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Authenticity and the relevance of discourse and figured worlds in secondary students' discussions of socioscientific issues

Daniel Åkerblom*, Mats Lindahl

Linnaeus University, Norra vägen 49, 39249 Kalmar, Sweden

HIGHLIGHTS

- Authenticity can bridge the gap between students' everyday- and school knowledge.
- Authenticity determines the relevance of figured worlds in students' discussions.
- Interacting with authentic stakeholders improves students' rational reasoning.

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ABSTRACT

The purpose of this paper is to examine how authenticity influences students' discussions of socioscientific issues (SSI). The students were found to bridge school knowledge and everyday knowledge, i.e. enter a "third space", in their explorative discussions. When the SSI task changed into a decision-making discussion for communication with an authentic stakeholder, the students excluded many perspectives. In the process, authenticity caused a loss of relevance for one discourse and several figured worlds, including the students' emotional reasoning. While losing emotional aspects, students' reasoning became more precise when grounded in rational reasoning, supporting well-informed decisions.

1. Introduction

An old problem that has persisted since the beginning of the last century (Dewey, 1916/1997, pp. 168–170) is that students do not consider education to be relevant to them or their lives (Keller, 1987; Sjoberg & Schreiner, 2010). Dewey's suggestion was to found educational goals on the individual's intrinsic needs for the purpose of developing reflective thinking (Dewey, 1938, pp. 27–28). Hence, he advocated that learning in schools, especially when conceived as social, could benefit when the focus is on allowing students to discuss and solve meaningful and authentic problems (Dewey, 1916/1997, pp. 161–163, 1938, pp. 31–35; Rule, 2006). In science education, introducing socioscientific issues (SSI) into the classroom has been suggested as a solution to the relevance problem (Driver, Newton, & Osborne, 2000; Sadler & Zeidler, 2009; Stuckey, Hofstein, Mamlok-Naaman, & Eilks, 2013; Tal, Kali, Magid, & Madhok, 2011). SSI often make use of authentic, societal problems (Sadler, 2004). However, there are problems with authentic tasks. For instance, the definition of an "authentic task" may not be the same for teachers and students (Nicaise, Gibney, & Crane, 2000). This is likely to have pedagogical implications, since authentic tasks cannot be expected to provide meaning to all students. The aim of the present study is to examine the meaning of authenticity in relation to students' discussions on societal problems. To exemplify the presentation of different dimensions of authenticity, the SSI debated by the students is how to deal with the inbred Swedish wolf population.

2. Theoretical background

The problem of students' viewpoints of education, and in particular science education, as lacking relevance to their lives is multifaceted, and the concept of relevance has been examined in various educational contexts and defined in several ways (see

* Corresponding author.
E-mail addresses: Daniel.akerblom@lnu.se (D. Åkerblom), Mats.lindahl@lnu.se (M. Lindahl).

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Feger, 2006; Gibson, 2012; Pagnotti & Russell, 2015; van Straaten, Wilschut, & Oostdam, 2016). Stuckey et al. (2013) reviewed the research on the relevance of science education for students and were able to formulate a model consisting of three dimensions: individual, societal and vocational relevance. Although emanating from a science education context, these dimensions do not necessarily have to be tied to a specific subject. The individual dimension describes the personal relevance of a topic to a particular student. Examples include personal interest, curiosity and good marks, but also acting responsibly and acquiring the necessary skills for one's future. The societal dimension refers to information that empowers students to participate as responsible citizens and promote their personal interests in societal contexts. The vocational dimension concerns the students' professional futures and careers.

Students' interest in science belongs to the individual dimension. Both students and teachers have been found to have a strong interest in science for society and for the future (Jidesjö, 2008). However, it was also found that teachers did not focus on this dimension in their teaching. Instead, students described science education as traditional, with the focus mainly on (scientific) school knowledge. This lack of connection between scientific knowledge and the students' personal lives, as well as societal practice, jeopardises the students' potential to find meaning and to experience educational goals as relevant (Eilks & Hofstein, 2014; Feierabend & Eilks, 2010). Hence, students' need their teachers' help to grasp the social context in which science education is relevant (Oscarsson, Jidesjö, Strömdahl, & Karlsson, 2009; Sjoberg & Schreiner, 2010). In order to make scientific learning more relevant for students, Hofstein, Eilks, and Bybee (2011) concluded that curricula, syllabuses and textbooks need to focus more on societal issues and less on school knowledge, such as disciplinary content knowledge and scientific processes. This adds to the idea proposed by Brown, Collins, and Duguid (1989) that by considering culture, activity and concepts, students' understanding of target knowledge could be promoted. Brown et al. (1989) also suggested that educational practices could borrow activities from contexts outside of school. For example, a medical context could be used when studying biology, i.e. including diseases and treatments, or a political context could be used when studying social science, such as the process of decision-making, which would include all members. In this way, learning can be seen as a process of enculturation into several different societal contexts.

