

Decision-Making Under Scientific Uncertainty Michael S. Spranger, Washington Sea Grant Program

Dealing with Scientific Uncertain: the Educational Challenge

Governmental policies or programs that are adopted need the strong support and actions of everyone in order to be successful. However, many individuals do not have a good understanding of the complex issues, problems, and potential impacts of global change or they are confused by the conflicting, alarmist information of the mass media. Also, unlike what has happened in the research community, there has not been a large infusion of public funds for a coordinated, integrated, and interdisciplinary education effort. As a result many informational activities are disjointed, and may be based more on emotion than fact. (Spranger, 1990).

There is a need for the public to receive accurate, objective scientific information about global change and its implications. Not only do they need to understand the basic science, processes, and impacts of global change, but they also need to understand how collective and local actions can be taken to respond to this issue. Hundreds of scientists from around the world who are working on this issue, as part of the International Panel of Climate Change under the directive of the United Nation's Environmental Programme, unanimously agree on this point. (Titus, 1990).

Envisioned by such eighteenth-century philosophers as Jean Jacques Rousseau, John Lock, and John Stuart Mill, government requires that everyone have the right to influence political decisions that affect them. A basic assumption is that everyone is -or should be- essentially equal, in both their concern for public issues and their competency to make decisions about them. However, in order to make these decisions, individuals need accurate and understandable information. Unfortunately, many articles on global change are either sensational, too technical, or too abstract for the student and the general public, or they do not provide a connection between their everyday actions and the impending long- term global changes that may take place.

In addition, in the classroom many science educators may teach the "science" of the issue, but fail to give the issue an interdisciplinary focus, which also discusses the socio-economic-political problems, but lack the scientific education and technical information needed to explain the "science" and how these issues may be resolved. Those educators involved in informal adult education face the same dilemma.

Also, we can point our fingers at the entire educational process in our current dilemma. In the February 25, 1991 issue of Newsweek Magazine an article was printed on "why my kids hate science". The author pointed out that our educational system provides a process where we cull out non-scientist. We tend to discard those students that are not initially turned on by science...and focus on the brightest and the best, or those that society deems are not suited to the scientific professions. For example, at one time the educational system only focused on males...women could not become scientist because their place was in the home. A similar indictment can be made for minorities today.

So we have become a nation of scientifically illiterate people. But remember, who makes the social decisions on local, regional, and national levels involving science and emerging technologies, and their budgets! It's all of us. Individuals turned off by science, or confused about the uncertainty that may exist over an environmental issue may not be supportive of science and its importance in dealing with the global environmental issues of today. So it's up to all of us to provide our students (whether it be in the formal or informal setting) with some basic understanding about the role and utility of science as we grapple with these highly complex issues.

Six Methods by Which We Acquire Our Values

1 **Authority**

Taking someone else's work, having faith in an external authority. (e.g. having faith in Church or the Bible).

Example: I have faith in the Authority of

2 **Logic**

Subjecting beliefs to the variety of consistency test that underlie deductive reasoning.

Example: since A is true, B must be true because B follows A

3 **Senses**

Gaining direct knowledge through our own senses

Example: I know it's true because I saw it, I heard it, I tasted it, I smelled it or I touched it

4 **Emotion**

Feeling that something is right: although we do not usually associate feeling with thinking or urging, we actually "think" and "judge" through our emotions all the time.

Example: I feel that it is true

5 **Intuition** Unconscious thinking that is not emotional.

Example: After struggling with this emotional problem all day, I went to bed confused and exhausted. The next morning, when I woke up. The solution came to me in a flash and I just knew it was true.

6 **"Science"**

A synthetic technique relying on sense experience to collect observable facts; intuition to develop a testable hypothesis about the fact; logic to develop the test (experiment); and sense. Experience to again complete the test.

Example: I tested the hypothesis experimentally and found that it was true.

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