SECTION E, SCIENCE EDUCATION

Inquiry and the Self-Directed Learner[1]

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Science educators have attempted to meet three criteria in developing curriculum materials for the secondary schools: educational soundness, consistence with current scientific knowledge, and appeal to the students and classroom teachers who were expected to implement the curriculum materials.

A closer examination of the three above-mentioned criteria reveals an apparent assumption that has not been adequately communicated to those who were expected to use the curriculum products; i.e., scientific knowledge is, at least, composed of (1) the knowledge of a set of inquiry processes and (2) the findings of these inquiries. For too long, the *findings* of these inquiries have been emphasized to the exclusion of the *processes* of inquiry. I would submit that these are equally important and inseparable in a science program that is consistent with current scientific knowledge.

If one views scientific knowledge as consisting of these two components, and if one studies both the processes and findings of inquiry, the perception of science as mysterious and complex is changed. The new perception pictures science as exciting and rewarding. This different perspective tends to humanize science and modifies the "man in the white coat whose experiments always work" image of the scientist.

Many individuals, both children and adults, who have studied science in the past have had unpleasant encounters in classes because all that was emphasized by the teacher and text were the products of inquiry, i.e., facts.

There is a belief on the part of increasing numbers of people that, if inquiry skills were emphasized, the student would understand better the facts of science, how these facts were determined, and how they are woven together to form concepts.

One of the problems facing us is that inquiry is an ambiguous term that elicits many definitions. On one point we do find agreement, however; self-directed learners are probably adept at inquiry skills and consciously, or unconsciously, employ these skills in their own activities.

This agreement is based on the rationale that an individual who has an internal motivation to resolve a question or explain a discrepant event (i.e., to him) evolves a pattern of behavior that produces an explanation that satisfies his inquisitiveness and "puts his mind at ease." For this individual, this process has called into play skills, behaviors, and thought patterns that for him are inquiry skills.

If one attempts to analyze what it is that the scientist does (we are told that science is what scientists do), a set of activities can be identified. However, one thing appears obvious—scientists do not have a single set of behaviors with a common entry point and a common exit point that is as simple as the once celebrated, but no longer considered complete and accurate, "five-point, scientific method."

The point to be made here is that when we speak of "teaching science by inquiry" we are referring not only to the asking of questions but

[1]Models relating the self-directed learner and inquiry may be obtained by writing the author.

rather, to a set of skills (questioning is but one of these skills) that produces at least tentative explanations—the product of the process!