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Summative Evaluation of *Kinetic City After School*

Report for

AAAS
(American Association for the Advancement of Science)
1200 New York Avenue, N.W.
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by

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PROJECT DESCRIPTION

The summative evaluation reported here focuses on *Kinetic City After School*, a program developed by AAAS (The American Association for the Advancement of Science). One component of this program is the *Omega Pack*, which contains a variety of hands-on activities, research activities, and educational games. An associated interactive, episodic Web site provides users with a variety of episodic adventures intended to teach children about standards-based science and to help them better comprehend the complexities of the world around them. The program combines on-line stories and interactive challenges with off-line hands-on science, creative writing, art and physical education activities. The program is based on Project 2061: Benchmarks for Science Literacy learning goals and pedagogy. The producers intend that by engaging children in a fun, adventure-based after school club in which they become familiar with standards-based learning goals, children will enter the classroom with confidence, with an understanding of critical core science concepts, and with an eagerness to learn more.

EVALUATIONS GOALS

The primary goal for this summative evaluation study is to assess the appeal, usability, and learning outcomes of using *Omega Pack* materials and participating in *Omega Pack* learning activities. The secondary goal for the research encompassed by this report is to inform decision making about the educational content of the *Kinetic City* Web site and its associated learning activities. Towards this end, both descriptive and explanatory findings are reported, based upon feedback obtained from urban minority children in Grades 2–5 about their performance of project activities. Summative evaluation efforts were designed to be naturalistic studies that are intended to inform the decision-making process.

RESEARCH METHODS AND PROCEDURES

Research for this project involved pre- and post-use written student and teacher feedback about their participation in *Omega Pack* learning activities and materials offline, as well as online use of the project's Web site in its designated informal educational context with the appropriate target group (i.e., students in grades 2-5). Test responses, completion of a writing assignment, and feedback were elicited from students at seven elementary school sites located in the Washington, DC metropolitan area.

A total of 92 elementary school students (35 male, 57 female) participated in this study. Data was analyzed to discern the degree to which the *Kinetic City After School* program were able to meet project goals. A site observation and interviews involving two classes were also performed. Research activities extended over the course of six months, beginning in January 2005. Each school performed project designed activities for a period of eight weeks, commencing at a time that best fit their instruction schedule.

EVALUATION FINDINGS

To probe for changes in students' attitudes about science, they were asked at the beginning and end of this study to complete the sentence "I think science is . . . ." The largest attitudinal changes from pre- to post-use are more students think science is interesting, important, something they can do, and something they would like to know more about. In contrast, fewer students think science is

not for them. Probing for further insights into changes regarding attitudes about science, students were asked whether or not they had engaged in any science-related activity at home, just for fun. Prior to performing project designed learning activities 58.7% of the students reported that they had engaged in science related activities at home. Afterwards, 70.7% said that they had.

Examining changes in students' attitudes about pursuing a job that involves science, prior to performing project activities 56.5% of the students reported that they "might" have a job that involves science and an equal percentages of students (21.7%) reported contrasting views that they either "definitely will" or "won't" have a job that involves science. Afterwards, the percentage of students indicating that they "definitely will" have a job that involves science increased while the percentages of students saying that they either "might" of "won't" have such a job decreased.

There are 12 points that were attainable on the test portion of both the pre- and post-use surveys. The post-use mean achievement score for the student sample is 4.96, significantly higher than the pre-use mean score of 2.61. Thus, the learning outcomes resulting from performance of project activities is statistically significant. More specifically, the percentage of correct answers increased for each of the questions from pre- to post-use.

Students were asked to read a four-paragraph passage about the rainforest and then to pretend that they are a creature that lives in the rainforest and write a letter to a friend who lives in the desert describing the rainforest habitat and wildlife. Students were also provided the opportunity to earn extra credit by pretending that they are a desert creature and answer the rainforest creature's letter. The post-use mean achievement score for the letter writing assignment is 1.65, significantly higher than the pre-use mean score of 0.64. Once again, the learning outcomes resulting from performance of project activities is statistically significant. Further, students' post-use letters contain more extensive, detailed, accurate writing than their pre-use letters. The letters are also more reflective of the four-paragraph passage and often accurately extend beyond passage content.

Over the course of a site observation at Seaton Elementary School, performed on April 18, 2005, students offered broad ranging positive comments via one-on-one interviews and small group discussions. Similarly, two participating teachers at this site offered feedback via interviews about the *Kinetic City After School* program. The interviews were performed approximately midway through the period of time their students used these project designed resources. The report contains transcripts of students' and teachers' oral comments. Participating teachers were also asked to submit written reports at the completion of their activities related to this study. To date, five teachers have complied with this request and we are awaiting reports from the remaining two teachers. The reports that we have received are contained in the body of the report.

Summative Evaluation of the *Kinetic City After School*

July 26, 2005

Introduction

The summative evaluation reported here focuses on *Kinetic City After School*, a program developed by AAAS (The American Association for the Advancement of Science). One component of this program is the *Omega Pack*, which contains a variety of hands-on activities, research activities, and educational games. An associated interactive, episodic Web site provides users with a variety of episodic adventures intended to teach children about standards-based science and to help them better comprehend the complexities of the world around them. The program combines on-line stories and interactive challenges with off-line hands-on science, creative writing, art and physical education activities. The program is based on Project 2061: Benchmarks for Science Literacy learning goals and pedagogy. The producers intend that by engaging children in a fun, adventure-based after school club in which they become familiar with standards-based learning goals, children will enter the classroom with confidence, with an understanding of critical core science concepts, and with an eagerness to learn more.

