

Living on Earth (LOE): Ecological Literacy Project, Year Two Evaluation

Submitted to:
Living on Earth

ROCKMAN ET AL

Bringing Technology and Learning Together

◆ **Bloomington, Indiana** ◆
125 S. Park Ridge Road, Suite 3
Bloomington, IN 47408
812/333-8883
Fax: 812/333-8885

◆ **San Francisco, California** ◆
49 Geary Street, Suite 530
San Francisco, CA 94108
415/544-0788
Fax: 415/544-0789

◆ **Chicago, Illinois** ◆
560 W Washington, Suite 240
Chicago, IL 60661
312/604-0880
Fax: 312/604-0879

email: info@rockman.com
<http://www.rockman.com>

Living on Earth (LOE): Ecological Literacy Project, Year Two Evaluation

Submitted by

Cynthia Char
Saul Rockman

R O C K M A N E T A L
Bringing Technology and Learning Together

San Francisco, CA

November 2002

Acknowledgements

The Living on Earth's Ecological Literacy Project involves a number of people who have contributed to our evaluation efforts. We would like to thank the participating teachers and their students who have talked with us and filled out our surveys, to provide us with valuable insights and perspectives on this curriculum project. Many thanks also to research colleagues, Katherine Schwinden, Janet Lee, Yael Sucher, and Candy Miller in supporting our data collection and analysis efforts. We also want to thank the Living on Earth staff, Steve Curwood, Carly Ferguson, and Antioch colleague, Cindy Thomashow, who have guided the Ecological Literacy Project and promoted its goals.

Cynthia Char
Saul Rockman

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
INTRODUCTION.....	1
FINDINGS FROM THE YEAR TWO EVALUATION.....	2
1. INTEGRATION OF ECOLOGICAL LITERACY AND JOURNALISM.....	3
2. PROGRESSION OF JOURNALISM WORK: COMMENTARIES, INTERVIEWS, AND FEATURE STORIES	8
3. UTILIZATION OF DIGITAL TECHNOLOGY FOR PRODUCTION OF RADIO PIECES	12
4. CONNECTION TO THE RADIO BROADCAST INDUSTRY	14
5. OVERALL APPEAL AND PERCEIVED VALUE AND REWARD OF THE ELP.....	19
RECOMMENDATIONS.....	22

Living on Earth Ecological Literacy Project Year Two Evaluation

Conducted by
ROCKMAN *ET AL*
San Francisco, CA

Executive Summary

The goal of the Living on Earth Ecological Literacy Project is to design an inter-disciplinary curriculum for middle and high school students. The curriculum integrates radio journalism, ecological literacy, and knowledge of global environmental change. As stated in a recent project document, the vision of Living on Earth (LOE) is to build a consortium of schools, informal science organizations, and local public radio stations in four geographical regions, to work in collaboration to create a corps of environmental communicators and radio journalists with expertise in journalism and environmental science, skills in the current digital technology, and creativity in global change documentation.

The 2001-02 school year marked Year Two of the three-year, NSF-funded Ecological Literacy Project (ELP). LOE hired ROCKMAN *ET AL*, an educational research firm, to conduct an independent evaluation of the ELP program. Evaluation activities, which took place over the course of the past 18 months, included interviews with teacher participants during Summers 2001 and 2002, and post-program student surveys administered to all six participating classrooms in May 2002. This Year Two evaluation was designed to provide project staff with information on how the ELP curriculum was being used by teachers and students in the six participating schools, to identify project components that were particularly well-received and effective, and to note areas for improvement.

Integration of Ecological Literacy and Journalism

Teachers and students reported that the ELP provided a challenging, yet compelling blend of ecological literacy and journalism.

- ❖ When discussing what they had accomplished in the ELP and what students got most out of the class, teachers generally noted the radio journalism piece, not the environmental science. Teachers described the effort and rewards of students tackling the writing for radio pieces, considering the audiences for their segments, and seeing the ways in which multiple drafts and editing improved their final products.
- ❖ Several teachers described how the radio journalism piece engaged their students in environmental issues in new, and deeper, ways.

- ❖ Students recognized the ELP’s clear connection both to science and journalism. At least two-thirds of all students reported learning either a “good amount” or an “incredible amount” for most of the specific areas in both science and journalism.
- ❖ When discussing what they had learned about science and the environment, the two major themes in students’ responses were environmental awareness and the need for environmental activism.
- ❖ In regard to what was learned about journalism, students identified learning to keep the audience in mind, the writing process, and specific writing techniques, interviewing skills, and the effort involved in developing their work.

Progression of Journalism Work: Commentaries, Interviews, and Feature Stories

A major development in the Year Two ELP curriculum was the expansion of the journalism component: the writing and production of commentaries, interviews, and feature stories. All six classes had students engaged in commentaries, five of the six conducted interviews for their radio pieces, and three classrooms undertook feature stories (interviewing, scripting, and some recording).

- ❖ Teachers approved of the expanded journalism component, finding that the greater specification and progression through the three genres (commentaries, interviews, and feature stories) provided an important sequence in helping students develop their journalism and writing skills.
- ❖ Teachers described the educational value of the genres, particularly the commentary, and the interview. Commentaries, they noted, engaged teenagers personally in a topic, developed their oral presentation skills, and empowered students by helping them realize that their views and opinions were important. Interviews were an important addition to students’ repertoire of tools for gathering information.
- ❖ Teachers noted that successful implementation of the program—writing and presenting, production and technical aspects—took a considerable amount of time throughout the school year.
- ❖ Students were able to identify six criteria for conducting good interviews: ask the right question, be prepared, establish a good rapport with the interviewee, present yourself clearly and with poise, be respectful and courteous, and be attentive to technical production issues.
- ❖ Students described several ways in which interviews best serve the production of a feature story, including: providing information and backup as well as facts and credibility to a story, offering a different perspective, and making the story more interesting or allowing the audience to connect with the story.

Utilization of Digital Technology for Production of Radio Pieces

A major component of the ELP was teachers and students learning to use digital technology, such as a MiniDisc recorder and software editing tools, for the production of their radio pieces.

- ❖ Teachers were both excited and challenged by the technical production aspects of the ELP. They were proud of their learning accomplishments, but were stressed by technical difficulties.
- ❖ Students recognized the prominent way in which technology was incorporated in the ELP, with over half the students (56%) indicating that they associated the ELP with computer technology, and a third (34%) indicating the connection to multimedia.
- ❖ When asked to list the two most important things they learned about technology and radio production, students described particular pieces of equipment they used to produce their radio pieces, not content or concepts.

Connection to the Radio Broadcast Industry

The ELP participants were connected to the radio broadcast industry in three main ways: through their producer mentors, in collaboration with Living on Earth staff and resources, and through additional broadcast opportunities.

- ❖ The project's partnership with professional radio journalists specializing in environmental science was a critical and defining aspect of the project for both teachers and students. The affiliation provided a strong professional thread throughout the project, and an authentic audience of potential radio listeners of national scope.
- ❖ Four of the six teachers were highly enthusiastic about their producer mentors. Two expressed a less positive experience.
- ❖ Producer mentors provided not only expertise, but also time and hands-on assistance that were a huge asset to, and an essential component of, classroom implementation.
- ❖ Teachers valued their collaboration with Living on Earth, and had a high regard for the journalism knowledge and expertise of the project staff. They desired greater contact with and support from LOE, beyond the Summer Institutes and Mid-Year Workshops.
- ❖ In several schools, the ELP received additional media coverage and public attention beyond the LOE broadcast.

