STRATEGIES FOR ACHIEVING GENDER EQUITY IN THE ECOLOGY CLASSROOM

Introduction

Does your classroom influence the career choices of your students? We all hope that our dynamic, exciting lectures and discussions inspire students to pursue careers in the ecological field. Have you ever thought that your classroom might turn off students to ecological careers? Whether we realize it or not, the textbook we use, the topics we choose to cover in lecture, our interactions with students, and even student–student interactions influence the career choices of our students. How you present the ecological field can either encourage or discourage male and female students to pursue an ecological career. We may be turning female students off to ecology without even realizing it. The leaking pipeline of women out of scientific careers begins about middle school and continues through the doctoral program and beyond. Of 21–25-year-old ecologists, 42% are female, but only 34% of 26–30-year-old ecologists are (Lawrence et al. 1993). This suggests that females may be quitting the ecological field in midcareer. We lose female scientists at every level of education, with an extremely steep drop from high school through the Ph.D. (Alper 1993). And, although we may think that students have chosen their major by the time they have reached college, 44% of successfully employed female ecologists with Ph.D.'s indicated that undergraduate courses influenced their decision to pursue a career in ecology (Langenheim 1988).

In this article I have outlined some strategies to help you encourage women to become and stay interested in ecological and science careers. The great thing about the following suggestions is that these techniques also have positive impacts on both male and minority students (Gardner et al. 1989). The suggestions and guidelines were drawn and compiled from the following sources: Hall and Sandler 1982, Klein 1985, and O'Brien-Carelli 1988. Because the classroom isn't just the teacher–student interface, I have organized the article into the following sections: curriculum, teacher–student interactions, and student–student interactions.

Curriculum

Selection of content.—What material you cover, how you cover it, and what resources you use to cover subject matter may play an important role in either encouraging or discouraging women to pursue ecological careers. General ecology courses cover population, community, and ecosystem ecology. But how we cover these topics and what we emphasize is left to our discretion. One way to encourage women in our classrooms is to include and validate experiences and subjects that concern women (Rosser 1990). For example, when talking about how the age structure of a population influences population growth, discuss how the decision for many Americans to delay childbirth affects population growth in the U.S. When lecturing about mate choice, make sure to include examples of choice by females.

Supply female role models.—Numerous studies and surveys indicate the availability or presence of other women is important for women's success as scientists (Matyas 1985, Alper 1993, Didion 1995). Forty-two percent of successful female ecologists indicate that a woman role model positively influenced their career (Langenheim 1988). How can you supply female role models? One way is to ask female graduate students to cover a lecture for you. Not only will you be providing a role model, but you are also helping the graduate student gain experience. If your department has a seminar series, make an extra effort to include women speakers. Hire both male and female tutors. In some cases, students with the same gender tutor do better than students with the opposite gender tutor (House and Wohlt 1989).

Choice of textbook.—I examined two of the most popular ecology textbooks (Begon et al. 1990 and Ricklefs 1990) for gender references. Overall, Begon, Harper, and Townsend are gender nonspecific when talking about a number of ecological studies. The authors of cited studies are listed by last name only and no reference is made to their gender. Ricklefs alternates between being gender nonspecific and mentioning the sex of the scientist doing the study. Both books do talk about the contributions that male ecologists made to early ecological theory, like Leopold, Clements, Grinell, MacArthur. To make sure that the accomplishments of early female ecologists are noted, bring them up in lecture. Sources that outline the contributions that females have made to the field of ecology include: Clarke 1973, Bowers 1986, Langenheim 1988, Vare and Ptacek 1988, Bonta 1991, 1995.

Inclusion of supplemental readings.—Look through the topics that you have chosen to cover with supplemental readings. Now look at the gender of the authors of the papers that you have chosen. Have you included any papers by women? I recently taught conservation biology and I made a point of including articles written by both male and female ecologists. I did not bring this to the attention of my students. Two of my students told me that they were encouraged by seeing that women were doing some neat, exciting work in the field of conservation biology.

Discuss women in ecology.—If you feel that your course excludes the contributions of female ecologists, by all means spend a lecture highlighting their work. Brattstrom (1995) suggests that we do not talk enough about female scientists and their accomplishments and that we need to point out that female scientists are successful, both financially and in status.

Teacher–student interaction

Gender-neutral language.—When I hear someone talk about man's destruction of the environment, I immediately picture a male. Are women not to blame as well? All women are created equal. Did you picture a male, a female, or both sexes? All men are

created equal. Did you picture a male, a female, or both sexes? Using "he" and "man" causes students, from primary school through college level, to envision a man (Scott and Schau 1985). Strive to use gender-neutral language when you lecture. Gender-neutral language includes the terms they, us, we, humans. You might bring a tape recorder into your classroom and listen to how you refer to the scientists whose study you are describing and how you refer to your students. When talking with students or colleagues, do you ever refer to a female student as a girl? Because the majority of college-age students are over the age of 18, female students should be called women.