Research Issues and Goals

The primary goal for this summative evaluation study is to assess the appeal, usability, and learning outcomes of using *Omega Pack* materials and participating in *Omega Pack* learning activities. The secondary goal for the research encompassed by this report is to inform decision making about the educational content of the *Kinetic City* Web site and its associated learning activities. Towards this end, both descriptive and explanatory findings are reported, based upon feedback obtained from urban minority children in Grades 2–5 about their performance of project activities. Summative evaluation efforts were designed to be naturalistic studies that are intended to inform the decision-making process. Researchers looked for patterns in the quantitative and qualitative data specified in the following section of this report.

Research Procedures and Measures

Research for this project involved pre- and post-use written student and teacher feedback about *Omega Pack* learning activities and materials off-line, as well as on-line use of the project's Web site in its designated informal educational context with the appropriate target group (i.e., students in grades 2-5). Test responses and feedback were elicited from students at seven elementary school sites located in the Washington, DC metropolitan area. Data was analyzed to discern the degree to which the *Kinetic City After School* program was able to meet its goals.

A site observation involving two classes was also performed. Before, during, and after the observed sessions, researchers noted the activities, attention patterns, comments of *Omega Pack* and Web site users, as well as any observed technical problems. Teachers and their students were also interviewed both individually and in group discussions. The criteria for observing the site were: (1) there needed to be at least twenty-five participating users at the site, and (2) users must be members of the project's primary intended audience, namely urban children enrolled in grades 2-5. Research activities extended over the course of six months, beginning in January 2005. Each school performed project designed activities for a period of eight weeks, commencing at a time that best fit their instruction schedule.

The research procedure involved placing the *Kinetic City After School* learning activities in their designated context (i.e., classrooms and informal after school learning programs) with the appropriate elementary school age target group. The intent for this phase of evaluation is to examine the effectiveness of project components under normal use conditions with the intention of implementing changes that will better serve the learning needs of its users. Toward this end, pre- and post-use questionnaires were administered to assess students' acquisition of standards-based science information; changes in their interests and attitude toward a science as a consequence performing project designed activities; changes of interest in a career that involves science; and changes in motivation to perform science-related activities at home for fun. Questionnaire responses are divided into the following three categories:

Demographic and Background Variables. The pre-use questionnaire established respondents' status with respect to demographic classification variables (gender, grade level, and school) and background classification variables (computer experience, experience exploring the Web, and access to the Internet from home.)

Science Interests. Students identified their attitudes about science both prior to and after participation in project activities. They also reported their science-related activities at home, the types of things they like to do on the Internet, and their interest in a job that involves science.

Science Knowledge. Both the pre- and post-use questionnaires included a knowledge test to assess understanding of science content associated with the project's learning goals. Twelve multiple-choice questions comprised the 12-point test about *Kinetic City* science content. The questions/statements, choices, and correct answers drawn from project activities appear below. Note that correct answers are highlighted by a checked box.

1. Which of the following is true?
   1. ☐ You can learn new facts, but you can't learn new skills.
   2. ☐ The brain is the largest organ in the body.
   3. ☒ Some skills can be practiced until they become automatic.
   4. ☐ Learning is the ability to memorize information.
   5. ☐ I Don't know.
2. Which of these is NOT true?
   1. ☐ Practicing a skill can improve it.
   2. ☐ People have different interests, skills, and talents.
   3. ☐ Muscles can be involved in learning.
   4. ☒ The ability to learn is a key difference between humans and animals.
   5. ☐ I Don't know.
3. The time it takes your body to respond to something you see or hear is called _____.
   1. ☒ reaction time
   2. ☐ sensory time
   3. ☐ brain freeze
   4. ☐ nerve gap
   5. ☐ I Don't know.
4. Which of these works closely with the heart to do a job?
   1. ☐ The stomach
   2. ☒ The lungs
   3. ☐ The brain
   4. ☐ The esophagus
   5. ☐ I Don't know.

5. Which of the following is NOT true?
   1☐ Most organs in the body work closely with other organs.
   2☐ Most organs in the body are parts of systems.
   3☒ Organs are designed to work independently of other organs.
   4☐ Organs all have jobs to do.
   5☐ I Don't know.
6. Why does the heart beat faster when you exercise?
   1☒ Your muscles need more blood pumped to them when you exercise.
   2☐ Exercise tires the heart out.
   3☐ Beating fast is your heart's way of getting you to slow down.
   4☐ Exercising gets you excited.
   5☐ I Don't know.
7. Which is the best way to classify animals?
   1☐ By the they look.
   2☐ By where they live.
   3☒ There is no "best way" to classify animals.
   4☐ By where they are on the family tree.
   5☐ I Don't know.
8. Which statement is NOT true?
   1☒ Some fish can swim, and other fish can't.
   2☐ Some birds can fly, and other birds can't.
   3☐ Some mammals can fly, and other mammals can't.
   4☐ Some plants eat animals.
   5☐ I Don't know.
9. Which of the following animals could be classified together in a group?
   1☐ Bears, wolves and alligators.
   2☐ Alligators, snakes and lizards.
   3☐ Lions, tigers and bears.
   4☒ Any of them could be classified together.
   5☐ I Don't know.
10. Which statement about bird beaks is true?
   1☒ Some beaks are best for eating one type of food, and other beaks are best for eating other types of food.
   2☐ The largest beak is the best, because the bird can eat the most types of food.
   3☐ A bird's beak is designed to let the bird eat the most possible different food types.
   4☐ All of the above.
   5☐ I Don't know.
11. What are adaptations?
   1☐ Features that make a plant of animal either stand out or blend in.
   2☒ Features that help a plant or animal survive in its environment.
   3☐ Changes to the environment that make it hard for plants or animals to survive.
   4☐ Ways that plants and animals change their environment.
   5☐ I Don't know.
12. If you saw a wild animal with very large ears, you could be fairly sure that _____.
   1☐ it hearing is better than its eyesight.
   2☒ the big ears somehow help it survive.
   3☐ it is probably a mutation.
   4☐ other animals make fun of it.
   5☐ I Don't know.