- ❖ Some of the teachers noted an over-emphasis on the selection of work to be featured on the broadcast, when only a handful of student pieces would actually get aired. This emphasis minimized the value of those whose efforts did not succeed in getting airtime.
- ❖ Teachers wanted clarification of the LOE’s expectations for student work, and the criteria and standards used to select student work to be aired on the LOE national broadcast or posted on the LOE website.
- ❖ Teachers recommended that project staff consider the implications of implementing the ELP as part of a science course, as opposed to a special journalism class. They recommended modifying the curriculum to provide a balance between process and product.
- ❖ Students felt that the groups most aware of their ELP work were teachers and administrators in their school, and students in other classes, followed by members of their family. However, 30% of the students felt that the general public across the country were at least somewhat aware of their work, while 22% felt that members of their local community were aware.

Overall Appeal and Perceived Value and Reward of ELP

Despite all the hard work and high standards involved in the ELP, teachers and students were highly positive about their enjoyment of, and learning from, the project.

- ❖ Teachers recognized the rewards of being involved in such a unique radio journalism project with direct ties to Living on Earth and the radio broadcast industry. They were proud of how much they and their students learned about science journalism and digital technology. Teachers felt that the Year Two program built upon the curriculum efforts and experiences from Year One, and were looking forward to continuing during Year Three.
- ❖ Students rated the ELP as highly appealing, with three-quarters of the students reporting that they enjoyed the class either “very much” (45%) or “an incredible amount” (29%).
- ❖ The variety of student roles in the radio assignments—technician, writer, presenter, and producer—afforded a variety of areas for students to enjoy and experience increasing skill and mastery.
- ❖ When asked about what they were most proud of in their radio projects, students noted the effort they had put into their projects and their ability to learn something about themselves, as well as specific things they had done or learned.

- ❖ In light of the multi-step, complex projects and group work, students reported that they learned about working effectively in teams (74%), planning projects and assignments (73%), and time management (68%).

Recommendations

Based on the findings from our Year 2 evaluation of the ELP, our evaluation team offered a number of recommendations to further strengthen the program. These recommendations include:

- ❖ ***Articulate the ELP's science-related goals; balance process and product; provide learning goals in addition to product standards.***
- ❖ ***Clearly specify criteria for final student products that are selected for broadcast.***
- ❖ ***Expand outlets for dissemination.***
- ❖ ***Address the full progression of commentaries, interviews and feature stories.***
- ❖ ***Continue to enhance the producer mentor role; strengthen communication between Living on Earth and participating teachers.***
- ❖ ***Leverage national representation and scope of participating classrooms.***

The project is filled with opportunities for building a solid environmental science learning component, along with mastering skills of broadcast journalism, and overlaying a strong element of media literacy. It is now a matter of tinkering to find the right balance among the project's goals and strategies that will guide teachers and help students. The potential is evident, most of the pieces are in place. In the final year, a great deal more can be accomplished.

Living on Earth Ecological Literacy Project Year Two Evaluation

Conducted by
ROCKMAN *ET AL*
San Francisco, CA

Introduction

The goal of the Living on Earth Ecological Literacy Project is to design an inter-disciplinary curriculum for middle and high school students. The curriculum integrates radio journalism, ecological literacy, and knowledge of global environmental change. As stated in a recent project document, the vision of Living on Earth (LOE) is to build a consortium of schools, informal science organizations, and local public radio stations in four geographical regions, to work in collaboration to create a corps of environmental communicators and radio journalists with expertise in journalism and environmental science, skills in the current digital technology, and creativity in global change documentation.

The 2001-02 school year marked Year Two of the three-year, NSF-funded Ecological Literacy Project (ELP). LOE hired ROCKMAN *ET AL*, an educational research firm, to conduct an independent evaluation of the ELP program. This Year Two evaluation was designed to provide project staff with information on how the ELP curriculum was being used and received by teachers and students in the six participating schools, to identify project components that were particularly well received, and to note areas for improvement.

Description of Participating Teachers and Classrooms

A total of six science teachers used the ELP curriculum this past year, in six different locations around the country: Chicago and Burbank, Illinois; Los Angeles, California; New York City; Camden, New Jersey; and Petersborough, New Hampshire. Four of the six teachers had also participated in a pilot phase of the curriculum during Year One. Five of the teachers taught high school, four in public high schools, and one in a private, all-girl high school; the sixth teacher taught middle school at a charter school.

Of the six teachers, two were relatively new, with 2 and 5 years of teaching experience; two were practitioners with a moderate amount of teaching experience, 8 and 10 years; and two were veteran teachers, with 17 and 29 years of teaching experience.

The ELP curriculum was implemented in a variety of ways, but primarily as part of a yearlong course on environmental science. Class size varied considerably, ranging from classrooms with fewer than 10 students to those with 41 students. A total of 124 students participated in the study.

Evaluation activities, which took place over the past 18 months, included interviews with teacher participants during the Summer 2001 Teacher Institute, post-program student

surveys administered to classrooms in May 2002, interviews with teacher participants during Summer 2002, and observations of the Summer 2002 Teacher Institute held in August 2002. Our data set consisted of two rounds of individual interviews with teachers, conducted in Summers 2001 and 2002 (audiotaped and later transcribed), and completed student surveys from all six classrooms (a total of 104 surveys). Evaluation findings encompassed both teachers' and students' assessment of the educational value of the ELP, and related classroom and project implementation issues.

Description of Year Two Curriculum

Based on feedback from teachers during Year One, the Year Two curriculum was restructured and expanded beyond the first year's focus on radio documentary pieces and feature stories. The Year Two curriculum featured a progression focused on the production of three different types of audio pieces of varied complexity: the commentary, the interview, and, finally, the feature story. As in Year One, students studied how to use a variety of technology tools for their radio pieces, including microphones, mini-disk recorders, ProTools software, and computers.

Other new developments for the Year 2 curriculum included producer mentors for participating classrooms, and a project website. The idea for the producer mentor was that each classroom would be paired with a radio producer affiliated with local National Public Radio station. This producer mentor would provide approximately 15 hours per month, and, according to project documents, "oversee the final editing of commentaries, coach and mentor students and teachers in the interviewing process, and help to develop, record, and produce feature stories for the radio broadcast and Web dissemination."

Website resources for the project were designed to provide "an interactive forum in which teachers and students will be able to communicate with those from other participating schools, and share images of their schools and MP3 files of commentaries, interviews and feature stories."

Findings from the Year Two Evaluation

Our findings are organized around the four key features of the program. These features include:

- a) Integration of ecological literacy and journalism;
- b) Progression of journalism work encompassing commentaries, interviews, and feature stories;
- c) Utilization of digital technology for production of radio pieces; and,
- d) Connection to the radio broadcast industry through producer mentors, Living on Earth staff, resources, and broadcasts.

Results cover both the overall appeal of the ELP and its perceived value to both teachers and students.

1. Integration of Ecological Literacy and Journalism

Teacher Perspectives

In general, teachers reported that the ELP provided a challenging, yet compelling blend of ecological literacy and journalism. Four of the six teachers incorporated the ELP project into their yearlong environmental science course.

In teachers' discussions of what they had accomplished in ELP and what students got out of the class, it was generally the radio journalism piece, and not environmental science, that received attention. As one teacher noted:

I think they learned the basics of journalism, they learned to clearly articulate environmental issues and present them to a diverse audience, write and edit better, utilizing a variety of resources, learned how to present themselves professionally, and they learned differences between commentaries, interviews and feature stories.

Several teachers described how the radio journalism piece enabled their students to become engaged in environmental issues in new and deeper ways:

I think that they had an opportunity to look at things they've never looked at before. We focused primarily on local environmental issues. But they had an opportunity to give their own opinion, especially with the commentary, and then with the feature stories they had the opportunity to go a lot deeper into things.

