

## *Rejoinder*

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I wish to thank Bowers, Courtenay-Hall, Simmons and Smith for taking the time and effort to provide their comments on my article. I believe the vigorous nature of the comments is a clear indicator that my research is fundamental to the core beliefs of the environmental education discipline. It is my hope that there will be continuing discussion of these issues. While I would have liked a few more favorable comments, I am pleased that this distinguished panel has responded.

When I was asked to write the lead article for a debate in this journal, I literally jumped at the chance. I was elated because after five years of frustration, I felt that this venue provided a chance for an academic discussion of the findings of my research. The issues that I have raised would be discussed and debated and through this process the discipline would advance. Alas, my frustration continues and the opportunity has been lost. The respondents all chose to evade the important issues I raise

The respondents use three primary methods to evade the issues. First, there is an attack on my research methods. The "attack the methods" tactic seems to be a convenient way to ignore findings which are inconvenient for defenders of the status quo. The second tactic used is evasion of the issues that I raise by simply changing the subject. The third tactic, and regrettably the most non-academic, is to attack my personal credibility. How can the discipline itself remain credible if it does not respond and condemn those who resort to this tactic? In response, I will summarize my research and findings as clearly and briefly as possible. Then I will demonstrate how the respondents evade the issues raised by my research.

### **Restatement of My Research and Findings**

From the start, my research agenda has been limited by specific boundaries. I have been trying to find out what the *average student in the average classroom learns* about the content of environmental issues. In other words, there are roughly 2 million classrooms in the

United States and what do the typical students in those classrooms learn about environmental issues such as global warming, acid rain, pesticides, air and water pollution, and rain forests. Does the content of these presentations offer basic scientific and economic information in a balanced way? If it is not balanced, what is the nature of the information which is transmitted? I was not trying to find out what students in environmental science courses or specialized courses such as Project Learning Tree or Project Wild were learning. When compared to the 2 million classrooms, these courses cover very few students.

The research methods I used to investigate these questions are admittedly limited. Short of a multi-million dollar grant to send researchers into a random sample of classrooms around the country, any methods are limited. I chose to start with content analysis of the coverage of ten environmental issues contained in 6th-10th grade science, health and geography textbooks. While this was limited to 33 texts used in Alaska (Sanera and Sielaff, 1996) and 62 used in Wisconsin (Sanera, 1996), these texts were published by major publishing companies and are used throughout the United States. Publishing companies do not release sales data for individual texts so it is impossible to determine exact usage of a particular textbook.

While recognizing the limitations of using textbooks as a basis of my research, it is a reasonable place to start. My findings were confirmed by less systematic reviews of environmental books written for children and of major environmental education curriculum materials (such as Project Learning Tree). In addition, I asked environmental education leaders at the state and national levels to guide me to materials which might include information that would provide balance on major environmental issues.

After documenting that most materials are not balanced, is it unreasonable to conclude that even teachers who are trying their best to be balanced will find it difficult to find balanced materials and to teach balanced lessons in their classrooms? To take a very specific example: if the textbooks, books in the school library, curriculum materials such as Project Learning Tree, and textbooks used in college courses to train preservice teachers do not provide balanced treatment, including the findings of the NAPAP study, is it unreasonable to conclude that most teachers will not know about this study? In addition, I have asked experts in environmental education to guide me to curriculum materials which include the find-

ings of this study and they have not even provided one reference. Instead, I get the responses such as those of Paden, Pickering, & Volk (1996) who argue that the findings of this study should not be taught to children because, they claim, it was politically inspired.

It is entirely possible that there are teachers who are providing balanced coverage of the acid rain issue by providing both the catastrophic acid rain thesis and the findings of the NAPAP study. Or teachers who provide the opportunity for students to research these issues in a balanced way. I don't dispute this possibility, but my research shows that it is more likely that balanced coverage of this subject, and numerous other environmental issues are the *exception, not the rule*. If I am wrong, show me the concrete evidence of teaching materials that teachers are using in their classrooms, don't evade this issue.