In addition to providing responses to pre- and post-use behavior, attitude, and content questions, students were asked to read a four-paragraph passage about the rainforest and then to pretend that they are a creature that lives in the rainforest and write a letter to a friend who lives in the desert describing the rainforest habitat and wildlife. The intent of this activity is to assess changes in students' ability to write a clear letter making appropriate use of content in the reading sample and to amplify upon the content using information they had acquired over the course of performing project designed learning activities. Students were also provided the opportunity to earn extra credit by pretending that they are a desert creature and answer the rainforest creature's letter.

Scoring of the assignment is based on a 4-point system that took into account variations in the quality of both correct and incorrect responses. The following rubric outlines the scoring method:

4 – a complete and correct letter that communicates accurate scientific and technical information and correctly applies scientific concepts and processes using the vocabulary of science (appropriate for students in grades 2-5), and completed the extra credit assignment;

3 – *a clearly written letter that makes appropriate use of content in the reading sample and contains responses that are correct;*

2 – *an essentially correct letter, but one that omits key detail(s) or underlying explanations and contains inaccuracies;*

1 – a response that is very skimpy, but generally correct, and demonstrates a grasp of the assignment;

0 – a response that is incorrect, no response, or wrote "I don't know."

Demographics

As specified in Table 1, a total of 92 elementary school students (35 male, 57 female) from 7 urban field-test sites located in Washington, DC performed project designed learning activities. All of the sample students responded to written surveys before and after performing *Omega Pack* learning activities and visiting the *Kinetic City* Web site.

Table 1. Urban Field-Test Sites in Washington, DC

	Gender			*Grade*			
Elementary School	*Boys*	*Girls*	***N***	*2nd*	*3rd*	*4th*	*5th*
Garfield	2	3	***5***	–	–	*2*	*3*
Martin Luther King	4	8	***12***	–	*7*	*3*	*2*
Miner	2	5	***7***	–	–	*3*	*4*
Oyster	2	*7*	***9***	*1*	*5*	*3*	–
Park View	8	16	***24***	–	*7*	*17*	–
Seaton	11	12	***23***	–	–	*2*	*21*
Two Rivers	6	6	***12***	*6*	*6*	–	–
Total	***35***	***57***	***92***	***7***	***25***	***30***	***30***

Note that at the time of the study, 7 of the sample students (7.6%) were second graders, 25 students (27.2%) were third graders, 30 students (32.6%) were fourth graders, and another 30 students (32.6%) were in the fifth grade. Note also that there are more female than male students. The large majority of participants are African American; the second most represented ethnic group is Hispanic; a few of the students are Asian Americans; and just a couple are Caucasian.

EVALUATION FINDINGS

As noted in the Demographics section, above, minority elementary students at seven urban elementary schools participated in this evaluation research. A total of 92 students (35 male, 57 female) provided feedback about project activities. As previously specified, the sample students performed activities contained in the project's *Omega Pack* and on the *Kinetic City* Web site. Findings from evaluation research efforts are reported below.

Prior Computer Experience

As specified in Figure 2, a total of 35 (38.0%) students described their ability to use a computer as "Advanced," 16 (17.4%) rated their ability as "Above Average," 23 (25.0%) indicated their ability to use a computer is "Average," and 18 (19.6%) rated themselves as "Just Beginning" computer users.

Table 2. Self-Reported Ability to Use a Computer

Variable	*N*	*Categories*	*Number (Percent)*
Computer Background	92	Advanced	35 (38.0%)
		Above Average	16 (17.4%)
		Average	23 (25.0%)
		Just Beginning	18 (19.6%)

Prior Internet Experience

As indicated in Figure 3, of the 92 students in the sample, 32 (34.8%) reported that they are "Advanced" Web explorers. Another 19 (20.7%) indicated that they are "Above Average" explorers and 15 (16.3%) view themselves as "Average" explorers. The remaining 26 (28.3%) members of the sample describe themselves as "Just Beginning" Web explorers. When asked if they are able to visit the Internet from home, 62 (67.4%) students said "Yes" and 30 (32.6%) said "No."

Table 3. Self-Reported Experience With Exploring the World Wide Web

Variable	*N*	*Categories*	*Number (Percent)**
Internet Background	92	Advanced	32 (34.8%)
		Above Average	19 (20.7%)
		Average	15 (16.3%)
		Just Beginning	26 (28.3%)

*Totals may not equal exactly 100.0% due to rounding.

Both prior to and after participating in *Kinetic City After School* learning activities, students were asked to describe what types of things they do on the Internet, if anything. Responses were sorted into categories and presented in Table 4, on the following page. Nearly a third of the responses referred to playing games. The percentage of references to academic Internet activities increased from 45.5% to 52.8% from pre- to post-use. Note that the greatest increase were reported to be "searching for information" and "visiting science Web sites." Other miscellaneous Internet activities include e-mailing friends, visiting hobby sites, participating in chat rooms, looking for pictures, and downloading music.

