The Effect of an Historical Geology Course on Students’ Attitudes Towards Science and Their Knowledge of Deep Time as a Threshold to Their Knowledge of Evolution

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Abstract
In America there exists a conflict between a small group of its citizens and the concept of evolution. Researchers have studied this conflict and the ways in which teachers might approach educational methodologies that not only address evolution in a sensitive manner, but also remain legally acceptable.

This research was designed to address teaching evolution in the context of deep time – the concept that time is vast and that geology and biology operate in a timescale of hundreds of millions to billions of years. In previous peer-reviewed works, it has been stated that deep time acts as a threshold concept, preventing students from making the proximal leap to fully learning evolution except through the context of deep time.

Students in Principles of Biology II (n = 100) were compared to those in Historical Geology (n=51). These students were scored on their responses to a pre-test/post-test research instrument which combined selected items from previously validated instruments – the Scientific Attitude Inventory II (40 items), the Geoscience Concept Inventory (15 items), the Conceptual Inventory of Natural Selection (10 items), and the Measure of Understanding of Macroevolution (10 items) – to address concepts of attitudes towards science, deep time, and evolution. A selection of open-ended questions (4 items in the pre-test, and 5 items in the post-test) at the end attempted to probe students’ views of evolution and deep time, as well as their methods of conflict avoidance.
if there were any conflicts between their own personal beliefs and the content being taught in the class.

Statistical analysis of the data was conducted using 2-way mixed ANOVAs to account for differences in means as well as any statistical differences between groups during the pre-test, multiple linear regressions to determine any correlations between the attitude and deep time scores with the participants’ evolution scores, a path model analysis to determine relationships between the various components of the Historical Geology instrument, and convergent parallel coding of open-ended responses using a data validation design to determine any changes in religious and/or evolution perceptions between pre- and post-tests.

These analyses indicated that knowledge of deep time did not act as a threshold to learning evolution, as indicated by non-significant (p = .077) differences between evolution scores in both the pre-test and post-test scores for both courses, despite Historical Geology students scoring significantly higher (p < .001) on their post-test deep time scores than their Principles of Biology II counterparts. This would imply that knowledge of evolution may not necessarily require prior knowledge of deep time.

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The knowledge integration framework is used to analyze studies on professional development in technology-enhanced science involving more than 2,350 teachers and 138,000 students. The question of how professional development enhances teachers’ support for students’ inquiry science learning is the focus of the work. A literature search using the keywords technology, professional development, and science identified 360 studies from the past 25 years, 43 of which included multiple data sources and reported results for teachers and/or students. Findings suggest that professional Secondary School Students' Attitudes towards their Learning of Geometry: A Survey. of Bindura Urban Secondary Schools. By.

Attitude is often considered in educational research since the development of a positive attitude is desirable because of its association with achievement (Nkwe, 1985). Ma and Kishor (1997) supports this by indicating that there is a general belief that children learn more effectively when they are interested in what they learn and that they will achieve better in Mathematics if they like Mathematics. Similarly, if students have positive attitude towards geometry they are expected to like geometry, participate in the classroom activities and to be high achievers in geometry (Bindak, 2004). This page lists the 100 most recently added references to the Threshold Concept Bibliography web pages. The most recent addition is at the top of the list, the previous most recent is next in the list and so on. Nolan, A. W. (2018) The Effect of an Historical Geology Course on Students' Attitudes Towards Science and Their Knowledge of Deep Time as a Threshold to Their Knowledge of Evolution, PhD Dissertation, Graduate School, The College of Science and Technology and the Center for Science and Mathematics Education, The University of Southern Mississippi, USA. 2018 https://aquila.usm.edu/cgi/viewcontent.cgi?article=2601&context=dissertations (last accessed: 25 August 2018) [Evolution, Geology, Biology, Theses and Dissertations].