SOSYOBİLİMSEL KONULAR
ve ÖĞRETİMI

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On the first day of class in my first science teaching methods course as a pre-service teacher, I remember responding to a series of questions about the purposes of science teaching and my motivation for becoming a science teacher. I recall writing something about science education as a vehicle for preparing students to critically examine the world and to become engaged citizens capable of making informed decisions. I wanted to help students use science to become critical thinkers and well-reasoned decision makers. As someone who had studied biology with interests in ecology and environmental causes, I was interested in influencing students in terms of environmentally responsible behaviors and decisions. A few months prior to me seeing these questions, in the midst of making the decision as to whether I should build a career as a research scientist or a science teacher, I witnessed a disturbing case of racism. As a young person in the racial majority group in a country (the United States) where race was a divisive issue, I knew that racism existed, but I had never experienced it so personally. This episode provided one more reason for me to gravitate toward teaching because I saw science education as a vehicle for helping the next generation to challenge the status quo and ultimately make the world better.

Many years later, after working as a middle and high school science teacher, I now teach science education courses for future and practicing teachers. At some point in these classes, I usually ask my students questions similar to the one with which I was confronted on my first day as a preservice teacher: Why do you want to be a science teacher? What do you hope to accomplish through your teaching? What should the purpose(s) of science education be? I often hear responses similar to the ones I gave. Most of the teachers (or future teachers) with whom I work are interested in helping their students to become better critical thinkers, better decision-makers, better prepared to engage in scientific reasoning, better citizens, and so on. As scholars we may quibble about what exactly constitutes critical thinking, scientific reasoning and citizenship (and these are important scholarly conversations). However, at a more general level there is a fairly remarkable degree of consensus around idealized goals for science education related to helping learners become better, more informed, more rational individuals capable of contributing productively to society. In a review of several decades of research on the goals of science teaching and learning, Roberts (2007) refers to this goal as vision II scientific literacy. The problem, as I see it, is how and when science educators go about accomplishing these ends.
Most science educators agree at some level about the promoting vision II scientific literacy as at least one important aim of science teaching; however, there seems to be considerable disagreement in terms of how to achieve this aim. Much of the field takes the view that learning science content is the best vehicle for students to develop the kinds of competencies that make them suited for dealing with science related issues in their lives. This position is not always stated explicitly, but it is an assumption that is frequently reified. For example, the Next Generation Science Standards, which have been recently developed in the US and are shaping much of the field’s discussions about research and classroom practices, begin with the following lines:

Never before has our world been so complex and science knowledge so critical to making sense of it all. When comprehending current events, choosing and using technology, or making informed decision about one’s healthcare, science understanding is key. (NGSS Lead States, 2013, p. 1)

The NGSS document goes on to present core ideas from across science disciplines, scientific practices, and cross-cutting science concepts that students should learn. Despite emphasis in the introduction about student use of science to negotiate their lived experiences, the NGSS does not return to a serious conversation about ways in which students learn to comprehend current events or make informed decisions regarding difficult issues (with the possible exception of climate change which is addressed in the standards). The assumption is that student understanding of scientific knowledge and practices is enough. However, there is no empirical evidence to support this assumption. In fact, psychological research on transfer and from the learning sciences offers evidence to seriously challenge the likelihood that learning science content alone (and in isolation of the contexts in which it could be applied) will have much of an impact on the ways in which students address science related issues in their lives (e.g., Greeno, Moore, & Smith, 1993; Haskell, 2001). Furthermore, science education research, which specifically addresses student negotiation of complex science issues, suggests that students relate to and conceptualize these issues through a variety of frameworks, most of which are not primarily defined by science (Sadler & Zeidler, 2005; Zeidler, Walker, Ackett, & Simmons, 2002). The point here is NOT that science should have no place in student negotiation of issues; but rather, science tends not to be the primary lens through which students understand and seek solutions for complex issues. Therefore, approaching science education with science content learning as the primary focus will not likely lead to the promotion of vision II scientific literacy.

The position that I have outlined here provides a rationale for the socio-scientific issue (SSI) movement in science education. SSIs are complex, social issues with conceptual, procedural and/or theoretical connections to science. The SSI movement advocates for the use of these issues as contexts for science teaching
and learning. SSI supporters and researchers argue that in order for students to develop vision II scientific literacy that they must have opportunities to confront complex issues and negotiate the ways in which scientific ideas and practices can help to address these issues as well as the limitations science has in terms of addressing these issues (Sadler, 2009). Over the last decade, extensive research has been conducted on how students negotiate SSI, how teachers think about SSI, and how SSI can be used in curricula and classrooms (reviewed in Zeidler, 2014).

As a community, we have learned a lot about SSI from an educational perspective but many questions also remain. Some of the most important areas of inquiry yet to be adequately explored include

- ways in which preservice and inservice teachers can develop expertise in teaching through SSI,
- how SSI can be systematically incorporated in curricula,
- development of new assessment tools that more accurately evaluate development of vision II scientific literacy, and
- productive approaches for integrating SSI in science classes.

All of these issues sit at the intersection of research, theory, and practice. In my opinion, the most promising lines of work in the area of SSI based education require collaborations among researchers, practitioners (including classroom teachers and teacher educators), and curriculum developers. These kinds of collaborations may yield very fruitful results for theory and practice, but they are also notoriously difficult to establish and sustain. One tool that may be quite helpful in facilitating these collaborations is a framework for generating shared understandings and language use around what SSIs are and how they can be used.

This book builds from the emerging research base and recent work toward the establishment of an empirically grounded, theoretically sound, and pragmatically relevant framework for SSI based education. I will leave it to this volume's main narrative to detail the framework and to provide details regarding this particular take on SSI. I see this work as critical to advancing the field of science education and our ability to promote the kinds of learning outcomes that have motivated so many of us to join the profession in the first place. I still believe, as I did on my first day as a preservice teacher, that science education has the potential to impact learners in ways that can make the world a better place; and I think that SSI-based education has an important place in achieving this lofty goal.
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