Table 4. What Students Do On The Internet

Category	*Pre-Use (Percentage)*	*Post-Use (Percentage)*	*Change*
Play games	30.0%	32.1%	+ 2.1%
Do homework	13.9%	14.2%	+ 0.3%
Search for information	12.3%	15.1%	+ 2.8%
Visit general education sites	7.7%	8.5%	+ 0.8%
Visit science Web sites	6.2%	10.3%	+ 4.1%
Explore the Internet	5.4%	4.7%	– 0.7%
Misc.	24.5%	15.1%	– 9.4%

Changes in Attitudes About Science

To probe for changes in students' attitudes about science, they were asked at the beginning and end of this study to complete the sentence stem: "I think science is . . . ." by checking as many of the sentence endings contained in Table 5 as are expressive of their feelings. Note that the largest attitudinal changes from pre- to post-use can be summarized as follows:

- More students think science is something they can do.
- More students think science is interesting.
- More students would like to know more about science.
- Fewer student think science is not for them.
- More students think science is important

Table 5. Pre- and Post-Use Attitudes About Science

Variable	*Sentence Stem* **I think science is. . .**	*Pre-Use Count**	*Post-Use Count**	*Change*
Attitudes About Science	something I can do.	49	59	+ 10
	boring.	1	2	+ 1
	fun.	65	67	+ 2
	interesting.	60	65	+ 5
	too hard.	5	3	– 2
	something I would like to know more about.	43	52	+ 9
	not for me.	5	2	– 5
	important.	43	46	+ 3
	uninteresting.	1	2	+ 1

Probing for further insights into changes regarding attitudes about science, students were asked whether or not they had engaged in any science-related activity at home, just for fun. Prior to performing project designed learning activities 54 (58.7%) of the students reported that they had. Afterwards, 65 (70.7%) said that they had.

Changes in Attitudes About Jobs Involving Science

Prior to performing project designed activities, participants in this study were asked to indicate which of the sentences contained in Table 6, on the following page, best describes how likely it is that they will want to work in a job that involves science. The largest percentage of students (56.5%) reported that they "might" have a job that involves science. Equal percentages of students (21.7%) reported contrasting views that they either "definitely will" or "won't" have a job that involves science. After performing project activities, students were once again asked this question. Note that the percentage of students indicating that they "definitely will" have a job that involves science increased while the percentages of students saying that they either "might" of "won't" have such a job decreased from pre- to post-use.

Table 6. Pre- and Post-Use Attitudes About a Job Involving Science

Variable	*N*	*Categories*	*Pre-Use Count**	*Post-Use Count**
Job Involving Science	92	I definitely will have a job that involves science.	20 (21.7%)	25 (27.2%)
		I might have a job that involves science.	52 (56.5%)	48 (52.2%)
		I won't have a job that involves science.	20 (21.7%)	19 (20.7%)

*Totals may not equal exactly 100.0% due to rounding.

Measured Learning Outcomes

Learning from project designed content was assessed via the same 12 content questions administered on both the pre- and post-use surveys. There are 12 points that were attainable on the test portion of each survey. The post-use mean achievement score for the whole sample is 4.96, significantly higher than the pre-use mean score of 2.61, as tested by a paired t-test, $t\ (1,91) = 8.067$, $p \leq .0001$. Thus, the learning outcomes resulting from performance of project activities is statistically significant.

With an interest in interaction effects, ANOVAs with interactions and nested factors were calculated for Survey (i.e., Pre, Post) and individual demographic/background variables of Treatment (i.e., *Omega Pack* hands-on activities, *Omega Pack* hands-on + online activities), Gender, School, Grade, Computer experience, Internet experience, and Science attitudes. None of the interactions are statistically significant.

Figure 1 shows the distribution of students' achievement scores for each content question prior to and after performing project designed learning activities. Note that the percentage of correct answers increased for each of the questions from pre- to post-use. Students generally demonstrated the greatest amount of difficulty identifying the set of animals listed in Question 9 that could be accurately classified together in a group.

Figure 1. Distribution of Test Scores by Question for Pre- and Post-Use Surveys

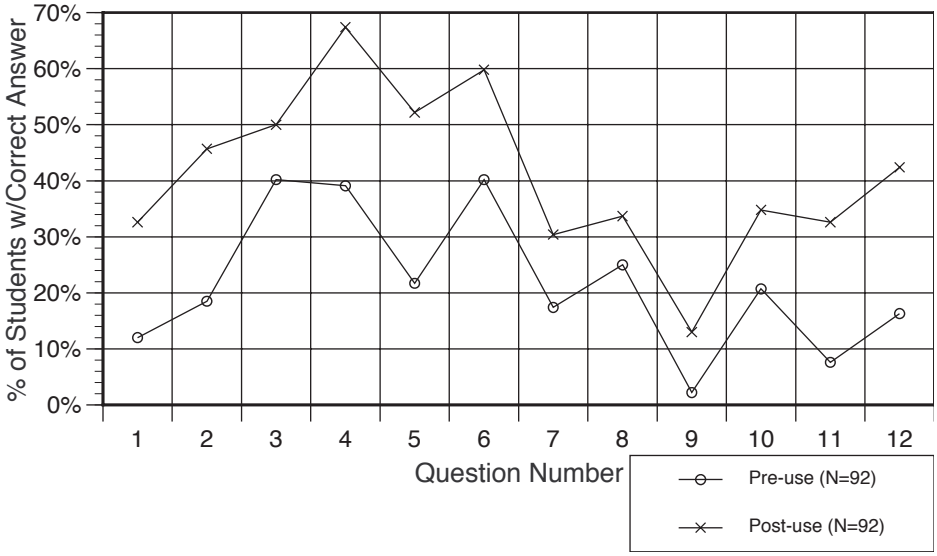


Table 7 presents the pre- and post-use survey results for each individual test item (See the Research Procedures and Methods section at the beginning of this report for wording of the multiple-choice questions and answer options.

