Environmental Education: Promise and Performance

Michael Sanera, Environmental Education Research Institute, USA

Abstract

Professional environmental educators promote quality environmental education based on high educational standards. Their aim, in part, is to provide students with knowledge of environmental issues from a variety of scientific perspectives so that the students can make up their own minds on these vital issues. This is what I call the promise, or intent, of environmental education and the leading documents in the discipline reflect this intent.

I agree with these good intentions. Indeed, much of the current debate is not about intent, but rather the performance of environmental education. In other words, when children receive environmental education in the classroom based on curriculum materials or textbooks, or when they go to the school library to check out books about the environment, do they receive information which lives up to this promise or intent? The research record shows that they do not. There is a big gap between intent and performance when students are taught about environmental issues. This paper discusses my efforts to explore and define this gap and discusses my ideas for narrowing it.

Résumé

Les éducateurs professionnels du domaine de l'environnement font la promotion d'une éducation de qualité basée sur des standards pédagogiques de haut niveau. Leur but, en partie, consiste à fournir aux élèves, au sujet des controverses environnementales, des connaissances qui proviennent de diverses perspectives scientifiques afin que ceux-ci puissent se construire une opinion personnelle au sujet de ces controverses fondamentales. Ceci correspond à ce que j'appelle la promesse ou l'intention de l'éducation relative à

l'environnement et les documents importants du domaine reflètent cette intention.

Je suis d'accord avec ces bonnes intentions. Naturellement, une grande partie du débat actuel ne porte pas sur l'intention mais plutôt sur la performance de l'éducation relative à l'environnement. En d'autres mots, quand les enfants sont éduqués à l'environnement, à partir de matériel pédagogique ou de volumes scolaires, ou quand ils vont à la bibliothèque pour regarder dans des livres au sujet de l'environnement, est-ce qu'ils recoivent une information qui soit à la hauteur de cette promesse ou intention? Les résultats de recherche démontrent le contraire. Il existe donc une lacune importante entre l'intention et la performance quand les élèves sont éduqués aux controverses environnementales. Dans cet article, j'explore, je définis cette lacune et je propose des idées pour l'atténuer.

As with many disciplines, the promise of environmental education is different from the actual performance of it. Without good output measures and a constant attention to feedback from the field, any discipline experiences a gap between the promise, or good intentions, of its leaders, and the actual performance by grassroots practitioners. The promise, or good intentions, of the field are represented in the key documents established by the discipline.

The North American Association for Environmental Education (NAAEE) recently published its *Environmental Education Materials: Guidelines for Excellence* (1996), which provides environmental educators with characteristics of quality environmental education materials. The first section provides guidance on the "Fairness and Accuracy" of materials. It states that quality environmental education materials must present factual material in "language appropriate for education rather than for propagandizing" and "materials should encourage learners to explore different perspectives and form their own opinions" (p. 5, 6).

In addition, one of the most authoritative environmental education curriculum guides, *A Guide to Curriculum Planning in Environmental Education,* (Engleson and Yockers, 1994) underscores this theme when it states that environmental education "must provide

students with opportunities to confront alternative points of view, to weigh them rationally, to determine their own position on issues, and to decide on their own the courses of action they will follow in attempting to resolve issues" (p. 136). This guide goes on to caution teachers about the temptation of letting their personal feelings about the environment interfere with their responsibilities as educators:

> "[E]ducators must be careful to educate rather than indoctrinate. Educators have the right to be and often are environmentalists . . . . But within the context of the classroom and the environmental education programs they must first be environmental educators . . . [who] help students learn how to analyze the merits of the *many and varied points of view* usually present on a given environmental issue and to develop the skills needed to effectively participate in environmental decision making . They must be familiar with *all sides of issues*, stand firm for the right of each advocate to be heard, and provide a *neutral atmosphere in which informed debate may take place*." (p. 136, emphasis added)

Richard Wilke (1997) in a recent article, highlights the award winning *Investigating and Evaluating Environmental Issues and Actions* (Hungerford, Litherland, Peyton, Ramsey, & Volk, 1992). Wilke notes the 14 questions to be asked before students take environmental action such as: "Will there be *economic consequences* of this action?" and "Do I understand the *procedures* necessary to take this action?" (p. 6. emphasis in original). All of the questions provide excellent guidance for anyone who contemplates environmental action, but they represent only good intentions unless they are communicated through materials which provide specific examples of responsible environmental education.

