Teacher Perceptions of the CAP LTER Ecology Explorers Summer Teacher Internship Program.

Monica Elser[1] and Charlene Saltz[2]

[1]Arizona State University, [2]University of Arizona

Ecology Explorers prepares teachers (grades 4 through 12) to learn and teach about ecological principals and phenomena to their students by employing a scientific protocol methodology in data collection. In turn, this approach to teaching and learning about science aims to make students more aware of the scientific process and issues involved in studying urban ecology. In this poster pre- and post-internship surveys from 2003-2005 were analyzed to gain insight into the effectiveness of the Ecology Explorers summer teacher internship program

What did the teachers perceive as important outcomes from attending the internship?

Survey Question: "What do you hope to achieve from the Ecology Explorers Program?

Category	# n=48
1. Teaching Activities	**28 (58%)**
a. Inquiry	9
b. Activities	14
c. Ecology	5
2. Professional Development	**34 (71%)**
a. Learning about local plants & animals	8
b. Improving science teaching	19
c. Integrate math/science/language	7
3. Meaningful for Students	**28 (58%)**
a. Outside/local environment	8
b. Doing real science	18
c. Meaningful for ESL	2

Answers were placed into categories reflecting several types of goals that the teacher expressed. These categories were:

1) Teachers interested in obtaining new teaching activities or lessons. This category was further subdivided into teachers interested in specifically obtaining:
   - **a)** inquiry-based activities,
   - **b)** exciting and/or "hand's-on" activities,
   - **c)** ecology lessons
2) Teachers interested in professional development. This category was further subdivided into teachers interested in:
   - **a)** learning about local plants and animals,
   - **b)** improving science teaching,
   - **c)** learning new ways to integrate math, science and/or language
3) Teachers interested in obtaining the skills/knowledge to provide meaningful activities for their students. This category was further divided into
   - **a)** connecting students with the outside/local environment,
   - **b)** connecting students with "real-life" science,
   - **c)** making science more meaningful for ESL students.

1. Teaching Activities: Selected Quotes :

- *"Discover new & exciting lesson plans"*
- *"Usable activities for my biology classes"*
- *"Learn new & creative science lessons"*
- *"Walk away with a program to use to help teach ecology in 8th grade"*
- *"Learn more about inquiry based science programs"*

2. Professional Development : Selected Quotes

- *"…give me ideas to better write my integrated unit & conduct research w/my students as an ongoing activity!"*
- *"I want science to be much more "hands on" than I am currently doing."*
- *"Learn more how scientists think and work."*
- *"Also, to increase my knowledge of science in order to better help my class & my teaching."*
- *"I'm also very interested in birds and learning about AZ birds and their habitats."*
- *"Integrate bio curriculum with real-world experiences".*
- *"Learn more about the impact of urbanization on the local ecosystem."*
- *"…hoping to learn as much as I can about incorporating different types of research and observation into my lesson plans."*

3. Meaningful for Students: Selected Quotes

- *"A hands-on "real life" project that the students can do around campus to show them science can be done by them with other (ASU) scientists in their own "back yard." I want them to see how accessible science is to them, not just in the classroom, or from a textbook or carried out by other people."*
- *"…allow students to become more interested with their outdoor surroundings."*
- *"Involve my students in a meaningful long-term research project. It is my hope that data collection analysis, etc from this project will inspire students to continue in science & to master basic scientific principles."*
- *"For students - practical research in which to participate"*
- *"…having the students see first hand how keeping records & collecting data about the environment is important."*

Teacher Demographics

Grade Level	percentage
Early Elementary (3&4)	6
Upper Elementary (5 & 6)	27
Middle School (7 & 8)	27
High School (9-12)	38
Elementary Science Specialist (5-8)	2
Years Teaching	
5 and less	49
5 to 15	36
Greater than 15	15
Highest Degree Obtained	
Bachelor's Degree	60
Master's Degree	38
Other	2

What did the teachers plan to accomplish during the school year?

Survey Question: How do you hope to implement Ecology Explorers in your classroom next year?

Category	# n=48
Protocol	31 (64%)
Activities	21 (44%)
Field Trip	4 (1%)
Integrate	18 (38%)

The responses were placed into four categories:

1) Teachers will implement one of the protocols
2) Teachers will use the extension activities
3) Teachers will take students on field trips
4) Teachers will integrate outdoor studies with current teaching practices

The following are some examples of what teachers were planning to do in the academic year:

- *"I will use five activities we did in the program to open my classroom to the scientific method."*
- *"I plan to run the ecology unit throughout the year… We can watch birds 2-3 times a week after the actual "Ecology" unit and I will try to bring bird stories into the other units like evolution and genetics (if I find any)."*
- *"…plan on setting up point counts at the school/collecting data & connecting math standards to analyze the data collected."*
- *"I want to use the graphing & data analysis stuff with my science methods unit, plus the whole bird protocol will be great there too."*
- *"…design & conduct an original experiment based on one of the activities/extensions such as seed trays or measuring distance from birds before flight. Use the pocket seed experiment in an "inquiry" fashion."*
- *"I'll be doing the arthropods in both my bio & env bio classes - bio twice (spring w/arthropod unit fall w/classification unit) & env bio w/biodiversity."*

Discussion

A main focus of this analysis of the data was to assess ways in which we can make the Ecology Explorers program a better experience for the teachers. The overall results seem to suggest that our internships are highly successful at meeting the teacher's desired outcomes from attending the program. Based on the academic year surveys, it seems as though a large percentage of the teachers were able to implement parts of the Ecology Explorers program during the academic year. Teachers implemented protocols and used many of the extension activities. It remains a question as to how many of the teachers who did not return surveys implemented protocols or conducted Ecology Explorer activities with their students.