I'm most pleased about the fact that the students had an experience that was unconventional, but very worthwhile...a real project with the radio. I think students got excited about it...and are taking an interest in their local environment. I think that sometimes presented in a conventional way, where we just talk about these issues or give a homework assignment, or have them write a paper about them, there is not as much interest. But here, I found that they were extremely interested in doing it, and I think a lot of it had to do with that it was put in this radio format.

Teachers who discussed the environmental science facet most typically described students' increased awareness and caring about the environment—and the sense that they could be advocates for the environment—or general exposure to environmental topics that they researched.

I'm most pleased that I think the kids got a handle on how to make a difference, and how to take care of environmental concerns, and I think that made a huge impact on them.

[In addition to learning about technical production and writing for radio] they did learn some ecological issues, specially dealing with whatever their commentary was about.

Most of the teachers offered students a choice of topic when producing a commentary, interview, or feature story, with students within a single classroom generally researching a wide range of scientific topics. For example, students in one high school class researched topics including genetically modified foods, urban rooftop gardening, beach closings, and human population issues. Only a few of the teachers had students focus their feature stories on a single, common topic, such as a local environmental problem.

Several teachers who incorporated the ELP into the academic track of their environmental science class acknowledged that they did not feel that the ELP fully addressed the science needs of their class. One teacher described how she used the ELP intensively during the first five weeks of school, but then used only sporadically through the school year because of her “requirements for the academic—you need to get the kids ready for the [AP] exam.” Another teacher noted that

...[the ELP] takes a huge amount of time. And I still don't feel like I'm doing enough science.... In a regular environmental science class, the class would be 18 weeks and I would probably do nine two-week units, on different topics. I really did a lot less topics with the kids, and I don't feel like their understanding of them was as rigorous as a regular environmental science class.

At the same time, several teachers expressed their appreciation of the ways the ELP could, to some extent, be flexibly incorporated into the classroom, and that it was not a structured curriculum.

Teachers did feel that students, grappling with the challenges involved in writing a strong piece for radio, achieved a lot in the area of writing:

I'm really proud that my students were able to find their voice. I think that their writing has definitely improved, I think their ability to critically edit has dramatically improved.

[What was most challenging for my students was] writing. To actually put words on paper.... They don't have a good outlining concept of what should go first, second, or third...[Plus] it's different than just writing a paper.... All the information has to be boiled down to a small amount that's vital. So they learn how to come up with what the most important facts are. And of course, writing and recording for the radio is a brand new experience.

Additional findings concerning the learning gains and challenges posed by the specific components of commentaries, interviews, and feature stories are discussed in a later section of results (“Progressions of Journalism Work”).

Student Perspectives

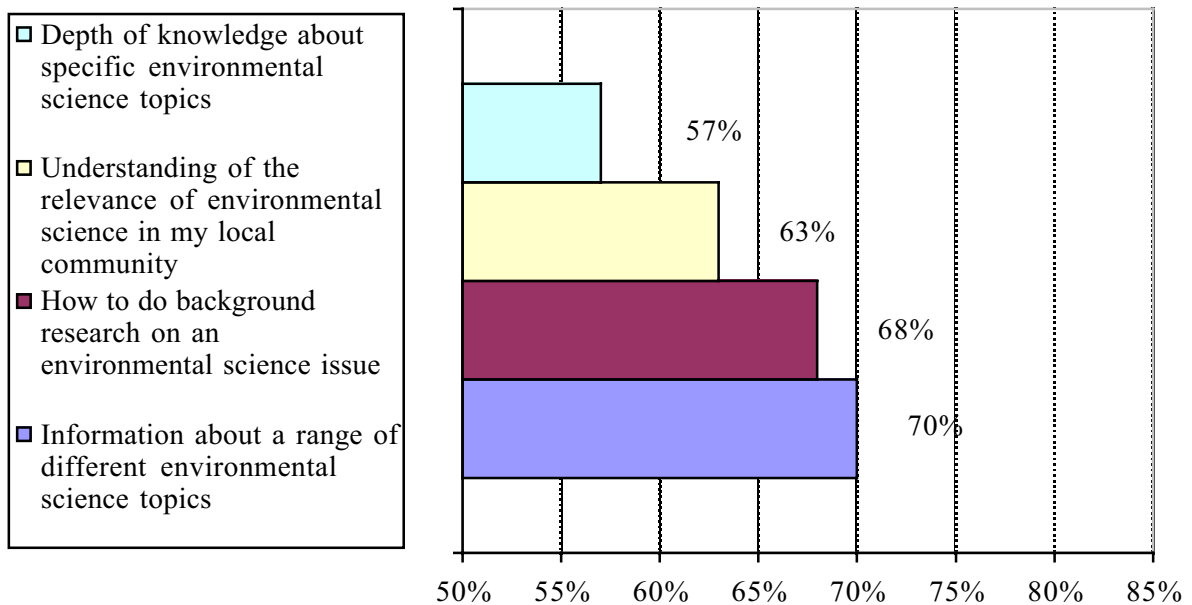
Students' responses to the survey generally corroborated the teachers' views of the ELP. First of all, students recognized the ELP's clear connection both to science and

journalism. When asked which subject areas they thought were addressed in the course, 90% of all students indicated science, while 70% indicated journalism. Just under half, (49%) also indicated English.

Students were asked to rate how much they felt they learned in a variety of specific scientific and journalistic areas. Ratings used a six point scale: 0 = *Did not do this activity*; 1 = *Learned nothing at all*; 2 = *Learned a little*; 3 = *Learned some*; 4 = *Learned a good amount*; 5 = *Learned an incredible amount*.

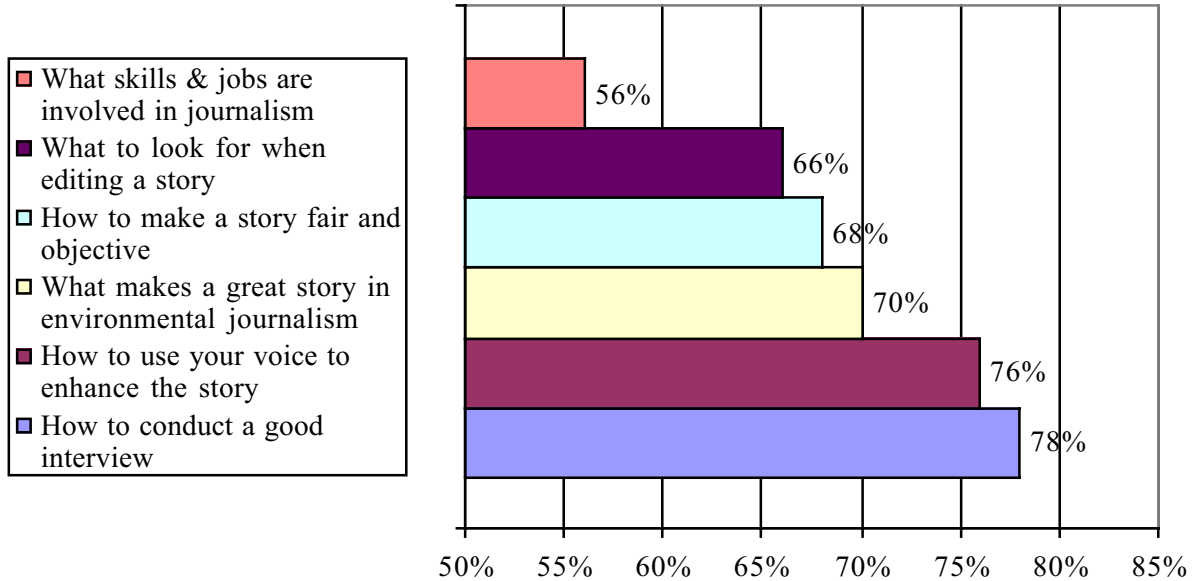
At least two-thirds of all students reported learning either a “good amount” or an “incredible amount” for most of the specific areas in both science and journalism (see Figures 1 and 2).