In my view, these good intentions, which I agree with, may have contributed to some of the misunderstandings in the current debate. My research, which analyzes the *content* of environmental education materials which cover *environmental issues*, has been misconstrued as an attack on the good intentions of the environmental education community. I repeat, I support the good intentions, stated above, and, as I will explain later, I am working to see that they are carried out in practice.

Unfortunately, there is a gap between these good intentions and what is contained in many environmental education materials

being used in classrooms. I am not the only one to notice this gap. The NAAEE "standards" project provides evidence that the NAAEE recognizes the gap and is attempting to narrow it by providing environmental educators with detailed guidance.

The recent review of environmental education materials by the Independent Commission on Environmental Education (ICEE, 1997) also found evidence of this gap. For example, the ICEE report states that environmental education materials often:

- do not provide a framework for progressive building of knowledge;
- fail to prepare students to deal with controversial environmental issues;
- fail to help students understand tradeoffs in addressing environmental problems; [and]
- Many high school environmental science textbooks have serious flaws. Some provide superficial coverage of science. Others mix science and advocacy (p. 3).

In a lengthy review of environmental education materials in the environmental magazine *Garbage*, Patricia Poore, editor and publisher, came to similar conclusions. Poore (1993) suggests that many environmental topics are ". . . presented from a single point of view, create a curriculum that is incomplete at best and misleading and unnecessarily pessimistic at worst . . . .What is even more striking than the imperfect content of the curriculum, however," Poore continues, "is its apocalyptic tone. Words like menace, catastrophic, collapse, shortage, disaster, breakdown, alarm, degradation and deadly are ubiquitous" (p. 29-30). In her opinion the environmental education curriculum contains: ". . . oversimplification and myth, has little historical perspective, is politically oriented, and is strongly weighted toward a traditional environmentalist viewpoint, i.e. emphasizing limits to growth, distrust of technology, misinformation, concerning waste management, and gloomy (if not doomsday) scenarios" (p. 28-29).

Shorter articles in *Audubon* and *E Magazine* document similar findings. Nancy Bray Cardozo (1994) writing in *Audubon* notes that:

> As if children don't have enough to worry about these days—AIDS, wars, starving people—environmentalists are teaching them that

> their very planet is at risk . . . . Children feel that their generation is fighting against ours for their future . . . . We need to teach our children to respect nature, not fear it. (p. 112)

Mike Weilbacher's (1994) *E Magazine* article concludes that:

> Eight-year-olds should not be asked to become warriors or worriers. Children have much more important work to do . . . Watch ants. Grow flowers. Dance between the raindrops. Before we shake children to their core with visions of doom, let's give them something to hold onto for life—a deep knowledge of a living planet that will be circling the sun for billions of years. It is adults who must be warriors, not children. (p. 31)

In my research, I have concentrated on the analysis of the content of *environmental issues* such as global warming, acid rain, air and water pollution, rain forests, etc. Therefore, my comments here and in the past apply only to the *content* of *environmental issues*, not basic nature studies which are part of many environmental education programs and are usually quite good. What I mean by "nature studies" are basic scientific concepts such as photosynthesis, biological diversity, ecological interrelationships, etc. I might add that even some of the most respected curriculum materials which cover basic nature studies concepts well, such as Project Learning Tree (1993), are much weaker in their discussions of environmental issues (see Project Learning Tree coverage of global warming p. 325, rainforests p. 161, and endangered species p. 335).

Definitions of Environmental Education

If the problem is the gap between the good intentions and poor performance in the materials used in classrooms, what is the source of this problem? A good place to begin is the basic definition of environmental education as established by the leading authorities in the field.

In a recent report to Congress from the National Environmental Education Advisory Council (1996) the field is defined as:

> a learning process that increases people's *knowledge and awareness* about the environment and associated challenges, develops the necessary skills and expertise to address these challenges, and fosters

> *attitudes, motivations, and commitments* to make informed decisions and take *responsible action*. (p. 1, emphasis added)

The essential elements of this definition are also contained in the founding documents of the field - the Belgrade Charter 1976 and the Tbilisi Declaration 1978. These essential elements are:

- knowledge and awareness,
- personal attitudes and commitments, and
- skills to take responsible action.

