessions.

Figure 5 shows that 79.8% of students agreed that there were either “Lots of Opportunities” or “Constant Opportunities” to ask questions; no one reported “No Opportunities” to ask questions.

Figure 6 shows that 97% of students responded either “Probably Yes” or “Definitely Yes” that they would recommend the program to a friend. No one responded “Definitely No” to the question.

Figure 7 shows a Wordle graphic of the question asking students to list their favorite two things about the program. Wordle displays responses scaled to reflect the frequency of responses. The most common favorites of students were the experiments; they particularly liked the experiment which featured liquid nitrogen. Many of the words suggest “active participation” such as “participating” and “learning”, and “seeing”.

Figure 8 shows a Wordle graphic of the question asking students for suggestions for program improvement. Many of the student comments indicated they did not feel any changes were necessary. The words “perfect”, “awesome”, and “change nothing” were used by several

students. There were some comments that indicated behavior may have been an issue at times – “stop talking”, “stop laughing”, and “not talking” are suggestions offered by students. Several students also requested “less writing”, “less math” but wanted “more experiments”.

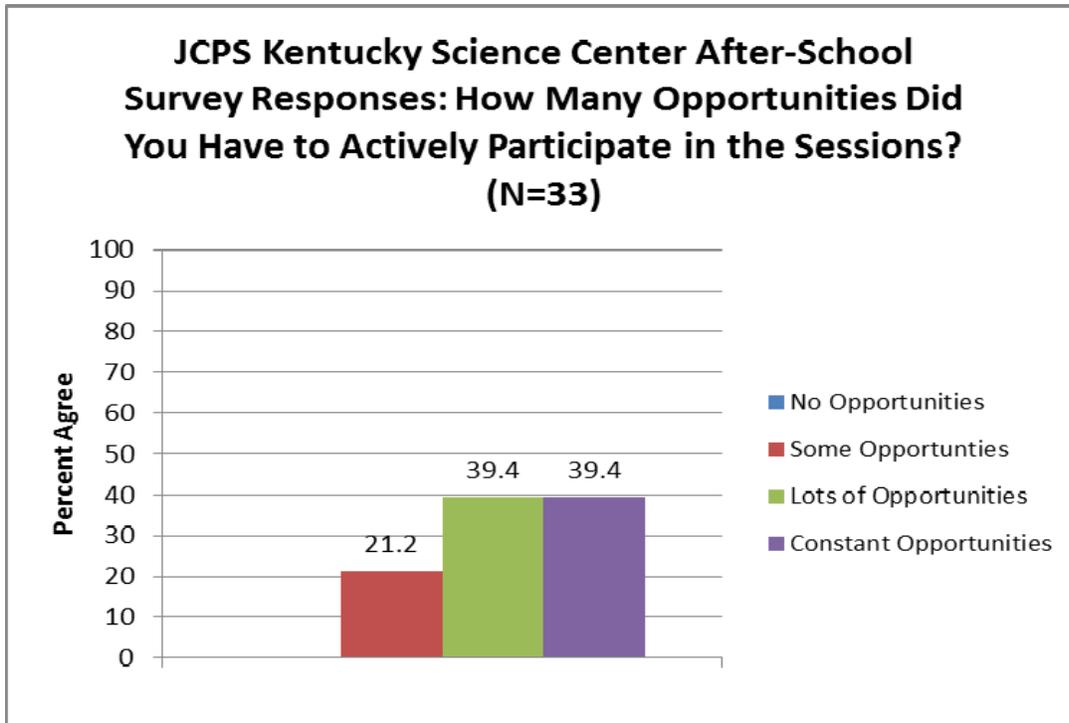


Figure 5. Student ratings of opportunities for active participation.

