The Newest "Reality Show":

The Importance of Legitimizing Experiential Learning with Community-Based Research

MATTHEW D. JOHNSON

Even a cursory awareness of TV culture is enough to show that Americans are pining for legitimate life experiences. From twenty-somethings exploring the latest extreme sports and flirting around a campfire to a menagerie of tourists desperately racing through a well-funded version of a global scavenger hunt, "reality shows" have proliferated on American airwaves. The irony, of course, is that the contestants are too beautiful to provide a real cross section of America, the tasks they are asked to perform too fantastical to be duplicated anywhere except in next year's episodes, and the conditions for their cooperation too forcefully strained, their personalities too purposefully opposing to reflect real group dynamics. Indeed, more than one excused contestant has announced relief to escape the show and return to the "real world" (Arild, 1999).

Unfortunately, much of American education carries a similar irony. The undeniably most fundamental purpose of education is to build a citizenry prepared to work toward achieving prosperous, resilient, and just communities (Orr, 1994). Why then, do students and teachers frequently invoke the notion that, once out of school, the educated must then learn to function in the

MATTHEW D. JOHNSON works in the Department of Wildlife, Humboldt State University, Arcata, CA 95521; e-mail: mdj6@humboldt.edu.

real world? Clearly, education should provide students with experiences that are genuine enough for students to learn practical ways to become good citizens. For teachers of biological sciences, our challenge is to immerse students in situations that will foster the skills and desires to become stalwart caregivers of the Earth and its inhabitants, both human and nonhuman.

High school and early college biology educators can better prepare students by engaging them in legitimate, community-based problems and challenging them to make substantive contributions to local understanding of biota. This article describes how most current biological curricula fail to foster citizenry, how this failure is problematic for conservation, and offers one approach to address the problem.

The Problem

There are two fundamental and compelling pieces of evidence for a problem in biological science education. A high human population and unsustainable rates of consumption threaten the Earth's finite resources, yet, (a) we make significant advances in conservation too infrequently, and (b) our most educated societies inflict the most damage. Of course the problem is not solely educational—environmental problems result from complex cultural, historical, economic, and political factors—but we, as educators, need to think critically about how our work advances or delays solutions to pressing conservation issues.

We Make Significant Advances in Conservation Too Infrequently

Most conservationists cite education as the ultimate key to change the fate of global biodiversity, but evidence clearly indicates that we, as educators, are not keeping pace. Substantial improvements in environmental protection punctuated the 20th century, from significant domestic legislation (e.g., the Clean Air Act, Endangered Species Act, etc.) to high-profile efforts to enhance awareness and protection of biodiversity abroad (e.g., the establishment of groups such as the World Wildlife Fund, widespread international recognition of the plight of tropical forests, etc.). Meanwhile, education has expanded worldwide. For example, the average national literacy rate for the world leapt from 58% to 80% since 1970, and global enrollment in tertiary education has increased more than 160% (UNESCO, 2003). Despite these advances, rates of species loss continue to accelerate to unprecedented levels (IUCN, 2000). While education may be helping to slow the loss of species, it is clearly not safeguarding biodiversity.

Our Most Educated Societies Inflict the Most Damage

Numerous commentators invoke human population growth as the most profound challenge for environmental education. This position is often supported by arguments that our population size is fast approaching the human carrying capacity of the Earth (Cohen, 1995) and that birth rates are negatively correlated with education (UNFPA, 1992). However, such explanations devoid of patterns of resource consumption miss half the problem at best (Ehrlich & Holdren, 1971), and at worst wrongly attribute the problem disproportionately to people in developing nations. While birth rates decline with increasing education, per capita rates of resource consumption increase more rapidly (UNESCO, 2003). Simple math and abstraction reveal the biologist's educational dilemma: Elevating global education (and corresponding resource consumption) to U.S. standards would usher total ecological collapse (*sensu* Daily & Ehrlich, 1992). The more we learn how to save the planet, the faster we destroy it.