Even the causal observer will notice that this definition is very ambitious. If we present this definition to a hypothetical average teacher, let's call her Mary Jones, it presents a significant educational task requiring detailed knowledge of several different disciplines plus many different skills. In order for Ms. Jones to responsibly teach environmental education, she must have the knowledge of a scientist in order to explain the chemistry of ozone depletion; she must have detailed instruction in psychology so she can use the behavior modification techniques necessary to influence attitudes and behaviors; and she must have training in political science to teach the political skills necessary for responsible action.

In addition, Jones will need a solid grounding in economics if she wants to teach about solid waste, endangered species or natural resources. In other words, for Jones to successfully accomplish her environmental educational mission, she will have to be a scientist, a psychologist, a political scientist and an economist. For her to successfully teach her students, she must keep up with the rapidly changing research by reading peer reviewed scientific journals in all of these academic fields. The intent is good, but the task seems too broad and too diverse. It is little wonder that the practice of environmental education often falls short of the promise.

What often happens in situations like this is similar to what happens in goal displacement. Individuals confronted with this complex and diverse goal are likely to select only part of it. For example, some will concentrate on teaching knowledge, others will work on student attitudes and behaviors, while still other teachers will emphasize the student action part of the definition.

Textbooks

Where does the average teacher get help with this problem? If Jones turns to nationally published textbooks for help, she will not get it. My study of 62 geography, health, and science textbooks used in Wisconsin shows that the average 6th through 10th grade student, as opposed to the student who uses an environmental science textbook in an environmental science course, is exposed to only one side of scientific debates which surround many environmental issues (Sanera, 1996). In addition, these texts often ignore basic scientific information that does not reinforce the "catastrophic" environmental message. I found for example:

- not one of 18 texts which discussed solid waste problems in the U.S. tells students that Mexicans throw away more garbage than Americans do. In fact, American households produce one-third less garbage than Mexican households. This is largely because Americans use modern packaging which actually reduces waste, while Mexicans have more raw food waste such as rinds, husks, etc. (see Rathje & Murphy, 1992, p. 217);
- not one of 18 texts which discussed the problems of endangered species states that most of the very high rates of species loss are predictions of the theory of island biogeography which is debated in the scientific community (see Slobodkin, 1996); and
- only three of 24 texts mentions the fact that the world population growth *rate* has been decreasing since the late 1960s (see, United Nations, 1994, p. 56-58, 62, 64).

Teacher Training

Perhaps the answer might be better pre-service teacher training. If Jones and her colleagues have a good environmental education course in college before they get to the classroom, they will be better equipped to teach this large and diverse subject. But if Jones took a college course which used one of the major environmental science textbooks which I have reviewed, she would be misled about major environmental issues. I recently applied the NAAEE materials guidelines for fairness and accuracy to six environmental science textbooks—part of a larger study which reviewed all mate-

rials used in twelve University of Wisconsin courses. My study shows that five of the six texts failed to pass and the sixth only partially meets the guidelines. These include texts published by leading textbook publishers such as McGraw-Hill, Prentice Hall and Wadsworth publishers (Sanera, 1997).

In fact, the G. Tyler Miller text *Environmental Science: Working with the Earth* (1997) not only failed to pass my application of the NAAEE guidelines for fairness and accuracy, but was also severely criticized in two other evaluations. The Independent Commission on Environmental Education (1997) criticized this text, stating that, "Throughout, the author cites the published literature selectively and without proper references in order to justify his personal recommendations . . . . Indeed, the author misses every opportunity to reinforce, apply, and motivate the study of science" (p. 42, 44). Rodel (1993), in *The Textbook Letter* published in San Francisco by scientists and journalists, states that this text "could serve as a model for education-with-indoctrination" (p. 6). This book is a popular text which is in its 6th edition and is published in several briefer formats. This text is used at one bastion of environmental education leadership, the University of Wisconsin-Stevens Point, the home of the National Environmental Education Advancement Project. There it is used in an environmental education course which education majors are required to take before they can earn their Wisconsin teacher certification.

Environmental Books in the School Library

If our hypothetical teacher, Jones, turns to the place where many of her students turn for help, the school library, she will also be disappointed. Jane Shaw and I reviewed nearly 120 environmental books (Sanera & Shaw, 1996) written for children, and which are in many school and public libraries. Our review shows a similar pattern of bias and misinformation.