Table 7. Comparison of Pre- and Post-Use Test Results

Question Number	*Pre-Use Survey (% Correct)*	*Post-Use Survey (% Correct)*
1	12.0%	32.6%
2	18.5%	45.7%
3	40.2%	50.0%
4	39.1%	67.4%
5	21.7%	52.2%
6	40.2%	59.8%
7	17.4%	30.4%
8	25.0%	33.7%
9	2.2%	13.0%
10	20.7%	34.8%
11	7.6%	32.6%
12	16.3%	42.4%

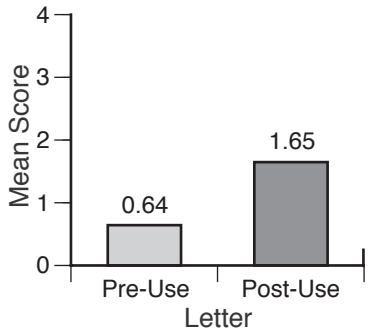
Changes in Students' Ability to Write Clearly and Accurately

As previously specified, students were asked to read a four-paragraph passage about the rainforest and then to pretend that they are a creature that lives in the rainforest and write a letter to a friend who lives in the desert describing the rainforest habitat and wildlife. Students were also provided the opportunity to earn extra credit by pretending that they are a desert creature, and answer the rainforest creature's letter. The following rubric outlines the scoring method:

- 4 – *a complete and correct letter that communicates accurate scientific and technical information and correctly applies scientific concepts and processes using the vocabulary of science (appropriate for students in grades 2-5), and completed the extra credit assignment;*
- 3 – *a clearly written letter that makes appropriate use of content in the reading sample and contains responses that are correct;*
- 2 – *an essentially correct letter, but one that omits key detail(s) or underlying explanations and contains inaccuracies;*
- 1 – *a response that is very skimpy, but generally correct, and demonstrates a grasp of the assignment;*
- 0 – *a response that is incorrect, no response, or wrote "I don't know."*

The post-use mean achievement score for the letter writing assignment is 1.65, significantly higher than the pre-use mean score of 0.64, as tested by a paired t-test, $t\ (1,91) = 7.681$, $p \leq .0001$. Once again, the learning outcomes resulting from performance of project activities is statistically significant. Figure 2, on the following page, presents the mean achievement scores for the pre- and post-use writing assignment.

Figure 2. Distribution of Mean Achievement Scores for Pre- and Post-Use Writing Assignments



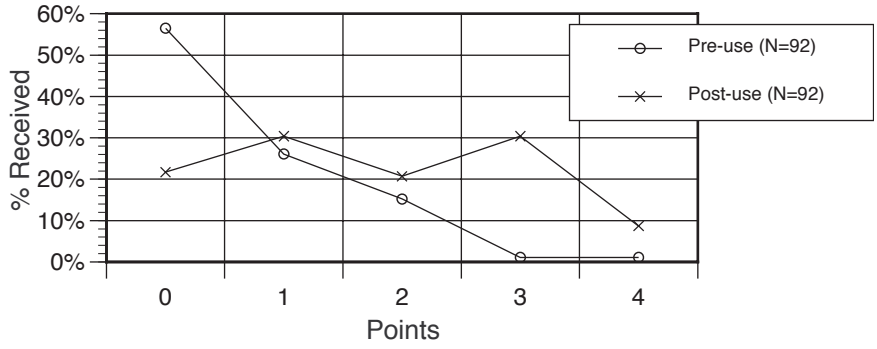
Students' post-use letters contain more extensive, detailed, accurate writing than their pre-use letters. The letters are also more reflective of the four-paragraph passage and often accurately extend beyond passage content. Table 8 presents the distribution of pre- and post-use points received by each student for the letter writing assignment. Note that fewer post-use letters received a zero score (indicating a response that is incorrect, no response, or wrote "I don't know." In addition, a much larger number of post-use letters earned three points for clear accurate writing and appropriate use of content in the reading sample. A larger number of well written post-use letters also received an additional point for satisfactorily completing the extra credit assignment.

Table 6. Distribution of Pre- and Post-Use Letter Score (N=92)

	Number (Percentage) of Points				
	0	*1*	*2*	*3*	*4*
Pre-Use	52 (56.5%)	24 (26.1%)	14 (15.2%)	1 (1.1%)	1 (1.1%)
Post-Use	20 (21.7%)	28 (30.4%)	16 (17.4%)	20 (21.7%)	8 (8.7%)

Figure 3 illustrates the difference between the percentage of points received for the pre- and post-use writing assignments.

