Building ESL Students' Linguistic and Academic Literacy through Content-Based Interclass Collaboration

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Interclass collaboration in the context of an in-depth interdisciplinary discussion and analysis of global problems yields significant benefits in the development of ESL students' sense of efficacy, their literacy, and their critical thinking skills.

For ESL students to succeed in an academic environment, they must develop not only the ability to interpret and create texts on a variety of issues, but also the ability to think critically and creatively as they conceptualize, analyze, and attempt to find solutions to global problems. Pedagogical activities that provide students the opportunity to explore and develop each of these skills offer them enhanced literacy as well as motivate them to find and create their own voices.[1]

To prepare our ESL students to meet the challenges of mainstream academia, we sought to incorporate activities that would help them build critical problem-solving skills as they were asked to consider and present possible solutions to serious problems in the real world. We have found that interclass collaborative projects foster a learning environment in which students are invited to take center stage. Such projects stimulate students to become actively and creatively involved in the learning process as they acquire and hone English language skills, expand their overall knowledge base, and develop analytical and critical thinking skills. In this paper we will describe how we use interclass collaboration in a content-based ESL curriculum to build students' literacy skills and content knowledge and to foster in them a greater sense of confidence in their ability to articulate their views on key social and environmental issues.

The Benefits of Interclass Collaboration

Collaboration has long been recognized as an effective means to engage students actively in the learning process. In fact, the power of collaborative learning communities is well documented in the research (see, e.g., Bruffee; Gokhale; Imel). Past research indicates that through a process of collaborative, constructive, and creative activities, these learning communities provide the context for students to create, share, apply, and critique their own new knowledge, rather than just absorb knowl-

edge created by others. According to the New London Group, collaborative learning communities facilitate literacy development because "when learners juxtapose [their differences], they gain substantively in metacognitive and metalinguistic abilities and in their ability to reflect critically on complex systems and their interactions" (69).

Collaborative groups create a venue in which students must play alternating roles as knowledge receivers, knowledge providers, and knowledge designers. Learning to assume these roles helps students increase their feelings of efficacy, fosters their active processing of interdisciplinary themes and concepts, encourages them to reconstruct and accommodate existing ideas and make personal connections with learning, and builds metacognitive knowledge associated with enhanced task performance (Kasper, "Assessing").

We have found that expanding the collaborative learning community beyond the individual classroom yields significant benefits.

Although studies of collaborative learning demonstrate the benefits described above, these studies have focused primarily on collaborative activities among students within the same class. Studies of collaboration across classrooms have all involved an online environment (see e.g., Warschauer, Turbee, and Roberts); the literature contains little, if any, reference to the type of face-to-face interclass collaboration described here. We have found that expanding the collaborative learning community beyond the individual classroom, in the context of an in-depth interdisciplinary discussion and analysis of a global problem, yields significant benefits in the development of self-efficacy, literacy, and critical-thinking skills.

Our Curriculum

We teach separate sections of ESL 91, a high-intermediate-level[2] course, emphasizing students' reading/writing and critical-thinking skills. Because we believe that intensive reading, writing, and research are key to helping students build strong literacy skills, we both follow a focus-discipline research curriculum, in which students choose a focus discipline from among ten content areas represented in their textbook[3] and then pursue sustained independent and collaborative study of that discipline over the semester (see Kasper "New Technologies" for a full discussion of the content of and rationale for the focus-discipline research curriculum). The goals of the ESL 91 course are to help students begin to see how multidimensional reading, writing, and meaning itself are and to encourage them to become creatively involved in transferring their newly gained knowledge as thinkers and writers of texts. To this end we encourage our students to explore meaning through reading, writing, and research and to find and express their own "voices" in their writing.

In-class collaborative learning activities are integral to each of our individual sections. Students in both sections work individually and as members of

focus-discipline groups, sharing and building knowledge in a strong, active learning community that provides students a peer forum to discuss and clarify readings and an audience to evaluate and critique writing. As Marcia Babbitt notes, through learning communities students "learn to respect each other's views, realize their own views are valuable, and gain confidence in their abilities as learners and writers" (53).

