Chapter 4
A Socioscientific Issue Approach to Understanding Middle School Students' Beliefs and Intentions Toward Climate Change

Wardell A. Powell
https://orcid.org/0000-0002-3486-2077
Framingham State University, USA

ABSTRACT

This chapter is a demonstration of how to use socioscientific issues to impact middle school students' beliefs and intentions towards climate change. Fifty-one middle school students from a summer enrichment program in the Northeastern United States participated in this study. The duration of this curricular unit took place over six consecutive one-hour class periods. The researcher utilized quantitative and qualitative procedures to analyze the students' abilities to think critically and to argue persuasively about their beliefs and intentions about climate change. The results indicate that the students concluded that human actions are a significant factor in climate change. The students' intentions to act, as well as their desire to encourage others to take actions necessary to mitigate climate change, were compelling. Additionally, the knowledge the students gained from the interventions used enhanced their abilities to write persuasively to the chief executive officers from power plants and waste treatment facilities to a round table discussion on ways to mitigate climate change.

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INTRODUCTION

Finding solutions to societal problems, such as climate change, will require citizens to understand two fundamental principles. One, they must first believe that the climate is indeed changing, and two, they must have the intention to act upon the known causes of climate change. Scientific literacy is central to helping such citizenry first to believe, and then to adequately act upon climate change. In its quest to determine what is essential for citizens to know and be able to do, the Programme for International Student Assessment (PISA) assesses the extent to which 15-year-old students have acquired key knowledge and skills that are essential for full participation in modern societies (Organization for Economic Co-operation and Development (OECD), 2015). One would agree that the P-12 system cannot wait until students become 15 years of age before providing them with opportunities in the classroom settings to develop scientific literacy. To solve scientific problems of the 21st-century world and beyond will require students to be exposed to activities that are aimed at improving their scientific literacy from day one. Interestingly, the term scientific literacy has gone through several iterations in its definition since it was first introduced in the late 1950s (American Association for the Advancement of Science [AAAS], 1989; Bybee, 1997; Holbrook & Rannikmae, 1997; Hurd, 1958; Laugksch, 2000; National Science Education Standards [NSES], 1996; Organisation for Economic Cooperation and Development [OECD], 2003; 2006; 2007; 2009, & 2012). However, one thing that seems evident is that a scientifically literate population matters more and more as humanity faces significant fallout from challenges such as climate change (UNEP, 2012). For example, the recent climate science special report (USGCRP, 2017), states that global annual averaged temperature measured over both land and oceans has increased by about 1.8°F (1.0°C) from 1901 to 2016, and by 1.2°F (0.65°C) for the period 1986–2015 as compared to 1901–1960. The report further states that the last few years have also seen record-breaking, climate-related weather extremes. These events from global climate change will create problems for local communities, and as a result, individuals will be faced with decisions about actions to take to combat these problems. Such actions will require individuals to have particular scientific awareness (European Commission, 1995:28).

The concept of scientific literacy is critical in developing a populace with the ability to make informed decisions on scientific and technological issues. According to the recent PISA report, individuals who are scientifically literate must have a knowledge of the major concepts and ideas that form the foundation of scientific and technological thought; how such knowledge has been derived; and the degree to which such knowledge is proved by evidence or theoretical explanations (OECD, 2015). Expectedly, the challenges created by climate change will require innovative solutions that have a basis in scientific thinking and discovery (OECD, 2015). While

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