**Evasive Tactic #1:  
Because the research methods are not perfect,  
the findings cannot be true.**

As briefly stated above, I acknowledge that my research methods are less than perfect. Simmons and Courtenay-Hall criticize my methods by building a strawman of a perfect research design and then compare my research to that strawman. Since my research is not perfect, they argue, the findings cannot be true.

Simmons criticizes me for not controlling for researcher bias, but she offers no specific examples of "bias." For example, readers of my review of 62 textbooks used in Wisconsin (Sanera, 1996) know that I used a fairly simple and straight-forward research design. First, I ask the question: What is the nature of the scientific discussion which surrounds 10 key environmental issues? That discussion is then summarized into several key points which must be included to provide a minimum baseline for a balanced discussion of each issue.

For global warming, for example, students should understand that some scientists are reaching conclusions based on climate computer models and others are looking at actual temperature records. Neither method is foolproof—thus the basis for the scientific debate. On acid rain, students should know that research by some scientists shows major damage done by acid rain. While other scientists who

conducted the NAPAP study, find little evidence of significant damage.

Textbook passages on each of the environmental topics were evaluated using four possible categories: did the textbook coverage explain the key point “fully,” “inadequately,” “incorrectly,” or did it fail to mention it at all? Criticism would be understandable if most of the evaluations fell in the “inadequate” or “incorrect” categories. But the findings are clear, for the most part, textbooks fully explain one side of the scientific debate on an environmental issue but then *fail to even mention* the other side of the debate.

For example:

- While 22 of 23 textbooks explained that world population growth is nearing the Earth’s carrying capacity, 20 of 23 fail to mention that the world population growth rate peaked in the late 1960s and has been decreasing since. (Sanera, 1996)
- While 24 of 24 texts explain that carbon dioxide is causing global warming, 19 of 24 texts fail to mention the role of water vapor in the greenhouse effect. 23 of 24 texts fail to mention that most of the warming which has occurred over the last 100 years took place before 1938. (Sanera, 1996)
- While 39 of 39 texts explain that acid rain is harmful to lakes and streams and kills fish and trees, 38 of 39 texts fail to mention the findings of the NAPAP study that there is little damage to trees and minimal damage to streams and lakes. (Sanera, 1996)

I expected criticism on this research, because it has limitations. I expected critics to argue with my selection of the key points of the scientific debates and I expected critics to read the texts and argue with how I applied the methodology to the texts. These criticisms have not occurred. It seems that none of my critics have tried to replicate my methods by reading the texts. Instead, my critics just throw out the unproven charge of bias.

Why is that? Is it because Simmons and others do not want to actually read the texts? Is it because they do not want to be seen arguing that NAPAP or the satellite temperature record should not be part of the curriculum? Is it because reviewing these texts—published by major publishers and used throughout the country—will demonstrate that they are biased? Or is it because the

respondents have looked at the texts and found my research accurate? I don't know which of these reasons is true, but I do know that, to date, no one has demonstrated that my major conclusions are wrong.

Though Courtenay-Hall also attempts to evade the real issues by questioning my methodology, her concern is whether or not my research is generalizable. She does not believe that my research provides "an adequate basis geographically, as well as across setting and across grade-levels, to support an unrestricted criticism of the 'actual performance' of 'grassroots environmental educators' in the U.S."

Unless they possess unlimited resources, most researchers will have less than perfect research methods. Though my content analysis of textbooks is limited to 62 textbooks in Wisconsin and 33 in Alaska, my other less systematic research and the research of others, including the Independent Commission on Environmental Education, has not provided sufficient exceptions to call my research into question. That is, I reviewed a total of nearly 130 textbooks and 120 books written for children found in many school libraries, plus numerous environmental education curriculum materials. In addition, my review of college textbooks used in teacher education also confirms my conclusions.

Generalizability would be a concern if the texts were published by minor publishing companies. But these texts are published by the top publishing companies in the United States (Macmillan, Prentice Hall, Glencoe, McGraw-Hill, etc.) and used widely in school districts around the nation. Though my content analysis has been concentrated on the 6th-10th grade levels, I have also reviewed numerous materials at all grade levels and exceptions to my conclusions are rare.

