A Review of Rola Khishfe's (2025) *The Complexities of Socioscientific Issues in Education: Research-Based Insights and Practical Strategies*

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Rola Khishfe's (2025) *The Complexities of Socioscientific Issues in Education: Research-Based Insights and Practical Strategies* addresses an increasingly significant challenge in science education: how educators might prepare students to critically engage in scientific questioning embedded in their everyday experiences. Socioscientific issues (SSI), including climate change, vaccination, biodiversity loss, reproductive technologies, energy production, and food systems, are characterized by uncertainty and intersections among scientific evidence, ethics, politics, economics, culture, and competing social values. Khishfe (2025) positions SSI as an important context for developing scientific literacy, nature of science (NOS) understandings, argumentation, critical thinking, and informed decision-making.

The book's most immediate contribution across its eight chapters is practical. Chapter 1 establishes relationships among SSI, argumentation, and NOS; Chapter 2 explains the purpose and methodology used to construct the SSI materials; Chapters 3-6 present organized SSI cases within biology, physics, environmental science, and chemistry; Chapter 7 addresses interdisciplinary ethical and societal challenges; and Chapter 8 presents implications and recommendations. These chapters give teachers accessible starting points for classroom discussion without requiring them to develop complex SSI resources independently. The central question that weaves through this review is: How does SSI education position knowers and knowledge? Khishfe's (2025) interpretation of NOS in Chapter 1 provides a foundation for this question, describing scientific knowledge as "subjective, taking into account the scientist's background and experience" and "socially and culturally embedded" (p. 3). Reading through this lens, the book's geographical grounding in Lebanon and disciplinary organization can be understood as strengths that make SSI concrete and approachable for educators. However, the recurring use of professors as experts and the more limited engagement with local and Indigenous knowledges introduce a tension within epistemological framing. Although scientific knowledge is presented as socially and culturally embedded, the scenarios can still position epistemic authority primarily within academic institutions. For SSI pedagogy, this raises the question of how students learn not only to evaluate competing claims but also to examine how credibility is assigned to different knowers. This review argues that meaningful SSI education involves more than introducing social controversies to science content; it also creates opportunities for students to examine how knowledge claims and knowers acquire credibility.

This aspect first emerges through the book's international orientation. Khishfe (2025) constructively moves beyond the geographical dominance of North American and European contexts that characterize English-language educational resources. Chapter 5, Environmental Science, explicitly uses Lebanon, an Arabic-speaking and multilingual Middle Eastern context, as a case study and includes SSI of overfishing, water shortages, desalination, pollution, waste management, deforestation, climate change, and urbanization. This specificity is a strength because SSI are simultaneously global and local in that their consequences and possibilities are profoundly shaped by place. Likewise, Khishfe argues that "SSI integration should prioritize cultural and global relevance, with scientific themes contextualized within local and international contexts" (p. 169). Situating Chapter 5 in Lebanon, therefore, adds a regional perspective to the SSI knowledge base and demonstrates how globally shared environmental concerns acquire particular social and material meanings in place. Precisely because the book values

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contextualization, however, the prominence of Lebanon raises questions about positionality. Khishfe's affiliation with the American University of Beirut gives these examples a situated context, yet this relationship receives little explicit reflection. A positionality statement of the author could strengthen the text by identifying both the lived experiences and educational contexts informing scenario selection. With this perspective, positionality becomes epistemological rather than merely autobiographical because identifying one's relationship to knowledge production makes visible the relations among perspective, authority, power, and whose scholarship is authorized to shape dominant narratives of NOS (Stroupe et al., 2025).

A similar tension in meaningful SSI integration appears in the book's disciplinary organization. Separate chapters for biology, physics, environmental science, and chemistry make the text conveniently approachable for teachers as they can quickly locate materials relevant to their curricular areas. At the same time, many SSI are compelling because they destabilize disciplinary boundaries. For instance, nuclear energy cannot be adequately understood as simply physics, electric vehicles as chemistry, fish farming as biology, or water shortages as environmental science. Each of these SSI involves scientific, technological, environmental, economic, political, ethical, historical, and cultural considerations. Khishfe (2025) writes that socioscientific questions "demand students to weigh scientific processes against ethical, political, and social factors" (p. 169). This highlights that navigating SSI through a social justice lens requires attention both to how knowledge is warranted and to the social settings through which it is produced and used, reinforcing the need to hold epistemic and social dimensions together rather than separate by disciplinary categories (Dagher, 2020). However, the book's organization presents a practical challenge when considering how to teach SSI within existing school subjects while still making their cross-disciplinary character visible. Chapter 7 explicitly recognizes this interdisciplinarity of SSI, but it might have operated more powerfully as a principle threaded throughout the subject-specific chapters rather than primarily as a separate category.

Khishfe's (2025) treatment of argumentation is one of the book's strongest pedagogical features. The SSI scenarios generally resist directing students toward predetermined conclusions and instead ask them to construct claims, assess evidence, consider counter arguments, and defend decisions. This supports a richer conception of scientific literacy as more than knowing scientific facts. As Khishfe explains, an epistemological shift can enable students to see "scientific knowledge as a social endeavor that is subject to criticism and debate, challenging inflexible and absolute viewpoints" (p. 4). Argumentation is therefore central to the book's conception of scientific literacy. However, a concern that emerges is not that questions of credibility and expertise fall outside argumentation, nor that Khishfe (2025) neglects the social dimensions of scientific knowledge. Rather, the SSI scenarios in the book tend to foreground argumentation among positions and evidence already supplied to students, whereas citizens encountering science outside the classroom must also determine which sources, institutions, and experts warrant trust, how claims have reached them, and how the evidence has been selected and framed (Allchin & Zemplén, 2020; Sharon & Baram-Tsabari, 2020). Khishfe reports that the scenario-development process used multiple search engines, including Google Scholar and Shamaa "to reduce bias in the selection of studies" (p. 10) and that six science teachers reviewed the scenarios for content validity, language, and clarity. These procedures acknowledge the importance of SSI selection and validation of knowledge base, but they do not make the framing of the scenarios itself an object of epistemic inquiry for students. The scenarios determine which questions are asked, which evidence is available, which perspectives appear, and which actors are presented as credible. Extending Khishfe's emphasis on the social and epistemic dimensions