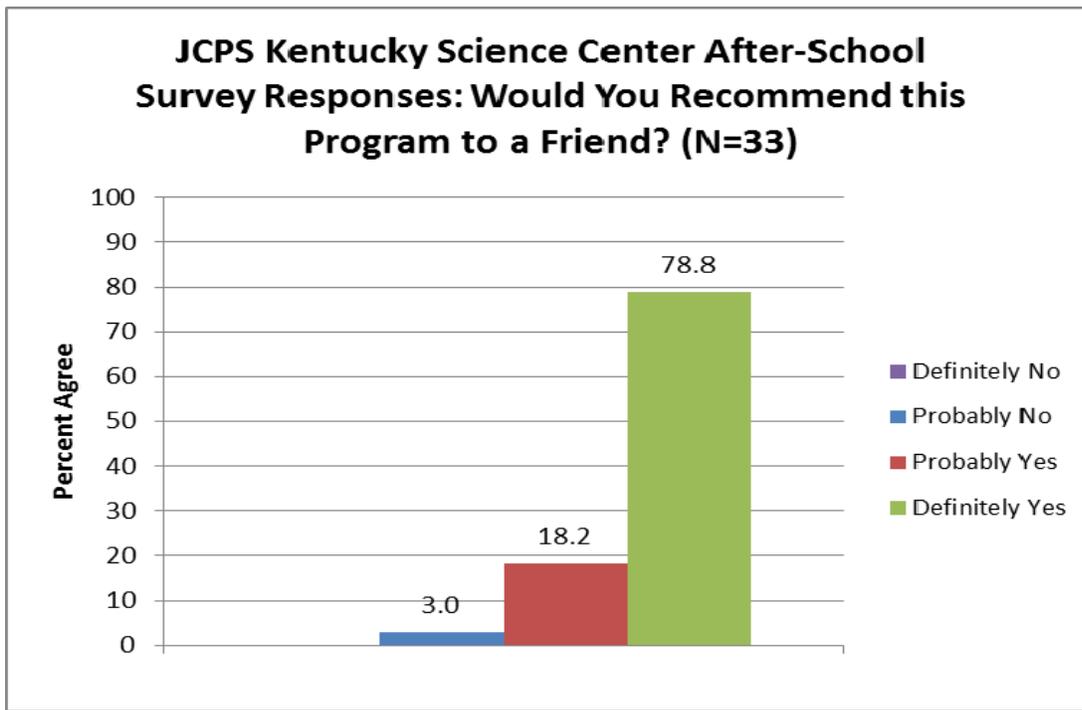


Figure 6. Student ratings of recommending program to a friend.



### Cost

The Kentucky Science Center offered JCPS a 40% discount for the pilot program. The total, discounted price was \$7,200. The full price would have been \$13,600 with \$1600 for the Family Science Night. The discounted price breaks out the following way:

- \$ 240 per site per 90 minute block, up to 20 children (\$1440 per school or \$7200 total).
- Family Science Night, minimum 200 people (free of charge).

With 51 students originally enrolled in the program, the cost per student was \$141.18 with the discounted pricing. Full pricing would have resulted in a cost per student of \$266.67. The KSC pricing indicated a capacity of up to 20 children which would greatly reduce the cost per child; however, both JCPS and the KSC agreed that a 20:1 student to teacher ratio would not have supported the type of inquiry-based, participatory experience desired for the students. The discounted cost per hour for each student was \$15.69. It will be easier to gauge the cost-benefit of the program once 2013 K-PREP science scores are available.

### Conclusions

The evaluation of this program sought to answer the following questions:

1. What would the student attendance rate be for an engaging content-based after-school program?
2. Would content knowledge significantly improve by the final after-school session?
3. Will participation in the after-school program lead to better performance on the 2013 K-Prep science assessment?
4. How would students report their satisfaction with the after-school pilot program?

Student attendance did vary by location and decreased at all locations by the final sessions. Anecdotal reports from KSC leaders indicated that some students were “double booked” for afternoon activities and were pulled out of the session to attend something else. Other students stopped showing up for sessions and the exact reason for their absence is unknown. It is noteworthy that attendance varied quite a bit by location.

Content knowledge increased on all items from pre to post assessment. It appears that students did learn content over the sessions; however, they still showed a lack of understanding for the concepts of structural and behavioral adaptations. ***It will be interesting to see how these students perform on the science component of K-PREP; especially when compared to a control group. That data should be available in the early fall of 2014.***

Overall, students were very satisfied with the pilot program. They seemed very keen on the inquiry-based approach and especially liked hands-on activities. Some students did not like the writing and math components but those complaints did not seem to prevent the majority of students from saying they would recommend the program to a friend. Some comments did indicate issues with behavior during the sessions. Three of the five locations had either a teacher

remain unofficially in the classroom or a principal who “popped” into the classroom regularly. It was reported by KSC personnel that the presence of the extra adults helped with the management of student behavior.

### **Recommendations**

1. Ensure that students selected for participation are available and committed to completing the entire program. They should not be pulled out of the session to attend another activity. Perhaps provide an incentive for program completion such as a coupon to dress-down or have an extra recess.
2. Cultivate parent engagement by hosting a “Parent-Open House” to kick-off the program and provide valuable program information. Send home a parent information sheet after each session that summarizes that session’s learning objectives and gives tips on ways that parents can engage their children in discussing or further exploring that content.
3. Contact the parents of students who miss more than one session and provide timely assistance when behavior issues are raised as a concern.
4. Offer the after-school sessions earlier in the spring so that learning needs can be shared with the teacher of record and hopefully addressed before the K-PREP assessment. Explore possible benefits of JCPS teacher scoring.
5. Consider adding an informal “check for learning” at the end of each session. Learning needs from the former session would be addressed before the next content is begun.
6. Collaborate with the district’s science specialist in future endeavors to ensure that the program addresses common student misunderstandings and aligns with the Next Generation Science Standards.
7. Seek novel approaches to increasing participation at “Family Nights”. Suggestions include providing transportation, raffling a KSC membership to attendees, providing a light dinner, and/or offering a “Science Fair” format where families are invited to see their child actively demonstrating an important science concept.