Implications of Earth science methods on classroom practice

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Science inquiry has been an important goals of science curriculum since 1960s. Scientific inquiry based on hypothetico-deductive approach and controlled experiment is regarded as exemplary scientific method in science education. However, many philosophers of science insist that distinct methodologies and multiple models of rationality exist in science. The major purposes of this study are to synthesize studies on Earth science methods, based on the studies in the area of geological science, and finding implications of the synthesis on classroom practice.

Many researchers have grouped the goals of Earth science inquiry into two categories: historical and causal. In the process of inquiry, Earth scientists often face problems of inaccessibility, complexity, and immanipulability of the objects of study. Earth science methods reviewed were retrodiction (Kitts, 1977), historical methods (Gould, 1986), abductive inference (Engelhardt & Zimmermann, 1982), Earth science methods (Laudan, 1987), and hermeneutics (Frodemann, 1995).

The problems of Earth science inquiry provide challenges and constraints, and earth scientists have to resort to methods other than controlled experiments. Abductive inference, or inference for the best explanation (IBF), is identified as the reasoning behind the historical and causal inquiry of Earth science. Hermeneutics provide conditions of inquiry for the synthesis of earth science method. The synthesis can provide guidelines for instructional approaches which can reflect the nature of Earth science. The synthesis also provide a model which will help understand students as a learner and researcher.

Key words: science inquiry, Earth science method, classroom practice, abductive inference