To effectively monitor student work, to make suggestions and to answer questions, we both participate regularly in each focus-discipline group discussion. This instructor participation allows students to clarify any ambiguities they may encounter, and it provides us with the opportunity to encourage students as they work on a variety of complex assignments.

Finally, in both sections we design general class activities to teach students vocabulary and language structures and to provide them with day-to-day practice in reading and responding to complex interdisciplinary texts. Students in both sections also receive guided instruction in how to dissect a text, search for clues to meaning, and compose cogent responses to inferential questions and essay prompts.

While the basic content of both of our sections is highly similar, there are some key differences in the format of the two sections. Loretta Kasper's section is a hybrid course in which more than 33 percent of the coursework involves the use of online materials and/or resources. This hybrid section meets six hours per week, in three two-hour blocks, for twelve weeks. Students meet in the computer lab each week for one of those two-hour blocks. Most students have computers at home; those who do not are able to use the computers in the college during open computer lab times. Students in Kasper's section use both e-mail and the Internet extensively, and their readings include both print texts from the core book and hypertexts.[4]

While Saundra Tara Weiss's section follows a focus-discipline curriculum, this section does not incorporate computer technology. Although many students in this class have access to computers at home, and all have access to open labs in the college, they are not required to use computer technology as part of the course. This section meets in the physical classroom for each of the three two-hour blocks each week. Neither e-mail nor the Internet is used or required in this section.

The Collaborative Lesson

Although the general format of our sections differs as described above, the content of our classes is the same. We have both followed a focus-discipline curriculum for several semesters. Collaborative learning has been such an integral component of both of our classes that an interclass collaboration seemed a natural outgrowth. Once during each semester we arrange to have the two sections meet so that students can come together for an in-depth discussion of issues in one of the disciplines covered in the textbook. So that all students come to the interclass collaboration with basically equivalent levels of knowledge, we select a subject that has not been chosen as a focus discipline by students in either section. Over the semesters,

our collaborative lessons have focused on a range of topics from the uses of language, to the implications of the Scopes "monkey trial," to global warming.

No matter the topic, the activities leading to the collaborative event become a focus and a dynamic embedded in the structure of each of our individual classes. This dynamic functions to motivate students to think critically as they prepare for and anticipate the upcoming interclass collaboration.

We design and choose the tasks and texts for our collaborative lessons with the goal of teaching our students to contextualize a topic, to argue and support a point of view, and to consider varying perspectives on an issue. We hope to help students learn to interact with language in new and varied ways as they develop and hone a range of skills that will help them to succeed in future academic and nonacademic settings.

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We have found, each in her own classroom and through our interclass collaborative lessons, that the peer group provides a comfortable context in which students feel freer and more able to express their ideas on complex issues. Students who, on their own, might not feel confident enough to express their ideas gain confidence through group discussion. In the process of discussing issues with their peers, students learn that their opinions are valuable because each of them has important things to articulate.

The topic of the collaborative lesson described here is global warming, which is covered in the core textbook unit on environmental science.

Preparation

To give our students sufficient time to gather information and prepare for the interclass collaboration, we decided to schedule the lesson for the week after spring break. Our students began their preparatory work two weeks before spring break. We both began by having our students read the core text, "The Greenhouse Effect" (Kasper, *Interdisciplinary* 35–39), from their course textbook; however, because of the differences in the format of our individual sections, we each used different supplemental preparatory texts and activities.

Kasper's Section

Because Kasper's section was a hybrid course, in which computer technology played an integral part, her students read the core text online as a controlled hypertext with glosses.[5] Weiss's section read the print version of the text in the course textbook.

