Chapter 5
Blending Creative Drama and Computer–Supported Collaborative Learning for Socioscientific Argumentation

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ABSTRACT

Argumentation has received a significant amount of attention from the science education community. To implement this important teaching method and scientific practice in science classrooms, curriculum reforms have recommended incorporating socioscientific issues. Research indicates that students have difficulty organizing information about complex socioscientific issues; students also tend to ignore counterclaims and only use evidence that supports their own views. Therefore, alternative teaching strategies should be used to overcome this barrier. This chapter advocates for blending creative drama and computer-supported collaborative learning in the context of socioscientific argumentation; it concludes with an instructional sequence for successful decision making about these issues.

INTRODUCTION

Argumentation, the process of justifying claims through evidence, has been receiving more attention than ever before—not only at the national level, but in the international science education community as well (Ministry of National Education, 2018; National Research Council, 2012). One of the core practices of science, argumentation has been highlighted in recent research because it promises to increase students' content knowledge, increase nature of science understandings, and improve motivation (e.g., Dawson & Venville, 2010; Eşkin & Ogan-Bekiroğlu, 2009; Uluçınar-Sağır & Kılıç, 2013; Zohar & Nemet, 2002).

Argumentation has been widely incorporated in science education in efforts to cultivate scientifically literate citizens. Scientifically literate citizens are expected to engage in evidence-based decision making about contemporary real-life issues (Hofstein, Eilks, & Bybee, 2011). These socioscientific issues, so-called because of their frequent ties to science and society, are dilemmas that society faces alongside advancements in science and technology (Sadler, 2004). The loosely structured assignments in SSI curriculum deal with issues that directly or indirectly affect the lives of students. Therefore, engaging students in evidence-based discussions and decision making about these issues is an important method for educating scientifically literate citizens (Lin & Mintzes, 2010).

When making decisions about socioscientific issues, students engage in informal reasoning processes; they weigh the advantages and disadvantages of these complex issues (Means & Voss, 1996). Unlike formal reasoning—in which premises are fixed and problems are solved through mathematics, logic, and the use of the available data alone—informal reasoning involves alterations to arguments as new evidence becomes available. Argumentation about socioscientific issues involves the verbal or written use of informal reasoning and could be used effectively to assess students' informal reasoning skills (Topçu, Yılmaz-Tüzün, & Sadler, 2011). Furthermore, researchers have indicated that argumentation makes students aware of the complexity of socioscientific issues (Chang-Rundgren & Rundgren, 2010) and helps them to develop informal reasoning skills and higher order thinking skills (Lindahl, Folkesson, & Zeidler, 2019). This occurs because in socioscientific argumentation, students engage in discursive practices such as evaluating evidence, assessing alternative perspectives, and addressing counterclaims (National Research Council, 2012).

In this research, we identified two major challenges that students encounter when engaging in socioscientific argumentation. First, research in science education indicates that students have difficulties using balanced reasoning because students tend to reason in biased ways—ignoring the counter-evidence and only using evidence that supports their own views (Sampson, Enderle, Grooms, & Witte, 2013). Research has also indicated that students tend to search for data that could potentially

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