The best way to prove me wrong would be to show national studies which evaluate the content of educational materials for balance on environmental topics which are generalizable and come to opposite conclusions. The reason neither Courtenay-Hall nor Simmons chose to follow this line of attack is obvious, there are no such studies. Until there are, my studies remain the only source of this information. And until the environmental education research community conducts these studies, I will continue to refine and improve my research methods and to publish my findings. I also invite others to pursue this greatly needed line of research.

Another less systematic way to prove me wrong would be to show me anecdotal examples of materials which contain balanced information on environmental issues. Neither Courtenay-Hall nor Simmons chose to use this method of criticism, and for good reason. There are few, if any, materials which cover controversial environmental issues and which also meet the high standards of the North American Association for Environmental Education *Guidelines*, (NAAEE, 1996) for "Fairness and Accuracy."

For example, a list of textbooks and curriculum materials which contain the NASA satellite temperature record or the findings of the NAPAP study would offer a sound method of refuting my work. But do these materials exist? There is no way to tell from the responses of the critics.

Another way Simmons tries to evade the issues is to criticize the methods I used to apply the NAAEE *Guidelines*. In my study of twelve required courses for preservice teachers at eight University of Wisconsin campuses, I evaluated the course materials using the NAAEE *Guidelines* key characteristic for "Fairness and Accuracy." I used only this characteristic of the *Guidelines* because my interest is in whether materials are balanced and present fairly the scientific debates on controversial environmental issues.

Simmons criticizes this use of the *Guidelines* by stating: "To arbitrarily choose which of the key characteristics and guidelines are to be scrutinized violates both the spirit and intent of the *Guidelines*."

So how are the *Guidelines* supposed to be used? According to Simmons (1998) the *Guidelines* are to "provide a *holistic* view of environmental education as a *process*." She states, "All [the guidelines] are designed to be taken together, as a *synergistic whole*, in evaluating or developing environmental education materials." And "The *Guidelines* were never intended to be used as a test with *fixed right and wrong answers* . . . (the *Guidelines* were not developed with textbooks in mind either)." (emphasis added)

Simmons then goes on to describe how reviewers used the *Guidelines* for the review of materials contained in the NAAEE (1997) publication "The Environmental Education Collection: A Review of Resources for Educators." She states that one must read "the entire review to get a *feel* for the curriculum [material]." (emphasis added)

And what does this NAAEE review of materials tell us about the materials? Each review of a curriculum material is provided on one page with each of the six "Key Characteristics" evaluated in just a few brief phrases. For example, for the evaluation of whether a material is fair and accurate, the document evaluates various materials with comments such as "Lists numerous sources of information" (p. 27) "Accurate, well-referenced, balanced approach to issues" (p. 17) "Very fair and accurate" (p. 77) and "Balanced presentation." (p. 61) This last comment was about *Living Lightly in the City* which the Independent Commission on Environmental Education (p. 16 and 36) criticized for giving anything but a "balanced presentation" of solar energy.

I ask the reader to consider the extreme subjectivity of this information. Nowhere are the operational definitions of balance, accuracy or fairness explained. It is true that one gets a "feel" for the materials, but I believe that teachers would rather have solid information.

Compare this to my use of the NAAEE *Guidelines* for Fairness and Accuracy. I tell the reader what I mean by balance by providing the content of a balanced presentation on an issue. Then I give narrative discussion of sections of the textbook where I believe the author is not providing balanced coverage of an important environmental issue.