Figure 1: Percentage of Students Who Reported Learning Either a “Good Amount” or “Incredible Amount” in Different Science Areas



Range for science sub-areas: 57% - 70%; Mean = 64.5%

Figure 2: Percentage of Students Who Reported Learning Either a “Good Amount” or “Incredible Amount” in Different Journalism Areas



Range for journalism sub-areas: 56% - 78%; Mean: 69%

Students’ Views on Learning in Science

When asked to describe “two important things I learned about science and the environment,” student responses to this open-ended question were quite varied. The two major themes that emerged related to environmental awareness and the need for environmental activism. Students also mentioned a wide range of specific scientific topics and issues, reflecting the diversity of topics students could elect to research within and across the six classrooms.

Figure 3: Students’ Views on “Two Important Things I Learned About Science and the Environment”

Area of Learning	Sample of Responses
Environmental Awareness	<p>That as humans we use so many things we don’t need, produce so much waste and generally don’t think of the effects on our environment of our actions.</p> <p>The awareness of a problem is the first step to solving it. I am now aware of many problems.</p> <p>There is a lot of trash.</p>
Environmental Activism	<p>How one person can make a difference by spreading awareness and understanding the serious issues of our environment.</p> <p>We are surrounded by toxics, pollution, and contaminated water and if we don’t do something soon we won’t have a chance to....Everyday we contribute to the problem with our cars, trucks, factories, industries, leaks, spills, and if we can’t stop it completely we can at least attempt to get it to a minimum.</p> <p>It is important to take care of your environment.</p>
Specific Scientific Topics	<p>I learned about global climate change and biodiversity.</p> <p>I learned about the global environment and how trees are used to make money. I learned about tons and tons of garbage is taken out of Central Park each year.</p> <p>Organic fertilizers are the best for plants.</p> <p>Overpopulation is a growing concern.</p> <p>Overdrawing of water from lakes may cause a recession.</p> <p>I found out how the Cooper River got polluted.</p>

Another area mentioned by some students was the role of science in the environment (e.g., “Scientific issues affect the environment and are a key role in the balance of life” or “We can improve the environment by investigating and using scientific study”).

Students’ Views on Learning in Journalism

When asked to describe “two important things I learned about journalism,” students indicated a rich range of understanding. Students’ responses fell into five main categories: keeping in mind the audience, the writing process, specific writing techniques, interviewing skills, and recognition of the effort involved.

Figure 4: Students’ Views on “Two Important Things I Learned About Journalism”

Area of Learning	Sample of Responses
Keeping In Mind the Audience	<p>How to write in a way that I can effectively get my point/images across to the listener.</p> <p>It is important to tell your story in such a way that the listener or reader feel they are really there.</p> <p>You need a hook to gain interest.</p>
The Writing Process	<p>How to get organized and write out my thoughts and feelings on paper.</p> <p>Journalism involves a lot of research before actually writing and it is important to get the facts straight.</p> <p>The story relies on the questions you ask in your interviews.</p> <p>How to learn important things in a story from unimportant things.</p>
Specific Writing Techniques	<p>One has to be very descriptive with lots of vivid details.</p> <p>When you’re writing a commentary the first 3 sentences should be the hook to get the reader interested in the story.</p> <p>Make your sentences short and to the point.</p> <p>Writing for the ear differs from plain newspaper writing.</p>
Interviewing Techniques	<p>Be courteous to whomever you are interviewing. Prepare questions, etc., before interviewing.</p> <p>When asking questions, ask why questions, not yes or no.</p> <p>When interviewing, look for a story within a story.</p>
Recognition of the Effort Involved	<p>To be a true journalist you must be willing to put time and effort.</p> <p>That there are many steps that go into making just one story.</p> <p>Rewriting takes a loooooong time and there are lots of edits and revisions.</p> <p>It takes a lot to writing a commentary or feature presentation.</p>
Representing All Viewpoints	<p>To have a good story, you have to show both sides.</p> <p>You need multiple viewpoints.</p>
Techniques for Public Speaking	<p>How to project my voice.</p> <p>One must speak clearly and at a good pace.</p> <p>Learning how to speak on a nationally taped broadcast.</p>
Good Work Habits	<p>How to take criticism.</p> <p>How to put in overtime.</p> <p>Always be prepared.</p> <p>Study.</p>

2. Progression of Journalism Work: Commentaries, Interviews, and Feature Stories

A major development in the Year Two ELP curriculum was the expansion of the journalism component: the writing and production of commentaries, interviews, and feature stories. All six classes had students engaged in commentaries. Five of the six

conducted interviews for their radio pieces, and three classrooms embarked on doing feature stories (interviewing, scripting, and some recording).

Teacher Perspectives

Teachers felt that breaking the process of environmental radio journalism into smaller, more discrete and distinct phases and assignments was important and worked well. They noted that the Summer Institutes enabled them to learn more about these different types of radio pieces, and was, along with the critical assistance provided by the producer mentor, essential to their being able to carry out these different assignments.

Teachers described how each of the genres—the commentary, the interview, and the feature story—offered educational value in its own right, developing different facets of students’ budding aspirations and skills as writers. Several teachers described how they thought the commentaries were a particularly important genre for engaging their teenagers in a topic and convincing them that their views and opinions were important.

They (the kids) love the idea of writing and becoming and creating something. They love hearing their voices. We gave them full range of creativity; we didn’t really give them any rules. What I wanted to do with that first commentary was to get the kids used to using the recorder, sharing their voices, what kind of inflections they put in so they can critique themselves.

Teachers thought that the oral presentation as well as the writing of the commentaries was an important element of the ELP.

In the beginning, a lot of them thought “I can’t speak in front of people, I can’t record.” We’ve been going through this for years because we always had an oral presentation for them to present their final results from the investigation, and they all say that at the beginning. And then when push comes to shove, they do it. That’s one of the biggest problems in the inner-city— it’s not that they can’t, they think they can’t. And so when they find out they can, it’s like “Oh wow. I can do that.”

Similarly, several teachers talked about how students’ interviews with experts were an empowering experience and an important addition to students’ repertoire of tools for gathering information.

Their poise is phenomenal, in terms of calling people. Going from “I’m a stupid little sixteen year old” to “I’m a confident young person who is going to ask you some hard questions.” That has been really fun to see.

With the interview, the whole thing was to teach them how to ask questions. And I love that because part of the component of this is to get the kids to do some research on environmental issues in their community... Doing interviews as a tool to find out information.

Teachers also said that successful implementation of the full progression took a considerable amount of time throughout the school year. First, there was the planning of each piece, the background research, the writing of multiple drafts, and practicing and perfecting the “speaking” of the piece. Second, there were the technical aspects of producing an audio piece—learning how to use the digital recording equipment and editing tools, recording the actual pieces, and going through multiple edits. Both components were necessary and not insignificant in terms of the time, energy, and attention required for each type of audio piece. Furthermore, a number of the assignments (at least the commentaries) were individual student works, and needed to be “multiplied” by the number of students in each class. For classes with more than 25 students, the time required was extremely intensive, and only feasible with help from the producer mentor who worked with the class.

One science teacher candidly described some of the challenges posed by the ELP in the area of supporting students’ writing:

I’m a science teacher, I’m not used to it. I know the English teachers do it all the time, but doing the revisions was a bit of a challenge... figuring out what they wanted to say, and trying to make it sound better, but still keep their voice. I probably could have more easily just changed it and made it sound good for what I would like it to sound like, but to try and work with the students to get them to revise it was challenging.