In Kasper's controlled hypertext, which may be found at http://kccesl.tripod.com/hypertextstudy/greenhousecontrolled.html, students began with the main text (the same one found in the print textbook), and then followed links to three additional online texts. These additional texts came from the EPA's Global

Warming site (http://www.epa.gov/globalwarming) and dealt with an overview of the earth's changing climate, climate trends resulting from global warming, and a greenhouse timeline, which traces the problem of global warming and describes key developments in the field from 1827 to 2001. As students completed reading each online text, they followed a link to the next text for a total of four texts. After students had read all four texts, they completed and submitted an online reading comprehension exercise (see http://kccesl.tripod.com/greenhousecontsum04.html).

After completing this reading comprehension exercise, students were given online homework, which required them to access, read, and take notes on four additional texts from the *New Scientist* Web site. The first two texts, located at http://www.newscientist.com/hottopics/climate/climatepoliticsfaq.jsp and http://www.newscientist.com/hottopics/climate/climatepoliticsfaq2.jsp, dealt with the Kyoto Protocol. These texts defined the terms and goals of the Kyoto Protocol and explained how this agreement addressed the effects of global warming on the citizens of the world. The third text, located at http://www.newscientist.com/hottopics/climate/climatequotes.jsp, provided students with a variety of quotations including statements from the director of the U.S. Environmental Protection Agency and the White House Council of Economic Advisors. The final text, located at http://www.newscientist.com/hottopics/climate/, contained two pages of links to articles dealing with various aspects of the greenhouse effect. Students were asked to choose one specific aspect related to global warming and read, take notes on, and summarize the text on the linked page. Students shared their summaries with the class.

In addition, students' independent online searches led them to another Web site: http://www.pbs.org/wgbh/warming/debate/. This site, "What's Up with the Weather? The Debate," contained contrasting arguments presented by a variety of key figures in the global warming controversy. In particular the arguments of two scientists, Fred S. Singer and Tom M. L. Wigley, offered students opposing viewpoints. As an additional preparatory activity, Kasper asked her students to write a letter to the person with whom they most disagreed and to present their argument against his or her position on global warming. Students were advised to be sure to use persuasive evidence, consisting of references to and quotations from texts, to support their position. This activity not only exposed students to opposing viewpoints, but it also encouraged them to begin to formulate and articulate their own views on the issues under study and to present these views in a coherent written form. In so doing, students began the process of considering and evaluating differing perspectives.

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The following student letter to Dr. Singer demonstrates the process:[6]

Dear Dr. Fred S. Singer:

I am a student of an ESL course at Kingsborough Community College. In our class we have learned and done research about the greenhouse effect. We have observed how the concentration of greenhouse gases in the atmosphere warms our planet and studied the possible consequences of the global warming.

During the research we faced different points of view on this problem, from skeptics to alarming attitudes about the consequences of global warming. At that time I read your interview from the webpage and I totally disagree with your statements, so I decided to write you this letter.

In the interview you say that climate changes are natural and these changes are not a threat to people because human beings have adapted to all kinds of climate changes. Yes, you are right. The climate keeps changing all the time, but today we speak about humans modifying the climate, not at one degree per millennium, which is the natural rate, but at possibly several degrees per century. Now the question is how can people and other habitats of our planet adapt to such a fast changing environment? Now the climate changes ten times faster than the history for which we have experience. According to the professor of biological sciences Stephen H. Schneider, "This seems an absolute prescription for an extinction crisis where we lose a large fraction of the species now on earth. Does anybody care?"

You also say that human beings in producing energy and in just living, generate heat and we are not going to go back to living without energy. It is very difficult to imagine that we might stop using the carbon-based energy in one day, but it does not mean that we should not develop more efficient technologies like fuel cells and we should also switch from coal to gas. It can protect the climate and we can have industrial development at the same time.

You then say that if the ocean warms, the sea level will rise and counterbalancing this is the fact that the warmer the ocean, the more ice will accumulate on the ice cap. If this is true how about the NASA studies which show that, between 1978 and 2000, 1.2 million square kilometers of apparently permanent ice melted away? That is an area five times the size of Britain and represents a loss of 9 percent per decade. As NASA ice physicist Josefino Comiso said, "At this rate permanent ice will have disappeared before the end of this century." This means that sea levels will rise 88 cm by the year 2100, causing flooding of low-lying areas and other damage.