2.1. Authenticity to bridge the gap

It has been suggested that the gap between school knowledge and everyday knowledge can be bridged with the aid of authentic tasks. In order to accomplish this, scientific language can be translated into real-world language and vice versa, thereby making scientific knowledge relevant and thus meaningful for students (Sharma & Anderson, 2007; Szybek, 2002; Young, 2008). When students are in a process of bridging the gap between school knowledge (second space) and everyday knowledge (first space), they enter a *"third space"*, a particular way of making disciplinary knowledge meaningful and communicating using disciplinary language (Moje et al., 2004; Wallace, 2004). In the third space, discourses may be interlaced. In order to reach the third space, students need to recognise different disciplinary discourses and negotiate them with their everyday discourse (Wallace, 2004). When students reach the third space, they are likely to experience their task as meaningful and relevant to them. Hence, an authentic task has the potential to provide relevance since the meaning of both everyday knowledge and school knowledge can be negotiated. According to Barab, Squire, and Dueber (2000), authenticity can occur in three different ways: 1) Simulation, i.e. the task is similar to one in the real world; 2) Participation, i.e. the learning task is embedded in an on-going activity within the ecological niche in which the real-world practitioner functions; 3) Co-evolutionary, i.e. authenticity occurs through meaningful relationships that can provide a sense of ownership by connecting the individual, the community, and the task. An authentic assignment provides students with the possibility to experience the task as relevant, as it concerns human actions in the real world; that is, it includes both the individual and societal dimensions (Stuckey et al., 2013). In addition, the bridging of everyday knowledge and school knowledge while entering the third space contributes to making the task meaningful for students. However, the task has to include both everyday knowledge and school knowledge in a manner that both are accepted for the production of new meaning. Tasks are perceived as authentic when they concern values and meanings that are familiar to the students (Wallace, 2004). It has therefore been suggested to use the local environment or environmental problems as a context to increase students' motivation to solve problems and to learn (Athman & Monroe, 2004; Powers, 2004; Semken & Freeman, 2008).

2.2. Difficulties with authenticity in the science classroom

Unfortunately, it cannot be expected that all students will experience every part of every assignment as authentic. For example, students may think that part or all of an assignment does not really represent the real world as they know it (Nicaise et al., 2000). Such an assignment might be regarded as a traditional school assignment, i.e. not relevant to the student. Hence, students may need help with identifying or understanding the authentic aspects of an assignment (Lundin & Lindahl, 2014; Petraglia, 1998), i.e. how an aspect can be understood as belonging to an everyday or a disciplinary discourse, in order to bridge the gap between discourses and enter the third space. Such help is important since it has been shown that students who perceived the learning environment as inauthentic were less successful than other students (Nicaise et al., 2000). The less successful students had problems understanding the learning goals of the task. Moreover, less successful students stated that they were not interested or lacked motivation in the field under study, meaning that they found it irrelevant to them. In addition, students are considered to be at risk of losing motivation if they do not experience any ownership of the authentic activity (Nicaise et al., 2000).

2.3. Making science authentic through SSI

The use of SSI is one method for developing authentic science lessons (Sadler & Zeidler, 2009; Tal et al., 2011), because they are authentic, real-world problems and controversial issues. The scientific content of these issues might pique the students' interest, making the problem relevant to them (Tal et al., 2011; Zeidler, Sadler, Simmons, & Howes, 2005). Thus, a controversial SSI gives students a chance to develop skills associated with critical thinking, argumentation, reasoning (rational and informal) and character development, along with several other skills associated with education for citizenship (Eggert, Ostermeyer, Hasselborn, & Bögeholz, 2013; Sadler & Zeidler, 2005, 2008). Other benefits of engagement with SSI are: understanding arguments and the different perspectives that impact decision-making; gaining knowledge of relevant scientific content; the ability to recognise personal as well as social values; and the ability to evaluate evidence from different perspectives (Driver et al., 2000; Mörk, 2005). Therefore, authentic SSI are valuable for education in science and scientific literacy (Laugksch, 2000). In addition, the use of local problems can make students feel that they have a personal stake in the debates and