FOSSIL FINDERS

Using inquiry to learn about the environment of past eras: Bringing environmental education into classrooms through science

A case study investigation to explore how an authentic investigation of the environment and explicit instruction in nature of science (NOS) can foster better understandings of science.

Question guiding student research:
What can fossils tell us about changes in the environment of the past?

Research Questions:

1. In what ways do students participate in science through an investigation of environmental change using fossils?
2. What are students' views about scientific inquiry, NOS, and environmental change, and how do these views change during the investigation?

Context: Teachers serving underrepresented and English language learning students will be using inquiry and explicit instruction in NOS to involve their classrooms in an investigation of local fossils. Students will be measuring fossils and comparing fossil samples from different sites to make inferences about the environment of the past.

Theoretical Grounding:

- Activity, context, and culture of science as situated cognition *(Brown, Collins, & Duguid, 1989)*
- Providing context for science learning through environment-based education *(Ernst & Monroe, 2004; Hacking, Scott, & Barratt, 2007)*
- Science learning as process of enculturation *(Driver, Asoko, Leach, Mortimer & Scott, 1994)*
- Science as a community of practice *(Wenger, 1998)*

Data Collection: Will include 3 weeks of classroom observations in 2 schools, Student pre-post tests, and interviews with students and teachers

Data Analysis: Will entail a content analysis of interviews and classroom observations using:

- National Science Education Standards for Inquiry *(NRC, 2000)*
- Framework for Instructional Congruency *(Luykx & Lee, 2007)*
- Nature of Science Components *(Lederman, 2004)*.

Discussion:
How can an investigation about the environment promote science learning in schools?

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Essential Features of Classroom Inquiry (NRC, 2000)

- Learners are engaged by scientifically oriented questions.
- Learners give priority to **evidence**, which allows them to develop and evaluate explanations that address scientifically oriented questions.
- Learners formulate **explanations** from evidence to address scientifically oriented questions.
- Learners evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding
- Learners communicate and justify their proposed explanations.

Nature of Science Components for Instruction (Lederman, 2004)

- Scientific knowledge is tentative (subject to change)
- Scientific knowledge is empirically-based (based on and/or derived at least partially from observations of the natural world)
- Scientific knowledge is subjective (theory-laden, involves individual or group interpretation),
- Scientific knowledge necessarily involves human inference, imagination, and creativity (involves the invention of explanations)
- Scientific knowledge is socially and culturally embedded (influenced by the society/culture in which science is practiced)

Framework for Instructional Congruency (Luykx & Lee, 2007)

- Integrating cultural experiences and materials into instruction.
- Inviting the use of native language during instruction.
- Scaffolding instruction for English language development.
- Sharing scientific authority.

References

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