Student Perspectives

Students were asked a series of open-ended questions related to their understanding of interviews, commentaries, and feature stories. When asked what was important when conducting a good interview, students shared a knowledgeable array of insights about interviewing techniques and objectives. Students’ responses fell into six major categories: ask the right question, be prepared, establish good rapport with the interviewee, present yourself clearly and with poise, be respectful and courteous, and be attentive to technical production.

Figure 5: Students' Views on Important Considerations for Conducting a Good Interview

Area of Learning	Sample of Responses
Ask the Right Question	Have meaningful questions that can be answered in a way which will be useful in the piece. Have good questions. Your questions shouldn't have a yes or no answer to it because then you won't get any information. Ask open-ended questions, and ask follow-up questions.
Be Prepared	Be prepared; be punctual. Have previous knowledge on the person being interviewed. Know what you're talking about and review your questions.
Establish Good Rapport with Interviewee	Get the interviewee interested in the interview and make them feel like their answers are important. Make the person you are interviewing feel comfortable and relaxed.
Present Yourself Clearly and With Poise	Speak loud and clear. Maintain eye contact with the interviewee. Stay calm in the most critical and nervous times. First introduce yourself and show you're not scared or nervous. Project your voice, try to talk clear, and take your time so you won't have that many mistakes to worry about.
Be Respectful and Courteous	Say hello, get permission from interviewee and say thank you. Speak clearly and ask appropriate questions. Also you should respect the views and opinions of the person being interviewed. To be respectful, listen attentively, feel comfortable.
Be Attentive to Technical Production	Never hide the mike; bring it out the moment you start. Where to hold the mike. Make sure you have all the right equipment and your batteries are not low. Have somewhere quiet to set up. Not make reassuring sounds like "mmmhmmm."

Students were also asked what they thought was an essential difference between a commentary and a feature story. Most students displayed a good understanding of the two genres, recognizing that commentary was based more on a person's opinion, while a feature was more factual and often drew upon multiple sources of information and perspectives.

A commentary is a short piece that reveals the speaker's opinion about a certain subject. A feature story is a full-length, more in-depth piece that explores and brings to light a certain topic.

Most students were also able to accurately describe several ways in which interviews best serve the production of a feature story. Their responses fell into three main categories: provides information/back-up facts/credibility to a story, offers a different perspective, and makes the story more interesting or allows the audience to connect with the story.

They get different perspectives on an issue and make your story more accurate.

Interviews provide more concrete and personal opinions of different people that make a more colorful feature story.

3. Utilization of Digital Technology for Production of Radio Pieces

Teacher Perspectives

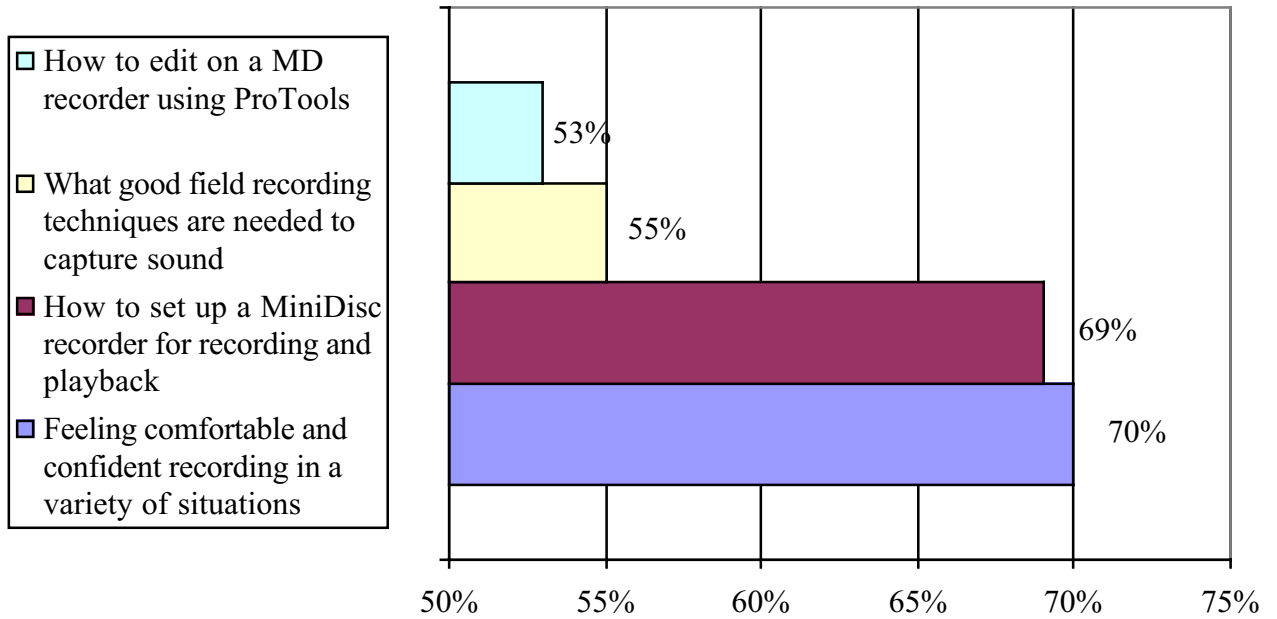
Teachers were both excited and challenged by the technical production aspects of the ELP. They were proud of their own accomplishments in learning about digital audio recording and editing with ProTools. At the same time, most of the teachers experienced some technical difficulties, such as getting computers that were both compatible with and had enough memory for running ProTools, not having enough computers for mixing audio, difficulty in downloading materials from the LOE website, and dealing with maintenance problems (e.g., how to fix a microphone wire). While most of the teachers seemed to have a technical person at their school who could offer some assistance, some of these technical difficulties disrupted the flow of work, exacerbated the time crunch posed by students' projects, and made the completion of radio pieces even more stressful. Given the skills, time, and energy required to edit multiple student pieces with ProTools, teachers were especially appreciative of their producer mentors who worked to support and assist them in this technical work.

Student Perspectives

Students recognized the prominent ways in which technology was incorporated in the ELP. Over half (56%) indicated that they associated the ELP with computer technology (56%), and a third (34%) indicated the connection to multimedia.

When asked to rate how much they felt they learned about different aspects of technical production, at least half of all students reported learning either a "good amount" or an "incredible amount" for most of the specific areas. (See Figure 6.)

Figure 6: Percentage of Students Who Reported Learning Either a “Good Amount” or “Incredible Amount” in Areas of Technical Production



Range: 53% - 70%; Mean: 61.75%

When asked to describe “two important things in this course I’ve learned about technology and radio production,” most students described particular pieces of equipment they had learned to use to produce their radio pieces. The equipment mentioned by students included ProTools for editing, mini-discs and mini disc recorders for recording their audio, microphones, MP3 recorders, CDs, and CD burners.

A second frequent comment pertained to learning about a specific aspect of the production process, such as the recording, editing, or mixing of tracks. A third type of student response concerned general comments about the advantages of technology for radio production.