In your interview you also make a statement that if we look carefully at other human activities we will see that people can produce things that cool the environment and, for example, you speak about the production of aerosols. While aerosols may cool the environment, we can not use the acid rain which is related to aerosols production to solve the problem of global warming. We know the aerosols are very bad for the environment and they are also part of air pollution which we breathe. This leads to increased lung and respiratory disease.

You say also that high levels of carbon dioxide should not concern us. They will make plants grow faster. They will make agriculture become more productive and obviously, not only lower costs for food, but also produce more food. On the other hand, the CO_2 is also the part of pollutants which are threatening the

ozone layer. The ozone layer is necessary for life as we know it. The ozone absorbs the dangerous ultraviolet radiation. The increased ultraviolet radiation is harmful not just to human beings; it also damages crops and plants. The result of this is less food and higher prices.

You say that the climate science has become abnormal in the sense that it is being guided by the money. You state that the scientist uses data selectively to support the idea that human beings face catastrophic problem of global warming, because the people who are skeptical about global warming generally do not have government support for their work. For example, the scientists don't mention the fact that the weather satellite observations of the last twenty years show no global warming, but a slight cooling. The scientists suppress data that disagree with the idea what they are trying to say. If there is truth in your words, how can the people trust the scientists?

Scientists don't have a Hippocratic oath, but they have to tell the truth and provide a clear picture of what is occurring in nature because the people have to take some steps to avoid the coming dangerous consequences of our activities. In the end of the letter I want to thank you for your attention to my thoughts. I hope that people will be able to observe the scientists' data, to analyze it, and to solve the problem of global warming to save our planet for our children.

This student letter demonstrates synthesis of knowledge and information. The student has considered opposing viewpoints and used these viewpoints as support for her own position on the issues under study. Her writing demonstrates that she is well prepared to engage in the ensuing in-depth discussion during the interclass collaborative lesson.

Weiss's Section

To prepare for this event, Weiss assigned specific readings. Like Kasper, she required students to read the text "The Greenhouse Effect" in the Environmental Science unit in the core textbook, and to answer the questions at the end of the section (Kasper, *Interdisciplinary* 35–38). Weiss also distributed photocopies of two short chapters from Rachel Carson's *Silent Spring*, "A Fable for Tomorrow" (Chapter 1) and "The Obligation to Endure" (Chapter 2), and one longer chapter, "Climate and Civilization: A Short History," from Al Gore's *Earth in the Balance*. She asked students to read each of these chapters, which would then be discussed in class. Weiss made these texts available to Kasper, and Kasper's students also read and discussed the Carson and Gore readings in class. Students in Weiss's class were also given the URLs of the four texts on the *New Scientist* Web site used by Kasper in her class; however, they did not read or discuss these texts in class.

Carson's scientific environmental stance coupled with her poetic style beckons budding environmentalists as well as general readers to ponder on the critical message she presents throughout her work. "A Fable for Tomorrow," replete with both gentle and stark images of a tranquil spring landscape gone awry, serves as an introduction to and as a cautionary fable about the environmental concerns Carson wished to communicate to her readers. In "A Fable for Tomorrow" Carson also

provides examples of the changes she foresees; students were encouraged to comment on the changes they envision as well. This activity prepared students for Chapter 2, "The Obligation to Endure." In this chapter, Carson reaches out to her audience, making it quite clear that the human race must take responsibility for its survival; toward that end, she suggests that our approach to nature must be deliberate and responsible.

Students were then asked to both read and comment on "Climate and Civilization: A Short History" in Al Gore's *Earth in the Balance* (56–80). In contrast to Carson's flowing, lyrical style, Gore's work is more complex and difficult to read. Helping students sift through this material required more time and greater instructor intervention. In spite of their stylistic variations, students understood that both Carson and Gore were ardent defenders of the environment, and were asking their readers to think seriously about our relationship to it.

