

Chapter 19

An Interdisciplinary Exploration of the Climate Change Issue and Implications for Teaching STEM through Inquiry

Michael J. Urban

Bemidji State University, USA

Elaine Marker

Delaware State University, USA

David A. Falvo

Walden University, USA

EXECUTIVE SUMMARY

The importance of science, technology, engineering, and mathematics (STEM) disciplines, and teaching through an inquiry approach, are critical facets in education today. The purpose of this chapter is to share useful observations and recommendations about teaching STEM through inquiry for practicing teachers. Three cases are used to collect data about participant interactions with an interdisciplinary activity related to climate change, human population growth, and atmospheric pollution (e.g., greenhouse gases and smog). Fifty-five participants, most of whom were pre-service teachers, completed a technology-rich activity, post-test

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assessment, and survey about the experience. The findings discussed include research results, the perspectives of the facilitating instructor, and recommendations for teaching technology-laden investigations through an inquiry approach. In general, the challenges related to teaching with technology and time constraints were found to be significant limiting factors in the success of inquiry-based teaching in STEM.

INTRODUCTION

Inquiry-based instruction and the promotion of interest in science, technology, engineering, and mathematics (STEM) disciplines are at the forefront of education in America today. This is evidenced by the emphases in both the science and mathematics national standards. It is no longer sufficient to learn about STEM topics in schools, rather students are expected to utilize and implement the strategies and processes that practicing professionals use on a regular basis. Nowhere are the use of inquiry methodology and the introduction of the importance of STEM disciplines more important than in K-12 schools; it is here that students are most likely to be influenced by exposure to these issues. The necessity of proper training opportunities and experiences for pre- and in-service teachers to learn, develop, and practice relevant skills and models of higher order thinking should not be understated.

The purpose of this chapter is to relay the findings of case-study research that was designed to explore an interdisciplinary, inquiry-based approach to teaching undergraduate pre-service teachers about climate change, in order to share observations and speculations about teaching STEM disciplines within the context of an inquiry instructional model. The findings and teacher-perspectives are shared in order to consider the struggles and potential obstacles to inquiry-based teaching in a technology-rich scenario, and to propose recommendations for dealing with them. Below, we share three cases related to the application of technology to inquiry-based, interdisciplinary approaches to learning about STEM topics and the struggles that pre-service teachers (and their university instructors) experienced with managing them. The cases themselves explore interdisciplinary relationships among science, math, geography, and literacy, within the confines of a technology-centered lesson.

BACKGROUND

The National Science Teachers Association (NSTA) Board of Directors stated the following as part of their official position about scientific inquiry:

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