THE SPICE STRANDS

There are many productive ways in which to make use of the environment as an educational tool. One approach is strictly classification: everything has a name and a specific way of interacting with the universe. Scientists describing unique objects use this taxonomical method as a principal operational procedure in their investigations. This method, however, has a drawback for the teacher with a limited scientific background, who may not know the multitude of specific names and conditions with which to describe the environment scientifically.

Another way of approaching environmental study is through an investigative, completely open-ended method. The teacher guides students in their attempts to discover what is present in their surroundings and to place their discoveries into some kind of perspective. The advantage of this method is it provides the kind of study that activates sensory awareness and enables the student to develop creative problem-solving techniques. The difficulty rests with the development of research skills. Research skills are another tool of the scientific investigator, and although they would provide a good background in problem-solving for the student, it takes time to develop them.

The SPICE Strand approach draws upon the advantages of both of these methods while eliminating the disadvantages. It incorporates both the specific and the investigative approaches into a third approach with which both student and teacher can feel more comfortable. It requires identification and classification, but on a modified basis. It also requires open-ended investigation leading to problem-solving. Yet all of its requirements can be taught by a teacher and fulfilled by a student who has little of the rigorous scientific training demanded by the other approaches.

The Strand approach makes necessary a reorganization of thinking into unfamiliar patterns, which may at first be difficult. The valuable, unifying characteristic of the Strand approach, however, makes whatever initial effort may be necessary unquestionably worthwhile.

The Strand approach uses five broad, universal concepts as a way of drawing the environment under a total, integrated "umbrella". They are known as the SPICE Strands because the first letter of each concept makes up one of the letters of the word SPICE. These concepts or Strands are:

> SIMILARITIES AND VARIETY: Many likenesses and differences occur among living and nonliving things. A variety of functions, sizes, and structures exist in plants and stars, rocks and animals, processes and people. Yet there are sufficient similarities to permit their classification into orderly patterns. These classifications increase one's understanding of this world.
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> PATTERNS: Organizational patterns are kinds of structures that may be found in rock formations as well as in social groups of

people and animals. Functional patterns include traffic movements and classroom schedules. Spatial arrangements are patterns that often please us. Such patterns occur both in nature and in artistic design.

INTERACTION AND INTERDEPENDENCE: Nothing exists in isolation. Each individual is constantly interacting with living and nonliving things: his family, his belongings, his friends, his world. These people and things also depend on the individual in order to function properly. The process is continuous (as part of the life cycle) even after death, for dead life-forms nourish the living.

CONTINUITY AND CHANGE: Both living and nonliving things are constantly changing--whether among galaxies and planets or within body cells and body systems. Some things remain the same in spite of change. Matter and energy may change in form, but they can never be created or destroyed.

EVOLUTION AND ADPTATION: Over centuries and centuries , living and nonliving things alter and develop in the process called evolution. Probably the greatest number of changes over the longest periods of time come about in order to enable an organism to adapt to the environment. Hereditary factors then preserve the continuing elements. The characteristics that enable the organism to adapt best (for example, the best food finder) are apt to be the traits passed on from generation to generation, thus ensuring survival of the species.

Similarities and variety means the simple recognition of each organic and inorganic thing. A classification is derived by noting similar characteristics in distinct objects. Once a classification is made, an object's Patterns can be identified. What is the nature of its design? Of its function (what does it do)? Of its organization? The functional pattern leads directly to Interaction and Interdependence. How does the specific variety interact with air, water, earth, (other) populations? As it Continues to Change, it is constantly undergoing Evolution and Adaptation, according to how it fits into the Pattern of existence. If a substance does not adapt in its present form, it Evolves, through Continuity and Change, into a new Variety, with a new Pattern of Interaction and Interdependence.

Using these large concepts, or Strands, teachers who have had no particular scientific or ecological training can instruct or guide students toward open-ended, purposeful activities. The scope of the Strands can be focused on the specific at almost any level of detail or sophistication. Within the Strands there is a synthesis of environmental relationships. This synthesis makes the Strands applicable to the wide range of disciplines within the school program, yet the Strands provide a tool for study that can be specifically related to the most widely differing ecological situations. For example, Patterns can be applied to the arrangements of beach fauna (biology), mountain ecology (natural history), or people living in an urban area (social sciences).