One of the most popular environmental books for kids is *50 Simple Things Kids Can Do to Save the Earth* (Javna, 1990). In its discussion of the rain forests, the book states that 100 acres of rain forest are destroyed every minute. According to the United Nations' Food and Agriculture Organization (United Nations, 1990) data, which many scientists consider the best available, the number is

closer to 21 acres per minute not 100 acres per minute. Children need accurate information, not information which has been manipulated to exaggerate the actual number by nearly five times.

The popular *The Kids' Environment Book: What's Awry and Why* (Pedersen, 1993) uses questionable data as fact when discussing endangered species. According to this book, in the 1970s one species was lost per day, and in the 1990s the number may be one species per hour. "If we keep up this pace, 20 to 50 percent of all known species that exist this minute will have died out by the year 2000" (p. 136). While some leading scientists have predicted high species extinction rates, their estimates are based on the theory of island biogeography which other scientists question. Professor Lawrence Slobodkin of State University of New York at Stony Brook writing in the journal *Nature* states that this theory is "useless for explaining or predicting actual cases" (1996, p. 205).

In a discussion of pesticides, Diane MacEachern, author of *Save Our Planet: 750 Everyday Ways You Can Help Clean Up the Earth* (1990), states that the Environmental Protection Agency ranked pesticide residues as the "third most important environmental problem in the United States in terms of cancer risk . . ." (p. 8), yet the scientific evidence for this is extremely weak. In 1996, a National Research Council report said that levels of synthetic chemicals in Americans' diet are "so low that they are unlikely to pose an appreciable cancer risk" (p. 5). The NAAEE guidelines for fairness and accuracy demand that students be exposed to both sides of this important scientific discussion.

The Pattern of Bias and Miseducation

The pattern which emerges from this research is undeniable. Fair and balanced treatment of *environmental issues* is almost nonexistent in these materials. In my discussions with national environmental education leaders at NAAEE meetings and elsewhere, I have often asked for examples of fair and balanced treatment of a *major environmental issue*, such as ozone, rain forests, global warming or acid rain. To date, no examples have been offered.

In fact, there has been a defense of the biased approach. In a Draft Discussion Paper written for the National Environmental Education Summit, authors Mary Paden, Kathleen Pickering, and Trudi

Volk (1996) try to justify the exclusion of certain scientific information which does not conform to their view of acceptable scientific research. The 10 year, one-half billion dollar National Acid Precipitation Assessment Project (NAPAP, 1990) is dismissed because "that study was widely believed among scientists to be politically motivated . . ." (Paden et al., 1996, p. 4-14). No evidence to support this claim is provided. Even if it was true, the NAAEE guidelines would seem to require that the findings of this study be mentioned since it was the largest scientific study of acid rain ever conducted.

Paden et al. (1996) go on to imply that students should only be taught the scientific consensus on global warming and not taught facts which make some scientists skeptical of global warming theory. I taught university students for 20 years and I believed that it was my job to teach students to be skeptical, to question and to critically examine almost everything. The NAAEE materials guidelines agree. They state that "Scientifically and socially credible positions and explanations are covered thoroughly, while other positions are also mentioned (Balanced presentation does not mean giving equal time and space to every opinion or perspective, but treating major positions fairly.)" (1996, p. 6). It would seem that not mentioning criticisms of global warming theory which appear in peer reviewed scientific journals is surely not "treating major positions fairly."

Furthermore, the NAAEE guidelines require that "a range of perspectives should be presented in a balanced way," (1996, p. 5) and that materials should "encourage learners to explore different perspectives and form their own opinions" (p. 6). Paden et al. (1996) seem to indicate that they will decide which scientific theories and data will be presented to students yet the NAAEE guidelines require that a "range of perspectives" be presented. Instead, the authors attempt to discredit the NAPAP study, which might be considered the "scientific consensus" because, they say, it was politically motivated. However, they justify the inclusion global warming theory *without criticism* because it is the "scientific consensus." I suggest that Paden et al. cannot have it both ways.

The careful reader will note that regardless of the scientific evidence, the authors want only the most "catastrophic" version of an environmental issue taught to children. Critics of the catastrophic version are discredited regardless of the quality of the scientific evidence they produce. I can think of no better example of ideologically driven education.