Figure 7: Students' Views on "Two Important Things I Learned About Technology and Radio Production"

Area of Learning	Sample of Responses
Technical Skills with Equipment	<p>How to use an I-MAC, mini disc recorder, how to use ProTools and other things.</p> <p>I learned how to load an interview into ProTools, and edit an interview on ProTools.</p> <p>When editing your piece on ProTools, be aware of which mode you're in: "slip" or "shuffle."</p>
Production Techniques	<p>When you're interviewing, the mike has to be at a certain level and you have to make sure you don't hold the mike too close to the person's mouth so there won't be a lot of static.</p> <p>Watch out for background noise when recording your piece.</p> <p>I learned how to edit out blank spots and annoying sounds on a mini disc.</p> <p>Editing is the most crucial detail to professional sound.</p> <p>You can combine many different tracks to create a news story.</p> <p>You can add sound to the background of your interview.</p>
Advantages of Technology	<p>Technology helps get things done faster. You have more options with technology.</p> <p>The technology used is easy to learn about and easy to work with.</p> <p>Using technology offers an easier means of editing.</p>

A small number of students also described things they had learned about the radio industry and technology field (e.g., "how things work at a radio station via field trip to local NPR station," "this field constantly varies and it's growing rapidly," and "how computer technology is one of the most sought out after majors in colleges").

4. Connection to the Radio Broadcast Industry

There were three different aspects of the ELP Year Two experience that involved a connection to the radio broadcast industry: the provision of producer mentors, the collaboration with Living on Earth staff and resources, and the opportunity to broadcast and post student work on the national broadcast of Living on Earth series and the LOE website. The project's partnership with professional radio journalists specializing in environmental science was a critical and defining aspect of the project for both teachers and students. The affiliation provided a strong professional thread throughout the project—in the kinds of tools, approaches to, and standards for writing and production; through the contact with professional radio journalists who played an active role in the classroom experience; and in the provision of an authentic audience of potential radio listeners of national scope.

Producer Mentors

Given the ELP's special focus on journalism and radio production as well as environmental science, teachers very much appreciated the opportunity to have a producer mentor work with their classes this past year. For a number of the classrooms, producer mentors from a local National Public Radio station were somewhat difficult to arrange; most teachers received them in their classrooms starting in the winter, but wished that they could have also assisted during the fall. Four of the six teachers were highly enthusiastic about their producer mentors. Two expressed a less positive experience with their producer mentor, citing a lack of "chemistry" and ambivalent attitudes and expectations about working with students. Nonetheless, the two teachers were looking forward to having a better match next year, and were eager to receive a producer mentor in their classroom.

In the four classrooms where producer mentors did work well, teachers readily acknowledged and welcomed the expertise the producer mentors brought to the classroom. Each of the successful producer mentors brought real world experience and expertise in broadcast journalism to their active roles in the classroom. One producer mentor was very involved through multiple activities—helping set up interviews, holding conference calls with students every two weeks, and encouraging students to set high standards for their work. Another producer mentor co-facilitated with the teacher on topics and lessons, and met with students once a week during a regular 90-minute class period. A third put in many long hours helping to edit and mix radio pieces, and was instrumental in getting some of the students' pieces aired on a local radio station.

The ELP required significant time, effort, and commitment from the teachers to handle the demands of technical production—recording, editing, and producing a large number of individual commentaries and a smaller, but still sizeable number of interviews and feature stories. Thus, having the producer mentors provide not only expertise but also time and hands-on assistance was a huge asset to, and essential component of, teachers' implementation of the ELP curriculum in their classrooms.

One teacher specifically mentioned how her producer mentor was able to "push" and demand a lot from her students. While the students found the challenge difficult, they also appreciated it at some level. A number of students in all six classrooms discussed how proud they were of their work, given the long hours and dedicated effort, high quality, and level of professionalism of their final products and the process by which they created them.

Several teachers arranged field trips to local radio stations, which were well received by students. As one teacher described, "When we went to the radio station, some of them said they had an interest in radio.... They thought it was cool to come in and see what the computer person does, or the producer."

Relationship with Living on Earth

The teachers valued their collaboration with Living on Earth and regarded that relationship as an important partnership. They found the Summer Institutes gave them

important hands-on experience with some of the production tools and processes they would be sharing with students in the coming year. Teachers appreciated the expertise and journalism knowledge of project staff, and, as such, were especially desirous of greater contact with, and support from LOE, beyond the Summer Institutes and Mid-Year Workshops.

One teacher actively encouraged her students to both listen to the Living on Earth series and use the LOE website, and described how her students became very interested in the technology aspect of the project:

As soon as the website was set up, they were thrilled about that. One of the things they started doing, was I'd check out the LOE program for the week, and I'd come up with a worksheet, "Listen to a story; what is the hook?" So they are analyzing the writing in the story, the journalism aspect. And then kids would in their free time come up and I'd see that they were getting on the LOE website and listening to the stories. I saw that as a huge accomplishment...that they were self-motivated to get on the radio.

Airing of Student Work on LOE National Broadcast, Posting on Website, and Other Audiences

A unique and powerful component of the ELP was that the radio pieces students created by students would be considered as possible segments broadcast on the LOE national radio series, as well as available through the LOE website. Thus, the project had built in not only the provision of an authentic audience beyond simply the class and teacher, but one potentially of national and international scope.

Teachers and students were excited about the possibility of students' work being selected and aired on the LOE broadcast or on the LOE website.

They really valued the chance to do something that was real, authentic. (Teacher)

I'm pleased with the way the kids came up to the plate, and hit a home run. They did well. That's why I want this Web page to work because I want them to be able to see – "I'm on the World Wide Web. Something I did is out there for everybody to see." We're talking about inner-city kids who don't have a lot of access to things like that. And then they see "here's something that I did" on there. (Teacher)

[What I'm most proud about is] that at some point it will be put on the radio for America to hear. Yay! (Student)

In several of the schools, the ELP also received additional media coverage and public attention beyond the LOE broadcast. In addition to stories on the ELP in the school newspapers, several local city papers (e.g., the *Los Angeles Times*) ran stories on the project. In New Jersey, a number of student radio pieces were aired on the local NPR station due to the special efforts of the sponsoring producer mentor. In New York, the

class of middle school students presented various facets of their student projects at an international conference called YOUTH CAN (Youth Communicating and Networking) at the Museum of Natural History.

Students were asked how much they felt various members of their family, school community, local community, and general public across the country were aware of the work in their radio project. As shown in Figure 8, students felt that the groups most aware of their ELP work were teachers and administrators in their school, and students in other classes, followed by members of their family. However, 30% of the students felt that the general public across the country were at least somewhat aware of their work, while 22% felt that members of their local community were aware.

Figure 8: Students' Views on How Much Different Groups Were Aware of their Radio Project Work

Group	Very Much Aware	Somewhat Aware	Not at All Aware
Teachers and administrators in my school	37%	48%	30%
Students in other classes	29%	46%	20%
Members of my family	19%	46%	30%
The general public across the country	4%	30%	68%
Members of my local community	5%	22%	60%

Some teachers felt that there was an over-emphasis on the selection of work to be featured on the broadcast, when in fact only a handful of student pieces would actually get aired. Given that over 100 students participated in the ELP this past year, teachers underscored the importance of having more student work available at least through the project website, and to have such work easily accessible to parents, members of their community, and the general public. During the current year, teachers experienced some problems with access codes and insufficient computer equipment to download sound files.

Teachers requested additional clarification concerning the expectations that LOE had for students' work, and the criteria and standards used for choosing student work to be aired on the LOE national broadcast or posted on the LOE website. One teacher expressed that ideally it would be good to select the best student work from each of the six participating classes, so that all classrooms whose students met LOE's journalism standards could at least have some representation. Teachers also requested a more prompt and timely review of students' work, as the teachers were trying to compress a considerable amount of project work into their packed science teaching schedules. In spite of their hard work and scheduling of ELP activities to begin in early fall, teachers found that the multiple delays posed by computer problems, getting a producer mentor in their classroom in late winter, and not receiving prompt feedback from LOE on student work-in-progress, made the

classroom implementation of the ELP span much of the school year, with a crunch in the closing weeks of school.