Figure 3. Comparison of Pre- and Post-Use Letter Scores



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Feedback Offered by Students via Interviews and Group Discussions

Over the course of a site observation at Seaton Elementary School performed on April 18, 2005 students offered the following broad ranging positive comments via one-on-one interviews and small group discussions:

- "I think these activities are fun."
- "They're more fun than other things we do in class."
- "They're more interesting and you learn a lot."
- "We get to work on the computer and do fun learning activities."
- "It makes me like learning science more."
- "The thing I like most is that we learn things that we didn't know before."
- "I liked learning new things."
- "This helps me understand things we're doing in our regular class."
- "It makes me feel better about learning."
- "I didn't understand this kind of stuff before we started doing these activities."
- "It's interesting and makes science less confusing."
- "I feel better when we do science in my normal class. I didn't understand these things. It seemed hard and now I'm able to keep up."
- "They're a challenge that makes learning better."
- "I like solving the problems and thinking about science stuff, like how animals are alike and fit into groups."
- "I've been learning about what it's like for different things to live other places and how they survive. I didn't know this before.
- "I especially like working with my friends and writing about what I'm learning."
- "I didn't know anything about science and now I feel comfortable standing up in front and telling everyone what I've learned.?
- "I have new ideas and see how things fit together."
- "I like the Web site and earning points, but sometimes the computers weren't working. The other activities and games were good to do too. They make you think a lot."
- "Some things were hard at first, but I got the connections and then it was something I liked doing a lot."
- "I think this is really cool."
- "If I don't get something my friends help me and then help them when I see differences and similarities in things that they don't."
- "I'm able to put things together with science that I learned from doing the activities and solving problems."
- "I like when things are easy to do, but this is sometimes hard and I still like it. Science is more fun than I used to think."
- "I've been using this information in reports for my normal class."
- "I told my teacher science information that she didn't know before. I tell my friends too and they say I'm like a scientist now. I like that."

- "I've been getting better grades on my homework because I like it more and science is interesting. I know more."
- "Sometimes it's boring when I can't find what we're looking for. Then I figure it out and keep going until something else is confusing. I want to keep going until I know all about living things."
- "There isn't anything about the activities that I don't like."
- "Everything was good."
- "It was all good, especially working in groups and sharing ideas."
- "Solving problems is the best part. It's like solving a mystery. It helps me know things and remember them better."
- "I wish we could keep doing these activities. I like what we've been doing."

Feedback Offered by Teachers via Oral Interviews

During the course of a site observation at Seaton Elementary School on April 18, 2005, the two participating teachers at this site offered feedback about the *Kinetic City After School* program. The interviews were performed approximately midway through the period of time their students used these project designed resources. The following are transcripts of their comments:

Teacher #1

"These [Omega Pack] activities support the teaching of science concepts. The students are getting some really good foundation information about major areas of life science. This is a more natural curriculum for the students than what they've experienced in the past. The way this program wants kids to demonstrate knowledge is a totally different approach. They're usually focused on content, but not the context of the content. They come to us and they don't have a grasp of the context, so the learning isn't as meaningful as it can be.

This is more effective. It's fun. In order for these kids to do well, learning activities have to be fun. So, this is definitely something that they're benefiting from. It maintains their interest.

The kids need support from me at the beginning of any new activity, but they begin working on their own more quickly than I've seen in the past, and that's helped their learning. We're having problems with our computers so it's difficult to do the activities on the Web site.

The Omega Pack activities definitely help me with my teaching. In DC public schools the focus has been on reading and math, not science and social studies. So, the equipment isn't always there for science instruction. I don't have a Bachelor's degree in science, so I could gather the information and do one project, but that's not as effective as what they're doing now, which is beyond what I could normally offer them."

Teacher #2

"The Omega Pack activities help develop critical thinking skills, and that's of major importance because the testing we'll be going to next year is criterion reference testing. Developing their critical thinking skills, being able to make comparisons, and helping them communicate their ideas are all connected to these activities. Most of these kids have never been to the national zoo, so the

activities give them a lot of opportunities to discuss things like animal categories and the relationships among animals.

This helps them expand their mind and enables them to discuss relationships that they wouldn't normally see. They usually only see relationships between things that they actually use, such as a table and chair. They can only think of one way to use this chair. They've never been challenged to think about how this chair can actually be used for something other than sitting in at this table. The Omega Pack activities are also definitely helping the kids develop math and writing skills. They have a thirst for knowledge and they love to work together and learn from each other. Some of their test scores are relatively low, but after engaging in these activities their confidence levels have risen and they feel more comfortable participating with the higher level students. I expect that their test scores will go up just because of the impact that these activities are having on them.

In fifth grade we don't have a science curriculum, it's kind of hit-or-miss, so they're more enthused about coming here to be involved in these activities. They're actively engaged. They're asking to perform these activities because it's expanding their thinking. The living things activity gave me a foundation upon which I could build my instruction. I also brought things into the classroom to use in this activity. We're going to grow plants and we're going to do other experiments related to the activity. It provides a platform to expand on to a lot of other activities. I'm very thankful to have the Omega Pack. Our principal is a science buff and loves it too.

As a wrap-up each day we have a group discussion about what we've done and the things we've learned. We also try to come up with an art depiction of what we discussed or make a presentation to my actual class the following day and share what they learned. They love to teach and showoff what they can do now. Getting them to communicate is part of my methodology and it gives me an opportunity to assess them better if they communicate back to me what they've learned.

My only qualms are about the limited computer access and support we have here at school. We have to rely on the kids to perform Internet activities on computers they or their friends might have at home. It's important to understand the limitations we face in school and at home. Very few of our kids have much access to a computer at school or at home. Our computers are networked, but there are many problems."