Finally, to improve environmental education, the NAAEE guidelines seem to require including more scientific information so that students can decide for themselves. The comments of Paden et al. (1996) seem to be moving in the opposite direction, toward selective exclusion of important scientific information. And this is not an isolated example. In my discussions with individuals at three NAAEE conventions, whenever the discussion turned to the substance of an environmental issue there has been an attempt to discredit or exclude scientific information which does not conform to the catastrophic environmental view.

Responsibilities of the Definition

The generally accepted definition of environmental education suggests a progression which responsible environmental educators should follow. Before students can decide for themselves what responsible action to take on an environmental issue, they must be exposed to the issue from a wide variety of perspectives. Thus, there will be an emphasis on a diverse base of knowledge of environmental issues as a *precondition* to action. But the research reviewed above demonstrates that for most *environmental issues*, students are *not* exposed to a wide variety of perspectives. Therefore, we can logically conclude that, for the most part, their responsible action is not of their choosing, but predetermined by the bias of the information they are presented. Here again is the gap between promise and performance.

For example, will students be able *to decide for themselves* whether to support or oppose the Kyoto global warming treaty if they have not been presented the temperature readings taken by NASA satellite which show no warming trend since 1979 (Spencer, Christy, & Grody, 1990, p. 1111-1128; Sanera & Shaw, 1996, p. 153)? Will students be able to *decide for themselves* whether to support or oppose more restrictions on coal fired power plants if they have not seen the findings of the NAPAP (1990) study? Will students be able to *decide for themselves* whether to support or oppose the reauthorization of the Endangered Species Act if they have not been exposed to the economic reasoning which outlines the unintended, often negative, consequences to species of the act (see Ed-

wards, 1995)? My research shows that this information is rarely, if ever, presented in popular environmental education materials.

Solution

The gap between good intentions and actual performance cries out for a solution. This section offers some recommendations and actions which I believe will narrow the gap.

First, we must narrow the definition by concentrating, at least in the short run, on the knowledge component of the definition. The discussion above supports this recommendation, which is also the first recommendation of the Independent Commission on Environmental Education (1997). It states: "Environmental educators should place primary emphasis on the acquisition of knowledge" (p. 3).

As a political scientist, I am the first to argue that students should be taught the skills and responsibilities of citizenship. My years of teaching at the university level were dedicated to teaching about the political system and encouraging students to participate in it. But given the dearth of quality materials which provide students with balanced, fair, and objective coverage of the science of environmental issues, the claim that students can engage in responsible action where *they* decide is a false claim. If I am wrong, I hope someone will provide me with a list of materials which discuss some of the key scientific facts mentioned above. Jane Shaw and I have provided lists of over 130 textbooks and nearly 120 environmental books for kids which, for the most part, do not (Sanera & Shaw, 1996).

Second, responsible environmental education organizations should give teachers, textbook authors, and curriculum writers guidance on the scientific *content* of environmental issues. According to the NAAEE guidelines, a "range of perspectives should be presented in a balanced way" (p. 5). A good way to communicate what is meant by balanced presentation is to give educators content information on key environmental issues. What better way to improve the teaching of environmental education than by giving environmental educators brief outlines from different scientific perspectives. This is especially important since the science surrounding

many environmental issues is constantly changing and teachers need help keeping up with these changes.

Virginia has adopted this content approach for their new educational standards. These standards require students to know, for example, what the Congress of Vienna and Harlem Renaissance were and who William Lloyd Garrison and Giuseppe Garibaldi were (Anon., 1997). In environmental education, students should be expected to know the full range of the scientific information and discussion on environmental issues. For example, my 1996 textbook study (Sanera, 1996) shows that major texts discuss the "catastrophic" scientific evidence quite well. But in addition to this information, students should be exposed to other scientific information such as:

- NASA's satellite temperature records show no warming trend since 1979 (see Spencer et al., 1990, and Sanera & Shaw, 1996);
- Rain forests naturally regenerate when small plots are cut and abandoned. Tree plantations are being planted to supply trees for commercial purposes (see United Nations, 1993);
- NAPAP study showed less damage from acid rain than previously thought (see NAPAP, 1990); and
- Manufacture of paper cups requires more chemicals and electricity and produces more air pollution and wastewater than polystyrene cups. (see Hocking, 1991).

Students who have a full range of scientific discussion on these issues would be better informed and they would be able to decide for themselves what their personal position on important environmental issues should be.