Teachers also described some of the logistical hurdles posed by the realities of their schools: the difficulty of setting up a quiet place and non-class time for recording; the necessity of having experts come to the school for interviews (LOE will not typically broadcast interviews done over the phone) because school policies forbid students to leave the building during school hours; the lack of a classroom phone and therefore no easy way for interviewees to get back to students; and class periods that were less than an hour. Nonetheless, teachers regarded the striving to produce segments that could be broadcast on the radio as a valuable goal, and made considerable efforts to get the work produced.

Several teachers did note that some of the logistical constraints of their schools prevented them from easily attaining the “broadcast standards” desired by LOE. While not necessarily wanting the project to relax its standards for quality, they wished that LOE at least acknowledge that the realities of schools may need to be factored into their definition of what should constitute appropriate broadcast standards.

Rather than being designed for a special after-school club, small student group activity, or “honors” program, the ELP is designed to be part of a school curriculum, implemented in a class of typical size. As a result, several teachers wished the project staff to seriously consider the implications of the ELP being part of a science course (as opposed to a special journalism class or club), and the appropriate balance between process and product.

In terms of product, I feel like their pieces are so much stronger than last year. They were really meaningful pieces that should be shared and are worthwhile contributions. I think it is hard because I think LOE has this standard that pieces are supposed to be professional pieces, and [yet] these kids are not professional journalists. So they may seem basic, but for them go get the thought process to being able to do that story, that process is huge, and I think that gets lost.

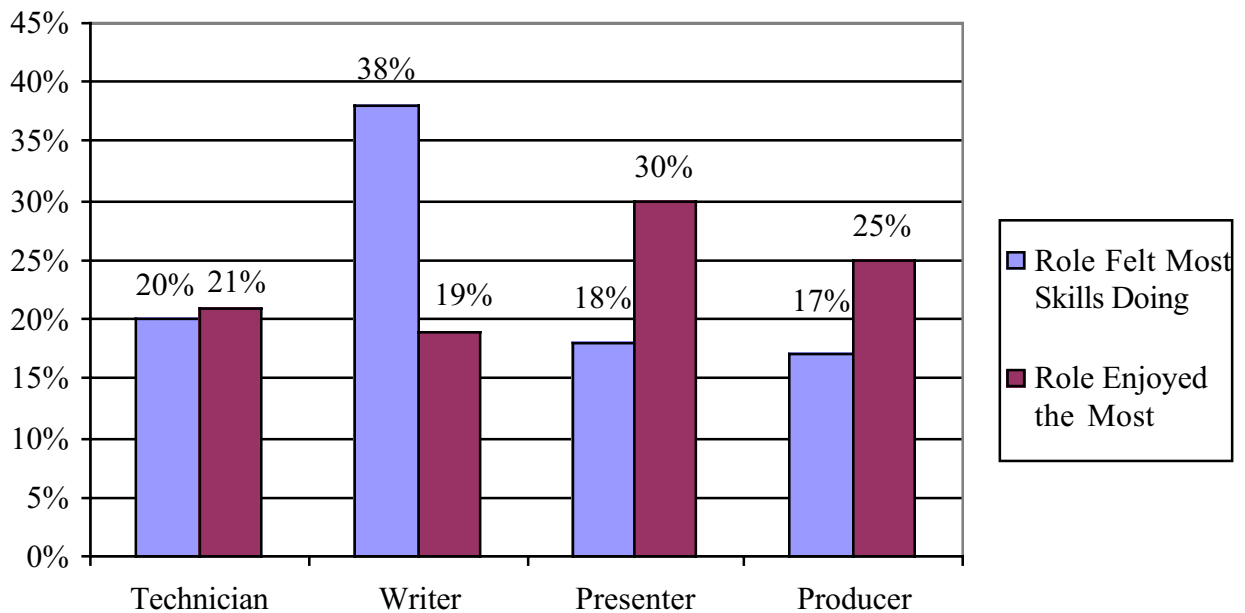
*I think it's a very worthwhile project. It's another tool to get kids to look at the world around them and appreciate the environment and that we have to take care of it and so on...The people running the program have to understand that that's what it is for me anyway— it's a tool. It's not an end-all. It's a tool to get me to the end which is to have kids, even inner-city kids, come out with good ideas and good feelings about how they can take care of their environment. It's part of what I do and it's a good tool but they have to back off a little bit in thinking that the radio is the end product. It's not. It's a product, but for the teachers it's not **the** product. The product is the students and their education and what they're getting out of it.*

5. Overall Appeal and Perceived Value and Reward of the ELP

Despite all the hard work and high standards required by the ELP, students reported that the ELP had a high level of appeal, with 45% of students reporting that they enjoyed the class “very much,” and an additional 29% reporting that they enjoyed the class “an incredible amount.”

The multiple roles required of the ELP—as technician, writer, presenter, and producer—provided students with a variety of roles to enjoy, and become skilled. As shown in Figure 9, all four roles were enjoyed by students, and afforded different areas for students to experience increasing skill and mastery.

Figure 9: Students’ Views on Roles



Students reported that they felt that they had learned to work effectively in teams, with 74% indicating that they had either learned a “good amount” (26%) or “incredible amount” (48%). In light of the multi-step and complex projects, students also indicated that they had learned at least a “good amount” about planning projects and assignments (73%) and time management (68%).

When asked what they were most proud of in their radio projects, the three most common responses dealt with the effort students had put into their project, their ability to learn something personal about themselves, and a specific thing they had done or learned. Students also talked about the level of professionalism they felt they had achieved.

Figure 10: What Students Were Most Proud about in their Radio Projects

Area of Pride	Sample of Responses
Effort Put Into Project	<p>How my group re-edited our story to make it into a much stronger piece.</p> <p>That I worked hard and I learned a lot about my subject.</p> <p>That everyone in my group worked together and effectively.</p> <p>The final draft of my commentary because it took so long to get there.</p> <p>That I was able to overcome my fear of recording my voice. Now I feel more confident.</p> <p>When we first learned about the assignment, I had my doubts whether or not I could handle it, but in the end I outdid myself.</p>
Self-Expression and Self-Awareness	<p>The idea that I was able to identify or bring out a different side of me. I was able to realize how the environment had a big impact in my life.</p> <p>I used my thoughts and feelings instead of a dictionary written story.</p> <p>That I was able to talk about something that was so personal and how some people responded to my story.</p>
Specific Skills or Activity	<p>The way I helped the listeners feel what I was writing about. The words I used took them to where I was describing.</p> <p>That I overcame difficult interviewing problems and the project turned out well.</p> <p>I was proud that I did well taking my time saying my words very clear and projecting my voice.</p>
Professionalism	<p>How professionally we conducted our interviews, how professionally we acted and were treated.</p> <p>How good the end result was! I really made a professional sounding story.</p> <p>The final commentary was a lot better than I expected and I was pleased with how professional it sounded.</p>

The project's dual focus on journalism and environmental studies was reflected by students' final comments on their surveys, when asked whether or not they had further ideas or comments they wished to share. Across all six participating classrooms, students were enthusiastic about the ELP, and the ways in which it had broadened their experiences in journalism and the environment:

This was one of the best classes I ever had. I was never really interested in journalism, just the environment— but now I love them both. This class opened my eyes to so many new opportunities. I'm so happy I took it.

This was an awesome experience and I learned so much. Journalism wasn't something I looked into until this year after this project.

I really did learn a lot about how I want to affect my community and everything I do has its effect.

I appreciate everything that was taught. I learned a lot about things that I never paid attention to. And now, I'm aware of what goes on in our society and economy. Thanks!

This is a good opportunity for urban youth to learn about and explore their natural surroundings.