For example, I criticize the G. Tyler Miller text *Sustaining the Earth* (1996) for not providing balanced information in three major areas: population growth, acid rain and global warming. Specifically, Miller fails to provide the NASA satellite temperature record of the Earth, which shows no warming from 1979 to 1996, and fails to tell readers that most of the warming which has occurred over the last 100 years took place before 1938. Because of these omissions, this is not balanced coverage of the global warming issue as required by the NAAEE *Guidelines*. This text also lacks standard academic citations for the information it uses, which is also required by the NAAEE *Guidelines*. Therefore, I conclude, "this text lacks the balance and fairness of presentation required by the NAAEE *Guidelines*." (p. 14)

Now the readers of my application of the *Guidelines* can decide for themselves if they think that this information is important for balance, and/or if they want to supplement this text with other materials which provide balance on this topic. I suggest that my ap-

proach is more useful to the average teacher than setting up a system which allows teachers to get a “feel” for the material.

But this is a side issue designed to evade the real issue. Why do Simmons and others who have worked so hard and long to develop *Guidelines* for materials resist with such vigor the inclusion of content information in the review process? Why don't they want to say that there are certain minimum standards for content information about key controversial environmental issues?

The current reaction to my research seems to indicate that Simmons would rather attack me than to recognize the problem of bias and use the NAAEE *Guidelines* to help correct it. Whereas those who are “officially” applying the *Guidelines* are not taking them seriously, I do.

**Evasive Tactic #2:  
Avoid the real issues by changing the subject.**

Bowers evades the real issues by using two tactics. First, he attacks my personal credibility by using guilt by association, and second, he tries to change the subject. (The latter will be discussed here and the former in the next section.) Changing the subject is a classic debating technique. It allows the user to shift from a topic where he is weak to one where he is strong. This seems to be Bowers' objective. He does not want to talk about the issue of whether or not environmental education is scientifically balanced. Instead, he wants to talk about his area of expertise which is postmodern critique of society and teaching (Critical Pedagogy). I have decided not to respond to this one because I believe it is largely irrelevant to both the vast majority of teachers and even my harshest critics in the environmental education community. It would appear to me, and I do not claim to be an expert in this area, that his criticisms of me would apply equally to NAAEE *Guidelines*. For example, here is the way Bowers describes how scientists think:

Scientists think in the metaphorical language of their cultural group (which is now largely English). This metaphorical language is based on root metaphors that still reproduce key elements of the cultural



schemata that co-evolved with the Industrial Revolution. The language they use to describe and explain relationships also reproduces the moral templates of the dominant culture—which still represent “man” as in an instrumental relationship with Nature.

I am sure that Bowers believes that he has escaped the control of the “dominant culture” and he has achieved a higher level of conscientiousness, much as Marx believed he did. I am also sure that Bowers believes that this argument is relevant to his critique of my work. But my main concern is whether or not K-12 students actually know something about the content of the scientific debates which surround environmental issues.

It is with regret that I place Gregory Smith’s response in this category. I found his response closest to an academic response of the four. In fact, I found myself agreeing with much of what he says, especially his lament about the environmental changes in Oregon. As a native Arizonan who has witnessed the pristine condition of Arizona in the 1950s and the subsequent environmental changes due to the rapid growth, I also lament the changes. But remarkably, I come to different conclusions on how this personal experience influences my views on environmental education. My personal experiences and views should not influence my understanding of balanced treatment of environmental issues. Growth has its problems and benefits, children should learn about *both* in a balanced way and then decide for themselves.

Smith changes the subject after failing to understand one of the fundamental points in my paper. (Simmons and Courtenay-Hall are also confused on this point.) Smith states that it is my expectation that an environmental education teacher must be a scientist, a psychologist, a political scientist and an economist, plus keep up on the latest peer reviewed research in the academic journals. I know that is not practical. This is not my view but it is a consequence of the dominant definition of environmental education which includes not only knowledge of the environment, but behavior modification and political action training. I sympathize with teachers, especially in states where K-12 environmental education is required by state law. I further note that their job is made even more difficult by the lack of quality materials which accurately summarize and synthesize the scientific literature on major environmental controversies.

Smith's misunderstanding leads him to divert the readers' attention from the central issue to side issues. In the process, he inadvertently reveals the problem that I am concerned with. Smith states that "[i]t will be on the basis of citizen activism that the excesses of market forces will be contained . . . [E]ducators must also find ways to instill in the young the ability to perceive their connection with the Earth and the willingness to protect it. In the end, environmental education cannot be neutral."