Revisiting our initial guiding questions we find the following answers:

What did the teachers perceive as important outcomes from attending the program?

Learning new activities, improving science teaching and bringing "real-life" science to their classroom were the most important outcomes for the teachers attending the program. The Ecology Explorers program was designed to bring University-level science to the K-12 classroom, so it is important to note that many teachers wanted to bring "real science" to their classrooms. It is interesting to note that relatively few of the teachers specifically stated that their goal was to learn about the local environment, or that they wanted their children to learn about the local environment. From informal conversations with the teachers, learning about the birds, plants and insects in urban Phoenix was important to them because they recently moved to the area and know very little about the local environment. Many also indicated that the lessons focusing on urbanization (land-use, heat island) was particularly informative.

Were the outcomes met at the completion of the internship?

All the teachers felt that the internship met or exceeded their expectations.

What did teachers plan to accomplish during the school year?

All the teachers stated that they planned to implement a protocol and/or use the extension activities during the academic year. Thirty-seven percent of the teachers specifically indicated that they would integrate the outdoor activities into their current practices, although it's seems reasonable to suggest that most of the teachers who would be conducting the protocols would have to integrate them in some way into their teaching. A couple of teachers did indicate that they would do the Ecology Explorer studies in an after-school club setting.

Did the teachers accomplish what they thought they would during the school year?

A majority of the teachers who returned the final survey did accomplish what they thought they would during the school year. The survey respondents who did not accomplish their goals cited lack of time, lack of supplies, and in one case a change in teaching assignment as reasons for not meeting their goals. A more detailed survey relating to which extension activities teachers used during the academic year might provide more insight into which lessons presented during the internship are most likely to be used by teachers in their classrooms.

As we review our content each year, these comments from the teachers are helpful in knowing that participating in our internships has been a positive experience for them and many of them implement some aspect of the program, whether the an entire protocol or just a few activities, into their classrooms. These comments are also helpful in thinking about new projects and ways to help teachers incorporate a sense of place into their classrooms.

Were the outcomes met at the completion of the internship?

Survey Question: " Based on your pre-survey response, did you achieve what you set out to achieve? Why or why not?"

All of the teachers stated that they did achieve what they had hoped to achieve. Teacher expressed great enthusiasm for the Ecology Explorers program and for the items learned during the internship. The following are typical comments:

- *"I achieved more than I set out to. This workshop is extremely helpful in terms of the content and how it applies to many different subjects. I will use the ideas I've gained from the workshop in earth and life science curriculums. And, I definitely got many ideas for outdoor projects. Thanks!"*
- *"yes I think this unit can bring real science into the classroom. Students enter data into an existing data base ad can feel connected to other student scientists. This unit is also great for inquiry because it allows students to generate so many testable questions".*

What did the teachers accomplish during the school year?

Survey Question: Based on what you had planned to implement, did you achieve what you had hoped from the Ecology Explorers program? Why or why not?

The final survey was sent to teachers at the end of the spring semester (late April, early May). The results only include the 2003 and 2004 cohort of teachers (n = 32). Fifty-three percent of the surveys were returned.

Categories	Total # N=17
Yes	1
Protocols	8
Activities	4
Total Yes	**13 (76%)**
No	1
Materials	1
Time	3
Subjects	1
Total No	**6 (35 %)**

Answers where placed into two categories with several sub-categories

1) Yes
   - **a.** Yes, but not clear whether the teacher did the protocol or just did activities
   - **b.** Completed a protocol and used activities
   - **c.** Used several activities, but didn't complete a protocol

2) No
   - **a.** No, teacher gave no reason.
   - **b.** No, materials not available
   - **c.** No, there wasn't enough time
   - **d.** No, they were assigned to teach a different subject

The following are examples of teacher implementation:

- *"Yes. My students did participate in many of the E.E. lesson plans and projects. Students were thrilled to be conducting science investigations in our school yard. Studying organisms w/in the confines of our campus provided students with a sense of ownership."*
- *"For the most part I would say yes. For example we were able to conduct bird counts w/the students, they learned to id the birds fairly well, and they came up w/their own questions to research."*
- *"Yes! I wrote a 3 week integrated unit-my science classes are a lot easier to plan & a lot more fun for me to teach. It's a more interactive classroom."*
- *"No ……my block classes were changed to earth science second semester and I didn't have all the materials I wanted to do the protocol (binoculars, measuring instruments, etc.)."*