<u>Feedback Offered by Teachers via Written Reports</u>

Participating teachers were ask to submit written reports at the completion of their activities related to this study. To date, five teachers have complied with this request and we are awaiting reports from the remaining two teachers. The following are the reports that have been received:

Martin Luther King Elementary

The program was exciting, challenging, fun, thought provoking, stimulating to the mind for the students at Martin Luther King, Jr. Elementary School. We met every Tuesday and Thursday for eight weeks. The program began on February 15,

2005. The students participated by taking a pre-test. The test was given to find out what the students knew about science.

They all put forth their best efforts. On Thursday of that week we had our first class. We opened our kit – "Wow" – the experiences began. Game after game, the students wrote about what they learned. We established our groups' passwords and code names.

The students worked in their groups. It truly was awesome to observe them collaborating, working hard to complete their tasks. The computer games were "off the chain." The students were up for the task, ready to demonstrate what they knew, as well as what he or she had learned from the hands-on games they had performed with their groups. Overall, the program was very good.

I feel we need more input from the program sponsor. We called as well as e-mailed and the response was great. More participation with site visits are highly recommended. I am appreciative for the opportunity to teach students in the science filled environment we created for them. This type of program is needed in our schools, with the assistance of computer technology for the Kinetic City After School Science Program, to expose our students to the world through science.

Oyster Elementary School

Oyster School joined the Kinetic City Pilot Program for DC Public Schools in February 2005. Students, who had been recommended by teachers for participation, were pre-tested by a team from AAAS just in time for Family Science Day at the Marriott Wardman Park on Saturday, February 19, 2005. The Kinetic City After School Program began at Oyster the next week. Because there was space available only on Friday, we decided to meet for three hours one time per week. We met in a classroom that had just three computers. The computers did not always work and Internet access was not always available, which made beginning the program slow. We began with 30 students and two adults.

Because forming into teams and registering each student is time-consuming, some students lost interest right away. Other students were not always able to stay. Nevertheless, we finished the program with 15 happy, interested, excited, and engaged students from grades 3-6 with one kindergarten student who participated enthusiastically. We purchased crayons, construction paper, pencils, tape and scissors for the "Smart Art" activity and kept everything for Kinetic City in a large plastic bin in a closet. Because we had three hours, we were able to begin each Friday with a snack and some free time for students to get settled. We had plenty to do and found that in eight weeks we could easily complete all four units without rushing with each session being three hours long.

The weakest link was the computer portion of Kinetic City. We had access to only three computers that did not always work and were not always connected to the Internet. This meant that any additional research we wanted to do using the Web addresses accompanying each unit could not be done during the class. We felt we didn't have enough in-depth information to answer questions that came up. Also, even with just 15 students, three computers are not adequate to let each child spend time with the computer activities for each unit. The time-consuming work of registering each student and setting up teams was made especially difficult with so

few computers. Students played the games with each unit, but these didn't seem to integrate with the rest of the unit activities.

The variety of activities within each unit was excellent. Students were engaged and excited and always had something different to do. "Fab Lab" was probably the most popular, followed by "Smart Art." Although each child loved to play the computer games, these tended to be more solitary and less team-oriented – certainly in the beginning – and less connected to learning than the other activities.

Because students left the program after teams had been organized, students didn't really stay in their teams and work with the same team each time. They kept their team name, but moved from group to group each session, which proved very successful. The students LOVED the cards and stickers they received at the end of each unit. Students used their journals more and more extensively as the program progressed.

Park View Elementary School

The Kinetic City program was well received by the students at Park View Elementary School. The children especially enjoyed the movement/manipulative activities, and activities centered on art and drawing. They enjoyed the opportunity to record/track their pulse rate after the movement activities. The children also enjoyed writing in their journals as a way to record their work activities.

Student Comments:

- "Out of Sight!"
- "Kinetic City Rocks!"
- "Exciting!"
- "Fun activities!"
- "These are activities that we can try at home."
- "I liked writing in my journal."
- "The smart art construction was a lot of fun."
- "The circulation game was terrific."
- "Wildlife window activity was one of the best!

The classroom teachers observed a correlation between the Kinetic City activities and the activities that they are already doing with students in the classroom. While the overall program was a success, we encountered problems with the following:

Internet Activities

- School's computer lab did not have a good Internet connection.
- The micro-media flash software was not compatible with the apple Mac computers
- Only a small percentage of students have Internet access at home.

Staff Volunteers

- Additional staff/volunteers are needed to assist with the different student groups.

Looking ahead to future activities and programs with Kinetic City, it would be helpful to incorporate Kinetic City in the school's After Care program. As a result, staff/volunteers will have more time to work with students, and to record/track their progress in the program.

Seaton Elementary School

Over thirty fourth and fifth grade students of Seaton Elementary School participated in the Kinetic City science program. Kinetic City is an interactive, hands-on science program which aims to help children gain key science concepts. It also aims to help children make connections between the world of science, themselves, and the world at large. The program was a success because it reached its aim.