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The in-class discussions of "The Greenhouse Effect," "A Fable for Tomorrow," "The Obligation to Endure," and "Climate and Civilization" prepared students for the collaborative forum. Students' comments and questions prior to the collaborative lesson suggested that they had acquired a good understanding of the connections among and the meanings embedded in the readings.

Finally, Weiss also told her students to use books, the Internet, magazines, and the *New York Times* to obtain additional related information. Weiss asked students to reflect on each of these readings and to bring their questions, thoughts, comments, and ideas to the interclass collaborative event.

Bringing the Classes Together

The collaborative event, which lasted for two hours, was held in a large conference room at the college, one traditionally reserved for official college events. The location of the event created a positive atmosphere for the students. In all, there were fifty students and two instructors in attendance. It was evident that students in both classes were eager to participate in the collaborative lesson. We see this as a consequence of the intensive preparation each class had prior to the collaborative event.

We welcomed the classes to the collaborative seminar and expressed the importance of participating in a twenty-first-century forum devoted to such a universal and pressing topic as "global warming." We expressed our belief that this event would encourage students to become more environmentally conscious; we also expressed our hope that students would take a more active role in "environmental science" in the future. Although students in each class were now more knowledgeable about the issues associated with global warming, we felt that it was important to briefly review some key points in the article "The Greenhouse Ef-

fect" before creating individual groups. For example, we posed questions to elicit student responses with reference to the hole in the ozone layer and the consequences of ozone depletion. These student responses to the review questions were written on the chalkboard.

Following this brief review, we introduced the topic for discussion, which would also serve as the prompt for the collaborative lesson's writing assignment. The prompt asked students to freely imagine what life on earth would be like in the year 2050 if global warming continued unchecked. We asked students to be specific when describing their visions; we asked them to consider as many perspectives as possible, including the adversarial ones, related to the effect(s) of global warming on the human race. We then created ten groups of five students each. To foster a truly collaborative interclass discussion, each group was composed of students from both classes.

We asked each student group to choose one critical consequence of global warming; the groups were asked to brainstorm, discuss, analyze, summarize, draw conclusions, and offer possible solutions. We informed the students that they would be required to share their conclusions with the entire audience. Students were given approximately thirty to forty minutes to engage in group discussions, which were quite lively and highly interactive.

We each circulated about the room, joining group discussions, becoming members of each of the groups and assuming the role of "colleagues" who listened and posed questions within the context of discussions begun by the students. We challenged our students to take responsibility for discovering and expanding knowledge, for finding possible answers to difficult questions, for analyzing the various issues key to global warming. Because they had engaged in an in-depth, focused study of the range of issues related to global warming in preparation for the collaborative event, our students were ready to take on this challenge.

When it came time to summarize their discussions, students were eager to share their conclusions and offer possible solutions to the problems discussed. So that all students might have a complete summary of the results of the collaborative discussion, Kasper wrote the conclusions of each group on the chalkboard, and we also collected copies of the written group summaries, which we photocopied and distributed to all students.

The conclusions presented by the groups reflected their overall understanding of the environmental problems facing humankind in the twenty-first century. Several groups articulated serious concerns, as they thought about and commented on life in 2050. For example, one group focused on living space in 2050, as it were, believing that humans will live primarily indoors, in order to avoid exposure to excessive heat and radiation from the sun. They envisioned a world in which humans would no longer be able to enjoy nature the way we have for so many centuries. Another group concluded that humans would have to invent more advanced ways to purify the air and water in order to survive. In some respects, this group presented a Darwinian profile of life in 2050, and we discussed the implications of "natural selection" and "survival of the fittest." Still another group consid-

ered the medical ramifications of global warming in fifty years. They concluded that there would be untold numbers of people with skin cancer and other diseases related to global warming. Regardless of each group's stance, students in all groups seemed to share an overall concern about the future of humankind. Some groups envisioned greater catastrophes than others. Some students, less threatened, felt that life on earth may not be all that bad down the road.