The Failure of Traditional Biology Curricula

To some, these fundamental problems in environmental education are surprising because various metrics suggest our collective knowledge of the Earth and its biodiversity is expanding rapidly. For example, the number of journal titles devoted to applied biology and conservation has increased dramatically over the last 20 years (ISI, 2003) and enrollment in American college natural science programs has increased by 18% from 1980 to 1995 (UNESCO, 2003). With marked increase in environmental knowledge, perhaps our programs need simply to transfer this knowledge more efficiently and completely, to produce students with the intellectual prowess to tackle problems and achieve solutions. To this end, many authors have offered opinions to enhance the completeness and rigor of our curricula (e.g., Nielsen & Decker, 1995; Steidl et al., 2000; NRC, 2003). But this is a losing proposition. While the volume of instructional material increases exponentially, available instructional time holds constant or even diminishes as administrators seek to lower curricular requirements (NRC, 2003). These trends produce an apparent quandary familiar to every biology teacher—more information in less time (Romesburg, 1991). I argue that a "solution" to this problem lies in the recognition that while our students need current information, they do not need more of it in order to be effective biologists. Instead, our students need the will to be responsible caregivers of the Earth.

An Alternative

Education can better foster responsible citizenry by providing students opportunities to examine legitimate, local biological research problems. Modern pedagogy emphasizes the importance of experiential learning because it can galvanize concepts and skills otherwise left abstract and forgotten by traditional lecture-based (information assimilation) learning (Kolb, 1984; Smith, 1992). However, experiential learning with merely a pedagogical goal entrenches the notion that biology education is shielded from "real world" environmental challenges. Legitimizing these experiences by also pursuing a community-based goal can encourage students to recognize the connection between science and society (Kendall et al., 1990; Root & Thorme, 2001).

For example, a common experiential learning exercise in field biology courses challenges students to plan a methodology to test "hypotheses" (actually deduced predictions) related to a local plant community (e.g., higher species diversity near an ecotone, more structural diversity in early than late seral stage, etc.). In the field, the students use instruments to measure vegetation, and this hands-on activity is then solidified and related to ecological concepts by an analysis of the data, often during a subsequent laboratory session. In some cases, students are asked to formalize their findings in a report or manuscript. Typically, the exercise is graded, and though the lessons on scientific process may be revisited, the biological results *per se* are thereafter ignored. While the students learn skills effectively, the unspoken lesson is that biological field data are insignificant to society.

To legitimize this activity, a better approach may be to collect similar data in a study site of significance to local planners (e.g., a recently restored marsh, a forest patch scheduled for selective logging, a burned weedy field). Students may even measure comparative sites or use models to predict how the plant community may change in response to human activity, helping to distinguish between true research hypotheses and predictions (McPherson, 2001). The data can be summarized in a report to local planners, and subsequent classes can collect similar data to monitor changes if appropriate (e.g., Johnson, 2003). Emphasizing the results as much as the process, students are exposed to real issues, and their discussions can legitimately address the question, "so what?"

This latter approach, called "legitimate experiential learning," has numerous favorable outcomes. First, it can help develop a sense of place by giving students exposure to their biological and human communities (O'Neal, 1995) and by establishing a connection between science, policy, and people (Burrows et al., 1999). Second, by introducing classes to local managers, biologists, and planners, it can illustrate the diversity of employment opportunities for natural resource scientists. Third, it can help students develop informed opinions about their surroundings and wrestle free of the tendency to equate scientific objectivity with neutrality (Orr, 1994). Fourth, by "turning results in" to someone besides their teacher, students learn accountability in biological data collection. Experiencing firsthand that data are important beyond academia is paramount to training effective biologists because our conservation efforts must be science-based. In my experience, students are far more careful and serious when they know their results will be viewed by working professionals outside their school. As I describe it, legitimate experiential learning shares several qualities with "service-learning" (Gray et al., 1999). In my experience, however, service-learning in biology often involves work in which students pursue tasks that are biological, but rarely do the students truthfully engage in scientific inquiry (i.e., hypothetico-deductive reasoning). As biologists, I believe our students can benefit more from conducting research within the framework of an unbiased institution (e.g., university) than from within a company or agency for whom the data will be most useful (e.g., an employer participating in service-learning).