Several things contributed to the program's success:

1. It was easy to facilitate. It was easy to facilitate due to the training, information, and support we received before and during administering the program. It was also easy to facilitate because of the materials provided. The materials were of high quality and thorough. Additionally, the materials were easy to understand and user-friendly.
2. It engaged children in the learning process immediately. Children are automatically attracted to the study of science. Nothing is more fun to them than an experiment. The Kinetic City program involved the children in many discovery experiments. For example, in one discovery experiment the children discovered how blood cells, oxygen, muscles, and the lungs work together to make the respiratory system work.
3. The branding and the prescribed delivery of the program also contributed to making it attractive and engaging to children.
4. The program included computer technology. This served as a reward to the children while simultaneously providing them with a way to demonstrate what they were learning. The computer's audio and visual images also provided accommodation for students who have difficulty with reading comprehension.
5. The program's technical support was effective. In most instances, the information facilitators needed to function effectively was usually given in advance, or it was just a phone call or e-mail away.
6. Lastly, the program was a success because it maintained its credibility. Oftentimes, when new programs are introduced in public schools, the information given at the beginning of the program is usually quite different from the information given after the program starts. However, with Kinetic City, information given, such as program requirements for facilitators, time tables, etc. closely matched the outcome.

Two Rivers Charter School

Two Rivers Public Charter School joined the Kinetic City Pilot Program for DC Public Schools in February 2005. Students, who had been selected by the Principal, Jessica Wodatch, for participation, were pre-tested by a team from AAAS just in time for Family Science Day at the Marriott Wardman Park on Saturday, February 19, 2005.

The Kinetic City After School Program began at Two Rivers PCS the next week, meeting once a week on Wednesday, from 12:30 to 3:30. Initially, we were assigned space in the art classroom and later we moved into one of the Pre-K classrooms. Neither one of these classrooms had desktop computers. We were able to occasionally have access to one Apple PowerBook when the faculty owner did not

need it, but it was insufficient to satisfy the requirements of the program. This had a direct negative impact in the program, since students were most excited about the computer components (Mind Games) and got to be enormously frustrated by the fact that we only had one computer available, and only some times. In addition to this, I was unable to interest the Principal and teachers into a meeting to learn about the Kinetic City program. My objective was to inform them what we were doing, and make the materials available to them if they wanted to use them in their classes as a way to get their support in raising the Kinetic City students' motivation during school hours.

We began with 30 students and three adults. We purchased crayons, construction paper, pencils, tape and scissors for the "Smart Art" activity and were ready to start. But we had problems from the first day on because forming into teams and registering each student is time-consuming. Some students lost interest right away. Other students were not always able to stay. Because students left the program after teams had been organized, and later, due to the creation of two shifts of students, students didn't really stay in their teams and work with the same team each time. They moved from group to group each session. We had constant behavior problems, some of them because many of the students would not sit and be respectful to the adults and the teachers, and this was contagious. But we also had behavior problems deriving from mere frustration, especially at having to wait between activities, not having adequate computer access, as well as due to the poor reading and writing skills observed in a majority of the group.

With the Principal's intervention, we reduced the number of students and divided them into two shifts to make the group more manageable; have all students under adult supervision at all times; and control for behavior problems. The situation improved somehow, but due to the reduction in time, we were not able to complete all the planned activities. The limited reading and writing skills in the group frustrated those students who had no such problems and they were disruptive. A few students left because they were "bored" with the program, but it was clear that it wasn't the activities that were boring, but the structural and logistic limitations, the wait, the hard to control behavior, and the limited reading and writing skills.

I would say that the weakest link was the computer portion of Kinetic City. We had access to only one laptop occasionally, and it was impossible to run all students through one laptop for each activity. We could not finish student registration, therefore we could not play in the Internet as a team. Only a handful of students had computers at home, and even less than that had an Internet connection.

The lack of computers also meant that any additional research we wanted to do with the students using the Web addresses accompanying each unit could not be done during the class. We felt we didn't have enough in-depth information to answer questions that came up and strongly suggest you include more background materials with the kit.

Having said this, I would like to highlight that when the students were engaged in activities, they were really interested. The program provides a variety of activities that cater to the students' diverse interests, and the variety of activities within each unit was excellent. Students were engaged and excited and always had something different to do. "Fab Lab" was probably the most popular, followed by "Smart Art."

Although each child loved to play the computer games, these tended to be more solitary and less team-oriented – certainly in the beginning – and less connected to learning than the other activities. They all loved the cards and stickers they received at the end of each unit.

Use of the journals was limited due to insufficient reading and writing skills in most of the class. The best qualified students, who were also the best at documenting, left the program in frustration.

In closing, I'd like to state that despite all the problems we had, this is a wonderful program to introduce students to science. It gives them lots of things to think about. However, it does not provide in-depth information. The variety of activities in each unit helps bridge the differences in the age groups and provides something for everyone. It also keeps interest high. The supplies for each unit are adequate with a group of 15 students – stretched with a group of 30. The materials chosen for each unit are imaginative and inventive and kept students interested and curious.

Recommendations:

1. More lead time to set up program, choose students, and have training.
2. A group no larger than 15-16 with a minimum of 2 adults is as big as the group should be – unless there is a large space and many more computers.
3. Reference materials: Additional resource/reference materials in the kit to help kids find more answers to the questions that the activities bring up. For example, a diagram with parts of the human body to help them build their own body; a list of animals and plants.
4. If the pilot in the DC Public School system is replicated, demand more involvement on the part of the administration, providing necessary resources to run the program (to include computers and Web access), and having teachers involved at least at the informational level so they can support the club through their teaching during regular classroom hours.
5. More traditional science experiments for the hands-on modules.
6. More detailed information for group leaders to assist in the preparation of each club meeting.
7. Pilot programs for public schools should address the inadequacy of IT resources, especially Web access in the classrooms, and attempt to provide resources to offer Kinetic City students computer and Web access at least during the program (at least the lease of equipment, if purchase is not possible)

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