It was evident in the way each group spoke that the in-class collaboration in the content-based classroom, coupled with the collaborative lesson described above, challenged students to think deeply about environmental issues. One student in Kasper's class brought information on the Salt Marsh Nature Center, an environmentally protected area located not far from our college. He described the center and the activities conducted there. He handed out brochures that he had gotten at the center and encouraged the other students to visit the center and join in the programs provided there.

Overall, students' interest in and enthusiasm for the topic were apparent in the way they responded to the other students in the forum. They were attentive and did not "miss a beat" in the sophisticated discussion that ensued. When we presented a problem or asked a question, students were quick to raise their hands to answer; moreover, students expressed confidence in presenting their critical stances. Students did not hesitate to argue a point with other students, supporting the argument with evidence gleaned from their research. In one instance, a student adamantly stated that society has to be more concerned with economics than with the environment. The rebuttal was immediate. Most students in the class genuinely believed that we are facing an environmental crisis. Albeit this student stood her ground, the somber tone of the other students tended to counter her position.

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This interclass collaborative event served to create a stimulating atmosphere for interactive learning beyond the confines of our individual classrooms. Had we had the time, the collaborative discussion could easily have lasted for another hour or two. We both believe that the experience of the collaborative lesson was a positive one for our students, and this belief is supported by both the essays students produced and the feedback they provided.

The Products of the Collaborative Lesson

Student Writing

To sustain the omnipresence of the text, interweaving both in-class research and interclass collaborative discussion into a tapestry of writing, we asked our students to use both the information they had gathered and their imaginations in describing a possible future scenario. Students were given the following essay prompt:

> Imagine that it is the year 2050. Although governments and their citizens were warned about the dangers of the greenhouse effect as early as the 1970s, they did not take the necessary steps to prevent it from worsening. As a result, global warming and ozone depletion continued unchecked. In a well-organized essay, describe what life would be like in 2050 under these conditions. What would be the state of the climate? What would the nations of the world look like? What would be the day-to-day living conditions of the people of the world?

The essays students produced were quite interesting and demonstrated their ability to synthesize knowledge, integrating fact and imagination. The following essay composed by a student in Kasper's class not only indicates the fluency and the creativity of student work but also provides a sophisticated analysis of the potential consequences of global warming:

> If you analyze the world where we live you will come to the conclusion that Nature is a perfectly balanced creature. Everything in this balance goes in strict mathematical order. As the well known mathematician Isaac Newton once said: "If God created the Universe then he must be an outstanding mathematician." This is an extremely strong quote because you can write down everything that happens in the nature on a paper in mathematical equations. This is the way it was 10 billion years ago and it will still be the same 10 billion years from now. When the numbers and structure of these equations change, the great cataclysms happen [. . .].
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> It is 2050 right now and the time for the next cataclysm has come. The living conditions on the Earth are terrible. The ground doesn't give food and the species of the sea and animals are dead due to acid rain. All natural resources are ending and everything alive on the face of the Earth is starting to disappear. Unfortunately the reason for this catastrophe is not a huge meteor or alien attack; the reason for it is the human being. People destroyed their own planet by their lifestyle and there is no one else to blame.
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> The problem began during the Industrial Revolution when changed agricultural and industrial progress created new chemical compositions (oil, gas, carbon dioxide) and added gases that absorbed ozone which were released into the atmosphere. As a result of this action the Earth's atmosphere kept on changing and the temperature of the planet kept on rising and now the global warming has no solution. Because of that the greenhouse gases (carbon dioxide, methane) increased, resulting in the depletion of the ozone layer. As a result other significant transformations happened around the world. The sea level increased and a lot of countries suffered flooding and some even disappeared. The tropical regions lost their vegetation and this caused deforestation on the planet. The deserts around the world started expanding with frightening speed. The beautiful sea coast of The Mediterranean Sea has become a wild desert just in 10 years. Skin cancer has become the "Black Death" of the 21st century. Children were born deformed because of the radiation and more children died from severe diarrhea caused by dirty water.
>
> These environmental conditions pushed people to hide from sunshine and air. The governments all over the world started building underground facilities for the most important people, but still a lot of people had to live on the ground.