I could not have summarized what I believe is wrong with environmental education more succinctly. Note that Smith does not see environmental education as a method for students to examine whether market forces *should* or *can* be contained, but that he sees environmental education as a way to train students to be citizen activists who "will" work to contain market forces. It appears that Smith has done the thinking for his students when he decided that market forces should be contained. He says it is up to the environmental educator to train the students to contain the market through political activism.

The second quotation reveals an additional problem in environmental education. Far too many environmental educators accept this proposition without critical examination. Is it the role of an educator to "instill in the young . . . the willingness to protect [the environment]"? In the United States, there are very few educational goals on which we are able to achieve consensus. Teaching the principles of democracy might be one. When it comes to controversial environmental issues, there is no consensus, especially when we look at the many ways which have been suggested on how and at what costs we are to protect it.

These two areas—political activism and behavior modification—are precisely the two areas which get environmental education in trouble with parents and the public—and justifiably so. In an attempt to dodge the issues, Smith stumbles on to the key issue. His failure to recognize the controversial aspect of his statements is testimony to how ingrained and how deep the basic ideology of the mainstream environmental education position is. It is only when this ideology is recognized and examined that the discipline will be able to clean up the abuses and start to bring itself into a new alignment with what the general public sees as the appropriate mission of environmental education.

**Evasive Tactic #3:  
If you discredit the person,  
you don't need to deal with his research findings.**

Before Bowers launches into his guilt by association tactic, he tries to discredit me by arguing that I lack a commitment to basic scientific information. Bowers attempts to prove this by stating that I refer to "a study that makes the dubious claim that 'Mexicans throw away more garbage than Americans do.'" Selection of this example shows his ignorance of the scientific literature in this area because it is not a "dubious claim," but based on widely accepted scientific research. University of Arizona archeologist, William Rathje, one of the world's preeminent experts on garbage, conducted the research which came to this conclusion (Rathje and Murphy, 1992). I know of no credible challenges to this research.

Bowers also misses the mark when he accuses me of ignoring the warnings of 1600 scientists who signed a statement regarding the limits of the Earth for the Union of Concerned Scientists, hardly a non-political organization. It is Bowers who lacks the basic commitment to scientific information because he takes this statement as the final word on these issues. It seems odd that I must remind Bowers and many others in the environmental education community that science is not a democracy. While the concept of "scientific consensus" is important is it not the way scientists determine scientific truth. It is through scientific research published in peer reviewed journals that is criticized by other scientists that a scientific consensus is developed. Any consensus is then constantly open to challenge.

I invite Bowers and others to review the history of plate tectonics. Alfred Wegener proposed the theory in 1912. It wasn't until forty years later in the early 1950s that Wegener's followers were able to gather enough peer reviewed evidence that the old scientific consensus folded and the new consensus was established. Should we close the books on environmental issues based on a few years of research as Bowers suggests? Or should students be taught the real process of science and the full range of the scientific debates on these issues? I am not the only one who wants to ensure that students are exposed both sides of on going scientific debates, the NAAEE *Guidelines* also demand it. They state that major scientific

positions are to be “covered thoroughly, while other positions are also mentioned.”

Be that as it may, Bowers moves on to use guilt by association in an attempt to “prove” my ideological bias, a bias that he never documents from my writings. It is assumed that my organizational connections prove that I am biased.

What is even more disturbing in this attempt to discredit me is his use of an old rhetorical trick. He asks “we need to know more about the connections between his (Sanera’s) Environmental Education Research Institute and such groups as the Center for Environmental Research at the Claremont Institute—which is connected with a network of Wise Use groups spread across the United States. We also need more background information on the role of the Heritage Foundation (which receives funding from corporate giants such as Chevron, Dow Chemical, and General Motors)” It would be one thing if Bowers explained these “connections “ and “background information” to the reader, but he uses it as a rhetorical device. The reader is left with the impression that something sinister is going on even without being provided any evidence by Bowers. (Does Bowers realize that NAAEE receives money from such “corporate giants” as Chevron, Phillips Petroleum, and Clorox?)