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of science, NOS education could therefore invite students to examine how scientific claims are selected, framed, and mediated as they circulate through society (Höttecke & Allchin, 2020). Students might then ask not only which argument is stronger, but why particular voices, evidence, and categories were included in the first place.

This concern about who is positioned as credible becomes especially visible in Khishfe's (2025) recurring use of Professor Ponso as an imagined expert across multiple chapters. In the genetically modified rice scenario, for example, students are asked, "As a scientist, do you think the Golden Rice should be produced and marketed?" and then told, "Another scientist, Professor Ponso, disagrees with your decision" (p. 154). The first prompt is pedagogically productive in that it positions learners as knowers who must inhabit scientific reasoning rather than merely receive it. The second, however, exemplifies a repeated pattern in which credible authority returns to the professor. This risks communicating an unintended epistemological lesson that expertise is located primarily in universities, even though the problem under consideration involves communities and forms of knowledge extending beyond academic science.

Farmers, fishers, healthcare workers, technicians, engineers, environmental organizations, community advocates, policymakers, and people whose lives are directly shaped by technologies or ecosystems may possess forms of expertise inaccessible to academic scientists. The book itself creates an opening for this broader conception of knowledge holders when it observes that SSI can allow students to "base their arguments on real life experiences, actively participating in social conversations about concerns and difficulties that are personal and relevant to their lives" (Khishfe, 2025, p. 5). If lived experiences of students can function as epistemic resources, the accumulated experiential knowledge of communities deserves similar consideration.

Research on local ecological knowledge illustrates why this acknowledgement of communal knowledge matters. Davis and Wagner (2003) recommend carefully identifying who qualifies as a knowledgeable local expert rather than treating either scientists or community as homogeneous categories. Oliver et al. (2012) demonstrate how farmers' knowledge can operate as expert data grounded in sustained observation and everyday land-management practice, extending what formal scientific investigations can provide. Ulicsni et al. (2019) similarly show the value of bringing conservation science into dialogue with traditional ecological knowledge and including local knowledge holders in that process. Taken together, these works suggest that local expertise should neither be romanticized or treated as automatically authoritative, nor relegated to anecdote simply because it is produced outside research institutions (Davis & Wagner, 2003; Oliver et al., 2012; Ulicsni et al., 2019).

With this contextualized understanding of communal knowledge, science educators could invite students to compare these epistemic resources by asking: What does a laboratory scientist know? What does a person who has observed an ecosystem across decades know? Through what practices was each form of knowledge produced? Where do they corroborate one another and where might they differ? This is epistemological pluralism without relativism, where relativism would mean treating competing knowledge claims as equally valid simply because they arise from different perspectives (Baghramian & Carter, 2025). On the other hand, epistemological pluralism neither abandons standards of evidence nor treats scientific, Indigenous, and local knowledge systems as interchangeable. Instead, it asks students to recognize that complex decisions may depend on multiple situated forms of knowledge and that judgments about expertise themselves require scrutiny. Broadening the range of knowers represented in SSI scenarios could, therefore, foster epistemic agency by teaching students to investigate how

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authority is constituted rather than simply receiving established hierarchies of credibility (Stroupe et al., 2025).

The comparatively brief final chapter, "Implications and Recommendations," offers useful recommendations concerning professional development, inclusive materials, curricular integration, and further research. The preceding chapters and their highlighted SSI cases, however, also generate questions about competing epistemologies, expertise, disciplinary boundaries, and teachers' responsibility for making the framing of social controversies visible. The SSI scenarios themselves repeatedly foreground uncertainty, asking students questions such as, "How certain are scientists about the knowledge related to genetically modified food?" (Khishfe, 2025, p. 155) and whether that knowledge might change in the future. This is an important strength because, as stated earlier, science is presented as dynamic rather than as a body of settled facts. Building on that strength, the final chapter could have connected uncertainty about knowledge more explicitly to questions about authority such as whose knowledge enters the discussion in the first place, and how students should evaluate different claims to expertise.

Overall, Khishfe's (2025) book makes a valuable contribution to science education. Its accessibility, geographical breadth, extensive scenarios, and emphasis on argumentation provide concrete resources for bringing consequential contemporary questions into science classrooms. If SSI education is intended to prepare learners for scientific citizenship, students must learn not only to evaluate arguments but also to interrogate disciplinary boundaries, identify appropriate expertise, recognize situated knowledge, and consider how power influences whose knowledge is heard. It offers a substantial foundation for SSI education and an invitation to push SSI pedagogy further, from considering science within social controversy toward a pluralistic examination of knowledge, power, place, and expertise. The book will be particularly useful for science teachers, teacher educators, and researchers seeking accessible, research-informed examples for integrating SSI into science education. Readers may find the SSI scenarios especially productive when used not only as resources for argumentation and decision-making, but also as starting points for examining whose knowledge is represented, how expertise is established, and which perspectives might be brought into the discussion.

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