Little by little the underground government's power was weakening outside of their bunkers. Consequently new leaders of the so called " Abandoned People" arose and wars between "underground" and "on the ground" people began all over the world.

100 years ago no one was thinking that such a needed thing as The Industrial Revolution would lead to destruction of our nature. Even 50 years ago it was not too late to fix this problem, but right now in 2050 people can do nothing in order to change anything and everybody feels sorry that they did nothing when it was the right time.

A student from Weiss's class blended facts from the core reading text with those gleaned from independent research to offer the following image of the world in 2050:

I am scared to imagine how terrible life may be for human beings in 2050. Terrible situation for human lives and the situation will continue in the future.

Machine-made products are created by modern technologies, such as are cars and airplanes and they provide a better life for people. In contrast, the products also destroy our lives. Chlorofluorocarbons called CFCs for short, are the guilty chemical pollutants use in aerosol cans, refrigerators, some air conditioning systems, and some packaging materials. When the CFCs are released from them into the atmosphere, it can destroy the ozone layer, which protects the earth. If the ozone layer disappears, the ultraviolet radiation, which is from the sun, can be sent to the earth directly and destroys all living things in the world.

Ultraviolet radiation is the major problem for all the lives in the world. For humans, it can cause people to have skin cancer and eye diseases. For marine life, it can cause them to die. For nature, it causes global warming. According to the U.S. satellite Nimbus-7 quickly confirmed the result "CFCs destroys the ozone hole that forms over Antarctica each October has spread around the world. The ozone hole can be as big as 1.5 times larger than the United States." (www.solcomhouse.com/OzoneHole.htm) To solve this pollution situation, there is humans' responsibility. If we don't take action to solve the problem of the world, the ozone hole will get bigger and bigger. The earth will receive a lot of ultraviolet radiation and it will have some shocking problems.

First, ultraviolet rays will create high temperatures in the daytime. When the hot temperature rises much higher than today during the time in 2050, ice in Antarctica will melt down. Water will flood on huge parts of land in the world. People will suffer. For example, the water will flood the land in the world and also force people to live in the high mountains. Unfortunately, human population is too large. Therefore the mountains are not enough to occupy all the human population. Some will have to cut trees to build boats and they will live on boats in the ocean. When the deforestation will become large, people will get sick and die easily because they don't have enough oxygen to survive. Human beings will die.

Also when the high temperature rises, it will change human life style. For instance, hot temperature will be over 130 degrees within the years 2050; it will be impossible for people to survive during the daytime. If the people will burn

by the sunlight, they will get a lot of diseases that include eye diseases and serious skin cancer. People will begin to sleep at the daytime and go out and work at the nighttime.

Next, ultraviolet radiation affects marine life. According to the NASA's Ames Research center "the effect of ultraviolet on marine life, particularly affects the microscopic algae called phytoplankton." When the ocean receives a lot of the ultraviolet radiation, it will affect phytoplankton and they will die. The phytoplankton will die; it will influence the entire ocean to become dead. For example, the phytoplankton is eaten by krill. When krill's food is gone, krill will die because they lose food. Same as the others, some bigger fish's food is krill. If the krill will die, they will also die because they won't have food. All relationship of the earth lives connects together actually. If the ocean is dead, human cannot survive as well because humans get much food is from the ocean.

The earth is our home. If everyone considers the environment of the world pollution and takes action to solve it, we will live our lives more healthfully and the world will become beautiful. Otherwise the world in 2050, the temperature will increase extremely high that forces people to live in the mountains and they will change the life style. Oceans will die and food supply will become less. All the living things on the earth will suffer. We must start now to take action before it is too late.

The examples presented here demonstrate our students' growing ability to synthesize knowledge and information. These essays are representative of the overall quality of written work produced as a result of the interclass collaborative lesson.