Let’s try this trick in reverse. “We need to know more about the connections between” the National Environmental Education Advisory Council and national education environmental organizations whose members sit on this Council. “We also need more background information on the” large sums of federal grant money which are given by the EPA, on the recommendations of this Council, to the same well connected national environmental education organizations.

That was easy. I made my charge leaving the reader with the impression that something shady, if not illegal, is going on and I did not have to present *one shred of evidence to prove it*. Enough said. The remainder of the Bowers response is spent changing the subject to a postmodern critique of my work along with, I might add, much of mainstream environmental education.

### Conclusion

So far I have expressed my disappointment that the respondents chose not to engage in a substantive discussion of my research and

findings. In this last section, I will speculate why they have not. Why have the respondents chosen to use evasions instead of following the accepted practices of an academic discipline by meeting the challenge posed by my research head-on?

First, it appears that many in the discipline are wholly dedicated to process over substance. Learning about the process of education is much easier than learning the content of the information which is taught. This is especially true when it comes to learning about the complexity of the scientific debates which rage around environmental issues. This process-over-substance bias is amply demonstrated by Simmons in her description of the procedures used to write the *Guidelines* and the way the materials were evaluated using the *Guidelines*. This is reinforced when I review the end result: *The Environmental Education Collection: A Review of Resources for Educators* (1997). I found this document of very little use in evaluating and selecting materials, especially if my primary concern is to select materials which are scientifically accurate and balanced. I get the impression that those who worked so hard on the process are similar to a person who spends all his time learning the process of playing the piano and forgets the end objective which is to make beautiful music.

Second, there is a natural bias in the field. This is probably due to the self-selection process where individuals who have a deep personal concern for the environment are more likely to join NAAEE and to engage in environmental education activities. Thus, when scientific content is evaluated by these self-selected curriculum writers, textbook authors, and teachers, they tend to discount studies which run counter to accepted environmental positions. Thus, we get the curious attacks, such as Paden et al. (1996), on the findings of the NAPAP study and those who provide scientific evidence which runs counter to the predictions of the GCM in global warming.

Finally, the avoidance of a real substantive discussion of the content of environmental education is a way to quash dissent. By following the three evasive tactics outlined above, the discipline is ridding itself of inconvenient challenge to the ruling paradigm. Because a successful challenge to the ruling paradigm within environmental education means a challenge to the those who hold position, power and status in that paradigm, they will fight off any challenge. This is true even in scientific and technical areas. Wit-

ness the way the astronomers fought the clock maker John Harrison and his discovery of a reliable way to measure longitude. (Sobel, 1995) Those in less exacting disciplines, like environmental education, are perhaps more susceptible to this temptation. It is a pity that those who claim to be dedicated to the values of education and openness do not deal with challenges to their core beliefs in a more professional manner.

I invite those in the discipline who are interested in a free exchange of ideas to review my research and offer their comments and criticisms. In addition, I believe that those scholars who are legitimately interested in balanced and objective environmental education should join in research efforts which improve the current state of the discipline. More academic content analysis of textbooks and curriculum materials is needed. Surveys of teachers to find out exactly what materials they are using and why are also needed. It is shocking that the discipline does not know more precisely the content of the environmental education that the average student receives.

For my part, I will be producing (along with Jane Shaw of the Political Economy Research Center in Bozeman, Montana) a series of single issue environmental books to be published by one of the largest publishers for the school library market. This series will contain 14 titles on environmental issues such as global warming, ozone depletion, rain forests, pesticides and population growth. The explicit goal of this series is to produce books which are balanced and contain the latest scientific and economic information on the topic. To help us with this task, we are inviting leading scientists and economists in each field who represent a diversity of opinion on the topic to review and comment on each book. When published in early 1999, the first four books in this series will provide a model for balanced treatment of controversial environmental topics.

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