However, legitimate experiential learning has at least three important disadvantages. First, it is a challenge for a teacher to identify local opportunities for legitimate experiences that can be feasibly addressed with campus funds and equipment. This is exacerbated in some locations (e.g., urban centers) and for certain subjects (e.g., eco-toxicology requires expensive equipment and long lab work). Second, adherence to a project's goals forces sacrifices in the amount of material taught. A hallmark of experiential learning is that the focus is far more on product and far less on process than traditional pedagogy (Kolb, 1984). Therefore, a given experience will not offer the breadth of skills and lessons typically offered in courses designed to provide an overview of a subject. Third, some learners may find it difficult to generalize from particulars associated with a given project to general principles intended to be taught during the course (Coleman, 1984). Reflective post-experience discussion can reduce this problem, but in my experience, generalization is still elusive for some students.

Suggestions for Implementation

The most significant initial hurdle to implementing legitimate experiential learning is identifying suitable community-based projects. Teachers can derive numerous ideas by scheduling meetings with community

members who may benefit from student projects, such as park managers, water quality officers, city planners, science center personnel, local conservationists, land trust directors, etc. These meetings can be arranged during summer breaks to initiate contact and establish the seeds of ideas, and teachers can schedule periodic update meetings to solidify project topics and cooperation. Simply demonstrating desire to cooperate often triggers numerous potential ideas from community members.

Once an idea has been identified, teachers must anticipate events, and diligently set the stage for the project's success. The following five elements are essential:

1. **Foremost, the project must be legitimate.** If the data will be inconsequential to the community, the project is not legitimate.
2. **It must receive devotion**–in emotional effort and time. A teacher must be willing to occasionally abandon the planned exercises to capitalize on opportunity and ensure that a project is completed with rigor.
3. **Students must have ownership.** While the instructor should be instrumental in the initiation of the project, the students should be given the freedom to, with advice, make decisions and steer its course.
4. **Results must be disseminated efficiently.** To solidify students' appreciation and pride in their accomplishments, the project outcome must be made available to the community in time for students to be adequately acknowledged.
5. **Lessons must be integrated into the curriculum.** The relationship of particular tasks to generalized concepts relevant to the course of study must be emphasized by the teacher before, during, and after the tasks are completed. Post-experience discussion is critical for learners to generalize principles.

As an example of this approach, here I briefly review a project conducted by my "Wildlife Habitat Ecology" class in the spring of 2002. Local city planners and the state Department of Fish and Game had recently proposed a marsh restoration project near the university. Together, they planned to breach ocean levees to allow high tides to inundate an area with salt water. Tidal action would then reintroduce salt marsh plants to the area naturally, potentially allowing the restoration of habitat for shorebirds, fish, benthic organisms, and rare salt marsh plants. However, the impact of this activity on vertebrate wildlife was unknown, and several community meetings and letters-to-the-editor in local newspapers indicated local citizens were concerned about potential impacts. So, the class undertook an ambitious project to predict how wildlife might respond to various management scenarios for the area. The students first used maps and survey data provided by city officials to predict how vegetation might respond to the different levee breaching proposals. Then, using a sophisticated computer software program administered by the Department of Fish and Game, the students were able to compare and contrast how wildlife would respond to each scenario. Finally, the students proposed alterations in the plan to help mitigate impacts on terrestrial wildlife. The results were summarized in a 50-page report that was submitted to city officials and Fish and Game, and it is available online (www.humboldt.edu/~mdj6/431/McD_home.html).

This project was successful because it adhered closely to the five points listed previously. It was certainly of keen legitimate interest to the community. We devoted nearly half of the weekly three-hour laboratory sessions to the project over the semester, students devised all the work themselves and felt ownership in its findings, and the lessons integrated smoothly into the curriculum of the course, which emphasizes relationships between wildlife and their habitats. The exercise could have been strengthened even more if the modeling work had been completed earlier. This would have enabled more students to be involved in the final written summary (which was necessarily completed in summer after many students had left the area). Nonetheless, students were kept abreast of the project via e-mails well after the semester ended. Though the project was exhausting and required some sacrifices in the syllabus, the students and the community benefited from the work. Moreover, the process helped clarify my thinking about the merits of legitimate experiential learning.

Adopting new teaching strategies can be intimidating, yet satisfying. In considering legitimate experiential learning, as with any alternative pedagogy (McKeachie, 1999), teachers should weigh the advantages and weaknesses of this approach relative to other educational strategies. Open dialogue with the students is also important so that they are aware of the teaching goals behind a project, and they should know why it is important to struggle through a real situation to maximize learning (Millenbah & Millspaugh, 2003). Experiential activities also often require considerable administrative support for field trips and equipment. Teachers should work to secure such support before initiating a project, and administrators should seek to make such experiences possible. With proper implementation, teachers can provide students with legitimately valuable community-based research opportunities, and students can recognize that school, science, and society are all, in fact, reality.