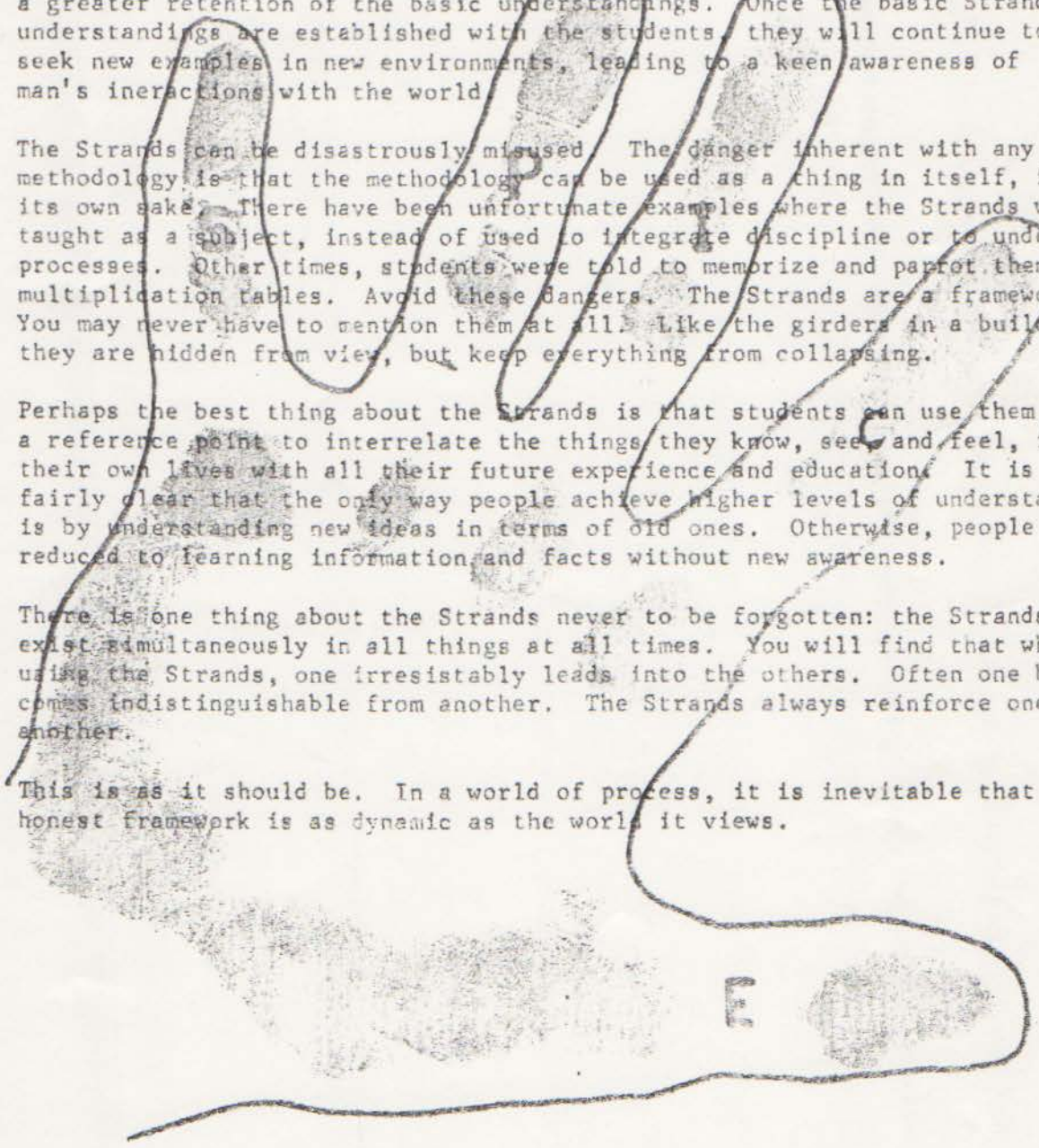
Teachers should think of themselves as catalysts--permitting the students to develop the answers themselves whenever possible, which will result in a greater retention of the basic understandings. Once the basic Strand understandings are established with the students, they will continue to seek new examples in new environments, leading to a keen awareness of man's ineractions with the world.

The Strands can be disastrously misused. The danger inherent with any methodology is that the methodology can be used as a thing in itself, for its own sake. There have been unfortunate examples where the Strands were taught as a subject, instead of used to integrate discipline or to understand processes. Other times, students were told to memorize and parrot them like multiplication tables. Avoid these dangers. The Strands are a framework. You may never have to mention them at all. Like the girders in a building, they are hidden from view, but keep everything from collapsing.

Perhaps the best thing about the Strands is that students can use them as a reference point to interrelate the things they know, see, and feel, in their own lives with all their future experience and education. It is fairly clear that the only way people achieve higher levels of understanding is by understanding new ideas in terms of old ones. Otherwise, people are reduced to learning information and facts without new awareness.

There is one thing about the Strands never to be forgotten: the Strands exist simultaneously in all things at all times. You will find that while using the Strands, one irresistably leads into the others. Often one becomes indistinguishable from another. The Strands always reinforce one another.

This is as it should be. In a world of process, it is inevitable that an honest framework is as dynamic as the world it views.



One easy way to remember the SPICE Strand framework is to examine the Strands Pocket Model. There are five fingers on your pocket model, one for each Strand:

Similarity and Variety - There are five projections on your hand that are so similar to each other, they are called fingers. But there is so much variety in them that no two are exactly alike. In fact, no two fingers in the world are exactly alike. Once this similarity and variety is observed, we can identify patterns.

Patterns - There is a pattern on the end of every finger called fingerprints. There is an endless variety of fingerprints though they all follow a similar pattern. There is a pattern in the way the blood flows through your hand, from the heart to arteries to tiny capillaries in the hand, and back to the heart through veins. These patterns lead directly to interaction and interdependence.

Interaction and Interdependence - There is interaction when the blood in your hand delivers sugar to every tiny cell in exchange for waste material. Your fingers interact, though independently, when they are playing a guitar or holding a hamburger. Your hand interacts when it is cold and by perspiring when it is hot. Interaction and interdependence subjects our hands to continuity and change.

Continuity and Change - The veins and arteries in your hand change as the temperature changes. The cells in your hand are constantly dying and being replaced by new cells. In fact, the hands you put in your pocket today are not the same hands you had six weeks ago. As your hands continue to change, they constantly undergo evolution and adaptation.

Evolution and Adaptation - Over long periods of time, the human hand has adapted to new situations. The opposable thumb allows us to do marvelous things with our hands that most other animals cannot. Evolution is change over long periods of time. The hands of man a million years from today may look and function much different than these of today.