Student Feedback

Students provided us feedback on the collaborative experience both immediately after the lesson and later on in an end-of-semester feedback questionnaire. This feedback was very positive. Overall, they expressed the view that they liked meeting other students with whom they could discuss their own ideas on the critical issues associated with global warming; they said that this experience broadened their own views. They commented that students from the other class had different information that they brought to the table, which helped to expand knowledge on the issues. For example, one student said, "I learned that it is always useful to discuss the issues with people with different learning backgrounds." Students also had different ideas about how to solve the various problems related to global warming. They enjoyed arguing about how to implement these solutions and coming to a group decision. The same student commented, "As a result of our cooperation, we came up with new ideas that we might never figure out on our own."

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Students also commented that the interclass collaboration helped them to feel more comfortable about developing and expressing their views on important

issues. They believed that their peers were helpful to them, and that this made it easier to develop their skills. As one student noted, "In the lesson, we could speak out with our own mind. That improved the confident of speaking. Sometime the students helped other students between the discussion."

Students also said that in meeting with the students from the other class, they had made new friends. Since both sections were following a focus-discipline curriculum, the interclass collaboration enabled students to expand their focus-discipline group base and reinforced the value of working collaboratively with peers. One student commented, "What I learned for myself is that to work with a group is much better than working alone." Some of the students said that they would keep in touch with students from the other section after the collaborative lesson. The lesson became, for many of the students, not just a valuable academic, but a constructive social experience. As another student noted, "The collaboration taught us to be polite and listen to each other."

Conclusion

The activities in the interclass collaboration fostered diverse and changing roles for our students and for us as instructors. Our students were encouraged to take more charge of and assume more responsibility for their own learning. Because students from each section had been exposed to different preparatory materials, they brought diverse information to the discussion. This created a context in which students were encouraged to view both themselves and their peers as valid resources for knowledge. Thus, each of the students became part of a diverse community of learners working together to share information and construct knowledge.

As instructors we moved from being knowledge providers to becoming knowledge sharers.

As instructors we moved from being knowledge providers to becoming knowledge sharers. Rather than creating knowledge for our students in a teacher-centered curriculum, we joined our students in their collaborative discussions, encouraging them to discover and expand knowledge through their own efforts and providing them with constructive feedback throughout the process.

With an average final pass rate of 70 percent, our students' hard work and dedication to the learning process paid off in the form of enhanced performance in the overall course. While the interclass collaborative lesson may have been only one aspect of our courses, we believe that it was a key factor in our students' success.[7] The collaborative lesson exposed our students to new and varied perspectives on the issues studied, creating a stimulating atmosphere of interactive learning. By encouraging students to interpret information, and to form, articulate, and support their points of view, the lesson enabled them to gain skill in knowledge synthesis and application, two areas that are critical to success in college courses. Moreover, the collaborative event taught students that their opinions were valuable and wor-

thy of consideration, and in so doing, helped to increase their overall sense of efficacy.

Notes

1. The work described here was supported by a PSC-CUNY research award to the first author.

2. "High-intermediate" here refers to an entry-level TOEFL score of approximately 450.

3. The ten subjects represented in the text *Interdisciplinary English* are: linguistics, environmental science, computer science, mathematics, business and marketing, psychology, sociology, physical anthropology, biology, and diet and nutrition.

4. Examples of hypertexts used may be found at http://kccesl.tripod.com/hypertextstudy/index.html

5. A controlled hypertext is an online text in which links lead to a predetermined and limited number of additional texts on the topic. Definitions of key terms appear in pop-up boxes. When students move their cursors over the words, the vocabulary definitions appear.

6. All student writing is used with permission of the student authors and is presented, unedited, as written by the students.

7. We will continue our collaborative work in future semesters. We plan to invite prominent environmentalists to speak at future collaborative events. We believe that this will create an even richer experience for our students by generating an extended point-counterpoint debate on the issues.

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