I really enjoyed learning about the radio things, but also being able to learn more about science through real people's experiences instead of just out of a textbook.

I had a great time in this class and I want to thank you for teaching me and giving me the opportunity to learn on my own.

This should keep going and further expanding across L.A. and other places in other states, because a lot of kids are interested in this type of work in their future.

Recommendations

Our Year Two evaluation of the Living on Earth's Ecological Literacy Project indicated that teachers and students alike were positive and enthusiastic about the project, and expressed a desire to continue participating. Both students and their teachers learned from it, they created outstanding products, and they made progress and showed gains that exceeded the Year One ELP involvement. Teachers and students indicated some areas of possible improvement and refinement, as suggested below.

Articulate the ELP's science-related goals: Teachers and students agreed that the project focused primarily on the journalism elements of the ELP and the specific journalism products they created. If the ELP wants to achieve a greater balance of student learning in both the science and journalism areas, focus on a greater articulation of the ELP's science-related goals. Currently, the relationships between the ELP program and student knowledge of science and information-collection strategies and results are not clear. How does conducting background research and interviews deepen and expand students' information-collection strategies? In what ways does communicating about their research support their science learning? Did teachers and students sufficiently address the "science" and "level of explanation" components of the ELP's scoring rubric for environmental radio scripts? Since the curriculum is most likely to be implemented in science courses and it takes a significant amount of time to implement, the project might be better served if science teachers could see more direct links between the ELP and their science objectives.

Balance process and product: provide learning goals in addition to product standards. While teachers and students were proud of their journalism products (e.g., commentary, interviews, feature stories), they sometimes felt rushed and pressured by all that needed to be done to create final student products that met LOE broadcast standards. Given the educational goals of the ELP, we suggest that LOE strive toward a greater balance between educational process and final student product. This could be accomplished through closer articulation of learning goals in both science and journalism. Consider specifying intermediary milestones that make up the steps and drafts involved in the process, outlining the ongoing progress that takes place during the pursuit of program goals. These would include both environmental science and broadcast journalism.

Clearly specify criteria for final student products: A number of teachers requested greater specification of the criteria for student products selected to be broadcast. The selection process is currently regarded as arbitrary and reserved for a few schools and students. Very few student products could actually be broadcast on LOE, and classrooms had difficulty meeting some of the broadcast standards required given the logistics and realities of schools. A clearly specified set of criteria would aid teachers and students in preparing a greater number of outstanding student products. At the same time, we recognize that the editorial process is a subjective one, and that meeting fixed criteria is not a guarantee of success on the air.

Expand outlets for dissemination: Expanding the types of outlets used to display and disseminate student work may provide additional opportunities to share exemplary work. Continue to offer student work through the LOE website and also encourage teachers to create links on a school's website. The project might consider burning their own CDs of student work, to further increase dissemination and easy access by parents and others in their local communities, as well as distributing across the project nationally. Exemplary student work could also be distributed as sample pieces in the curriculum, for new students involved in the ELP. Local mentors can also help disseminate editorials and features to other local outlets (including commercial radio, newspapers, and even local television stations who can shoot B-roll for the audio). Students may judge their success by dissemination, not completion.

Address the full progression of commentaries, interviews, and feature stories: Teachers were very positive about the logical and comprehensive expansion of the ELP curriculum, but it took them a considerable amount of class time to successfully complete each type of product. For teachers who want to save time, the ELP might consider whether there are possible ways to streamline classroom implementation efforts. The project might identify the high priority areas for classroom involvement: which steps in the sequence are vital and which parts of the curriculum could be used selectively. Classroom implementation might also be streamlined to reduce time and effort involved, using a combination of radio materials that are reviewed and critiqued in conjunction with original production from scratch, both individual and small group products, and the like. Finally, fostering collaboration between classroom teachers and journalism and/or computer teachers in a school may increase student class time for projects. Such a co-teaching arrangement will involve greater orientation, learning and clarification, and coordination of teaching roles from teachers in these other disciplines.

Continue to enhance the producer mentor component: Continue efforts to secure high quality producers from the radio field to assume producer mentor roles as early in the school year as possible. New mentors should be screened by participating teachers since "chemistry" as well as clear expectations and communication are essential ingredients for a successful producer mentor/student relationship. Producer mentors should be informed of the roles they might assume through written materials and discussion with past mentors. Valued producer mentors clearly devoted a significant amount of time to their classrooms this past year, far exceeding the required 15 hours per month. More centralized support and services from the LOE/ELP project staff, including a guide of strategies in the ELP curriculum, could help take the load off the mentors. A guide could include: tutorials and related student assignments to teach editing equipment that could accompany hands-on assistance; "tips from producers" guidelines; and listening assignments based on producers' past work with accompanying commentary, which students could review and critique.

Strengthen communication between LOE and teachers: Teachers desired greater contact with LOE to learn from their staff expertise. The decision by LOE to designate a new LOE staff person to this role during Year Three is a positive step addressing this need. The presence of this individual at the Summer 2002 Teacher Institute was appreciated and reassuring, and helped solidify and strengthen the relationship between teachers and LOE. It is clear that the LOE teacher liaison will be instrumental in providing the teachers with support on greater clarification of process and criteria for student work, feedback of student work, recommendations on the writing and editing revisions needed, and the distribution process and channels for final student work.

Greater integration of LOE broadcasts and products into the teaching process and classroom materials might also serve to strengthen the relationship between LOE and teachers. During Year Two, several classrooms actively engaged in listening to and reviewing past LOE pieces, seeing them as opportunities for students to learn and critique, both science content and journalism techniques.

Leverage national representation and scope of participating classrooms: Given the ELP's distinct focus on studying global environmental issues through one's community and personal experience, the project might consider ways to better leverage the distinctive national representation of participating classrooms. Consider making a CD of selected student work from across the country that could be a core or supplemental resource for all classrooms. Students might also be encouraged to collaborate and communicate via e-mail or a group discussion of particular issues on the website, or produce some cross-classroom student article that is posted on the website.

The project is filled with opportunities to build a solid environmental science learning component, along with mastering skills of broadcast journalism, and overlaying a strong element of media literacy. It is now a matter of tinkering to find the right balance among the project's goals and strategies that will guide teachers and help students. The potential is evident, most of the pieces are in place. In the final year, a great deal more can be accomplished.

ABOUT THE RESEARCH TEAM

This study was conducted by ROCKMAN *ET AL*, an independent research and consulting firm, specializing in the impact of technology and its roles in education. The company consults with corporations, state and federal agencies, and educational organizations on research, evaluation, and policy development that advance the application of technology to meet educational and business learning needs. ROCKMAN *ET AL* undertakes local, regional, and national studies of technology's role in school reform for both public- and private-sector clients.

Current and recent clients of ROCKMAN *ET AL* include: Adobe, California Department of Education, Children's Television Workshop, Classroom Connect, Compaq Computer, Co-nect Schools, Harvard Graduate School of Education, Indiana's Buddy Project, Indiana Department of Education, the Joyce Foundation, Microsoft, National School Boards Association, Scholastic, Teacher Universe, US West, Public Broadcasting Service, Toshiba, and numerous U.S. Department of Education and National Science Foundation projects ranging from Technology Innovation Challenge Grants to FIPSE projects, to Bill Nye, the Science Guy and Cyberchase.

The offices of ROCKMAN *ET AL* are located in San Francisco, California; Chicago, Illinois; and Bloomington, Indiana; the company has working relationships with contractors, university faculty, and consulting groups in all regions of the country.

Further information about this study can be obtained from:

ROCKMAN *ET AL*
49 Geary Street, Suite 530
San Francisco, CA 94108
(415) 544-0788
FAX (415) 0789

<http://www.rockman.com>