Arizona's Environmental Education Reforms

In Arizona, we are narrowing the definition of environmental education and concentrating, at least in the short run, on teaching environmental education in a balanced manner based on the latest science. While there has been a lot of misinformation about environmental education reforms in Arizona, the Arizona statute is quite clear. All K-12 environmental education programs in the state must be "conducted in a balanced manner" and "based on current scientific information" (Arizona Revised Statutes, 1992). To ensure that statutory mandates are carried out, the Legislature established the Arizona Advisory Council for Environmental Education (AACEE) which is authorized to award grants of up to $10,000 for development and implementation of environmental education programs, and up to $30,000 for programs at environmental education sites around the state. As a member of this council, I recommended, and the Council adopted, a slightly modified version of the NAAEE guidelines for fairness and accuracy. Arizona is the first state to adopt a portion of the NAAEE guidelines.

Funds for these grants come from the voluntary purchase of special environmental-theme automobile license plates. This fund has accrued nearly $1.5 million with an appropriation of $900,000 each year for fiscal years 1998 and 1999. These funds will go for grants, environmental education sites, and other programs established by statute and the Arizona Advisory Council for Environmental Education. This commitment puts Arizona among the state leaders in providing financial support for environmental education.

The Arizona Advisory Council for Environmental Education also established an innovative class environmental research contest as one of its grant programs. This contest asks middle and high school classes to write a balanced research paper on one of five topics selected for the 1997-1998 school year. These topics are endangered species, global warming, recycling, timber harvests, and urban air pollution. These papers will be evaluated on whether or not they accurately reflect the scientific and economic aspects of these issues in a balanced way. Each of the 10 classes which win 1st place will receive an award of $10,000 to be used for a field trip or other educational experience which relates to the topic of their paper. Second and third place awards are for $5,000 and $2,500. the Arizona Advisory Council for Environmental Education has earmarked

$200,000 for this contest. This contest will demonstrate that the gap between good intentions and actual performance can be reduced (AACEE, 1997).

Environmental Education Research Institute

My work as director of the Environmental Education Research Institute, a program of the Center for the New West, a Denver-based think tank, also demonstrates an attempt to narrow the gap. For example, we recently signed a contract for a series of environmental books for kids with a publisher who specializes in books for school and public libraries. This series of 14 books, co-produced with the Political Economy Research Center, a Montana-based economic research institute, will cover most environmental issues, including population, global warming, acid rain, recycling, rain forests and pollution. This series will be written by leading science writers and each book will be reviewed by noted scientific authorities. The approach we are taking is to ask scientists who represent a diversity of views on the topic to review and certify that the material in each book accurately and fairly represents the diversity of scientific viewpoints on each issue. Their names and a statement certifying their review will appear in each book. Thus, students, parents and teachers will know that these books represent the true state of scientific discussion on an environmental topic. We look forward to the publication of the first four books in this series in late 1998 or early 1999.

Conclusion

My research over the last five years has revealed a gap between the promise and performance of environmental education. The NAAEE leadership also recognizes the gap and is moving through its "standards" project to narrow it. I commend this effort in the area of establishing guidelines for materials which are fair and accurate, but I believe that the gap is much larger than many in the field realize. When environmental education materials cover environmental issues, they, more often than not, fail to cover the wide range of scientific discussion. Instead, they cover only the "cata-

strophic" scientific version and ignore any scientific evidence to the contrary.

The solution to this problem is found in returning to first things. In environmental education, this means developing a knowledge base on environmental issues for teachers and students alike. Teachers need to know the broad outlines of the content of the scientific discussions on such environmental issues as global warming, rain forests, recycling, world population and ozone. We cannot expect them to do content research on numerous environmental issues without help.

Arizona is leading the way both in establishing a legal framework and in practice. Funding of grants and the innovative class research project will provide models of quality environmental education based on current science and taught in a balanced manner.

I look forward to improvements in the field. These improvements should narrow, if not, eliminate the gap between promise and performance.

Notes on Contributor

Michael Sanera is the Director of the Environmental Education Research Institute, a Center for the New West program. He is also a Senior Fellow at the Center. Dr. Sanera taught political science and public administration at Northern Arizona University for 17 years. A native of Arizona, he enjoys running in 10K races, backpacking and leading his 10 year-old son's Webelos cub scout den.

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