References

Arild, F. (1999). Reality TV in the digital era: a paradox in visual culture? *Media, Culture & Society, 21*(6), 787-804.

Burrows, M.S., Chauvin, S., Lazurus, C.J. & Chehardy, P. (1999). Required service learning for medical students: Program description and student response. *Teaching and Learning in Medicine, 11,* 223-231.

Cohen, J.E. (1995). How many people can the Earth support? *Science, 26*(5222), 341-346.

Coleman, J.S. (1984). Differences between experiential and classroom learning. In M.T. Keeton & Associates (Eds.), *Experiential Learning* (pp. 49-61). San Francisco, CA: Jossey-Bass Press.

Daily, G.C. & Ehrlich, P.R. (1992). Population, sustainability, and Earth's carrying capacity. *BioScience, 42*(4), 761-771.

Ehrlich, P.R. & Holdren, J. (1971). The impact of population growth. *Science, 171,* 1212-1217.

Gray, M. J. et al. (1999). Combining service and learning in higher education: evaluation of the Learn and Serve America Higher Education program. Santa Monica, CA: RAND Education Press.

ISI Institute for Scientific Information. (2003). Ecology and environmental journal lists. Available online at http://www.isinet.com/isi/.

IUCN: International Union for the Conservation of Nature. (2000). *Confirming the Global Extinction Crisis.* Available online at http://www.iucn.org/redlist/2000.

Johnson, M.D. (2003). Student project contributes to a marsh restoration and enhancement effort. *Outdoor California,* June-July: 4-7.

Kendall, J.C., Duley, J., Little, L., Permaul, J. & Rubin, S. (1990). Increasing faculty development (pp. 137-160). In J.C. Kendall & Associates (Eds.), *Combining Service and Learning: A Resource Book for Community and Public Service.* Raleigh, NC: National Society for Internships and Experiential Education, Volume 2.

Kolb, D.A. (1984). *Experiential Learning: Experience as a Source of Learning and Development.* Edgewood Cliffs, NJ: Prentice Hall Publishers.

McKeachie, W.J. (1999). *McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers, 10th Edition.* Boston, MA: Houghton Mifflin.

McPherson, G.R. (2001). Teaching & learning the scientific method. *The American Biology Teacher, 63*(4), 242-245.

Millenbah, K.F. & Millspaugh, J.J. (2003). Using experiential learning in wildlife courses to improve retention, problem solving, and decision-making. *Wildlife Society Bulletin, 31*(1), 127-137.

Nielsen, L.A. & Decker, D.J. (1995). Educating natural resource professionals for ecosystem management. *Renewable Resources Journal, 13*(1), 12-17.

NRC National Research Council. (2003). *BIO2010: Transforming Undergraduate Education for Future Research Biologists.* Washington, DC: National Academies Press.

O'Neal, L.H. (1995). Using wetlands to teach ecology and environmental awareness in general biology. *The American Biology Teacher, 57*(2), 135-139.

Orr, D. (1994). *Earth in Mind.* Washington, DC: Island Press.

Romesburg, H.C. (1991). On improving the natural resources and environmental sciences. *Journal of Wildlife Management, 55*(3), 774-756.

Root, R. & Thorme, T. (2001). Community-based projects in applied statistics: using service learning to enhance student understanding. *American Statistician, 55*(2), 326-331.

Smith, T.E. (1992). *The Theory and Practice of Challenge Education.* Dubuque, IA: Kendall/Hunt Publishers.

Steidl, R.J., DeStefano, S. & Matter, W.J. (2000). On increasing the quality and rigor of wildlife science. *Wildlife Society Bulletin, 28*(3), 518-521.

UNESCO: United Nations Educational, Scientific and Cultural Organization. (2003). Global Education Database (GED) Online. USAID. Available online at: http://qesdb.cdie.org/ged/index.html.

UNFPA: United Nations Fund for Population. (1992). *State of the World Population 1992.* New York: United Nations.