Equitable grading.—When using essay exams, have students write their names on the back or have them use their social security number rather than putting their name on the first page of an exam. This minimizes any biases you may have based on gender. You may think that you can tell the gender of a student by handwriting, but in my experience, this is not the case.

Student–student interactions

Cooperative rather than competitive.—For those ecology classes that have a laboratory, pay closer attention to the interactions between group members. Who is using equipment and who is collecting data? Who in the group is typing up the report? You might be surprised to see that your male students are more likely to be using the equipment while females have the role of recording data and typing the paper. This often happens in middle and high school science classes and is thought to be one of the things that contributes to the leaking pipeline (Alper 1993). One way to ensure that both males and females use equipment, collect, and record data is to have the group rotate duties. When I consistently saw that my female students typed up a paper for the group, I began to assign and rotate duties to group members. I made a point of having both male and female students dig trenches for drift fences and pitfall traps.

Group discussion.—Lay down ground rules prior to a discussion period. One way to ensure that everyone feels comfortable in speaking is to make sure that students are not allowed to interrupt each other and to make sure the students argue the point that is being made, rather than with the person making the point.

Conclusion

I hope this article has prompted us to become aware of how our classrooms can either encourage or discourage female students from ecological careers. Initially, we must make a conscious effort to make our classrooms encouraging for both our female and male students. With time and practice, however, these suggestions become part of your everyday teaching. I would like to thank Bethia King for helpful comments on previous drafts of this manuscript.

Literature cited

Alper, J. 1993. The pipeline is leaking women all the way along. Science **260**:409–411.

Begon, M., J. L. Harper, and C. R. Townsend. 1990. Ecology: individuals, populations and communities. Second edition. Blackwell Scientific, New York, New York, USA.

Bonta, M. Y. 1991. Women in the field: America's pioneering women naturalists. Texas A&M Press, College Station, Texas, USA.

———. 1995. American women afield: writings by pioneering women naturalists. Texas A&M Press, College Station, Texas, USA.

Bowers, J. E. 1986. A career of her own: Edith Shreve at the desert laboratory. Desert Plants **8**:23–29.

Brattstrom, B. 1995. Women in science: do we ignore female role models? ESA Bulletin **76**:143–145.

Clarke, R. 1973. Ellen Swallow. The woman who founded ecology. Follett, Chicago, Illinois, USA.

Didion, C. J. 1995. The Wheat and Chaff dilemma of college science teaching. Journal of the College Science Teacher **24**:299–300.

Gardner, A. L., C. L. Mason, and M. L. Matyas. 1989. Equity, excellence and just plain good teaching. American Biology Teacher **51**:72–77.

Hall, R., and B. Sandler. 1982. The classroom climate: a chilly one for women? Association of American Colleges, Washington, D.C., USA.

House, J. D., and V. Wohlt. 1989. The effect of a student and tutor gender on achievements of academically underprepared students in mathematics and science. Journal of Instruction in Psychology **16**:192–198.

Klein, S. S. 1985. Handbook for achieving sex equity through education. Johns Hopkins University Press, Baltimore, Maryland, USA.

Langenheim, J. H. 1988. The path and progress of American women ecologists. ESA Bulletin **70**:184–197.

Lawrence, D. M., M. M. Holland, and D. J. Morrin. 1993. Profiles of ecologists: Results of a survey of the membership of the Ecological Society of America. Part I: a snapshot of survey respondents. ESA Bulletin **74**:21–35.

Matyas, M. L. 1985. Factors affecting female achievement and interest in science and in scientific careers. Pages 27-48 *in* J. B. Kahle, editor. Women in science: a report from the field. Falmer, Philadelphia, Pennsylvania, USA.

O'Brien-Carelli, A. 1988. Sex equity in education: readings and strategies. Charles C. Thomas, Springfield, Illinois, USA.

Ricklefs, R. E. 1990. Ecology. Third edition. W. H. Freeman, New York, New York, USA.

Rosser, S. V. 1990. Female friendly science. The Athene Series. Pergamon, Oxford, UK.

Scott, K. P., and C. G. Schau. 1985. Sex equity and sex bias in instructional materials. Pages 218–232 *in* S. S. Klein, editor. Handbook for achieving sex equity in education. Johns Hopkins University Press, Baltimore, Maryland, USA

Vare, E. A., and G. Ptacek. 1988. Mothers of invention. Morrow, New York, New York, USA.

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