

Review of Science Education for Everyday Life: Evidence-Based Practice, by Glen S. Aikenhead.
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Article:

What is the purpose of science education? What counts as legitimate science education? In the beginning of his book, *Science Education for Everyday Life: Evidence-Based Practice*, Glen Aikenhead hits readers with these critical philosophical questions, compelling science educators to rethink taken-for-granted school science practices and to understand the historical and philosophical foundations of traditional science education. Aikenhead argues that traditional science education is dominated by a “pipeline ideology” that governs school science’s purpose to provide students with adequate preparation (acquisition of skills and knowledge) to progress to the next level of science courses and, ultimately, to direct the most capable students into science and engineering careers.

Although the pipeline ideology has dominated school science curriculum since its nineteenth-century inception, Aikenhead argues that alternative rationales and approaches, less *politically* powerful, but more *educationally* sound, have had equally long histories. Aikenhead juxtaposes pipeline science education with humanistic science education, an “alternative everyday-life approach that animates students’ self-identities, their future contributions to society as citizens, and their interest in making personal utilitarian meaning of scientific and technological knowledge” (p. 2). In today’s political climate that emphasizes the importance of science for economic productivity and competitiveness and science education for the sake of ensuring the supply of future scientists, Aikenhead presents readers with a multifaceted argument for a fundamentally different kind of science education based on humanistic approaches. Humanistic approaches vary, but some of the major characteristics include one or more of the following: (1) an emphasis on social responsibility; (2) a challenge to purely positivistic and realist accounts of Western science; (3) an integration of humanistic and traditional canonical science content; (4) an integration of Western science with citizen, frontier, and/or indigenous sciences; (5) the integration of scientific disciplines with one another and with other school subjects; (6) instructing/assessing students in out-of-school contexts; and (7) schooling as an agent of equity and social justice. Science educators will recognize humanistic perspectives in the following science curriculum movements: science–technology–society, science for public understanding, citizen science, and cross-cultural science among others.

Aikenhead makes his argument for humanistic approaches to school science based on evidence available from the research literature. Unlike previous work on humanistic school science that might be “thoughtful apologies for *what ought to happen* in science classrooms,” this book “focuses on the *results of research*” and generates “evidence-based findings rather than philosophical rationales” (p. 2; emphasis in original).

Anyone familiar with Aikenhead’s work will not be surprised to see his conscientious attention to making explicit the multiple discourses, contexts, and ideologies at work in science-learning settings. He is careful to present research from what he terms different paradigmatic (historical, quantitative, interpretive, critical-theoretic, and Aboriginal), disciplinary (psychological, sociological, anthropological), and methodological (quantitative and qualitative) traditions. Furthermore, Aikenhead dedicates a roughly equal amount of his argument to research that examines humanistic approaches to school science (grades 6–12) in various critical

contexts (historical, curriculum policy, classroom, cultural) and with various key actors (teachers and students) that affect their successful or unsuccessful enactment.

After a succinct introduction, Aikenhead presents a brief, but effective, history of humanistic perspectives in school science. He traces the development of Western science and indigenous sciences, explains the history of the formal science curriculum, and provides an overview of humanistic science curriculum movements. This chapter effectively highlights the school science curriculum as a social and cultural construction. That is, though pipeline ideologies dominate the formal science curriculum, it does not *have* to be this way. Aikenhead persuades the reader that today's science curriculum is contested territory. Now might be just the time for humanistic school science to challenge traditional school science—to work against the enduring grooves of status and power worn by 150 years of pipeline school science.

Aikenhead's argument for the timeliness of a humanistic science education is taken up in chapter 3, where he examines research concerning curriculum policy. This chapter begins by summarizing evidence for the primary shortcomings of traditional science curriculum. A major point is that students' difficulty in learning traditional school science is based, in part, on the curriculum's lack of relevance for everyday life. Aikenhead presents various instructive heuristic categories of "relevance" that force readers to consider the political motivations and underlying assumptions of defining relevance in various ways. For example, in "wish-they-knew-science," academic scientists and many science educators define the knowledge of most worth to science, which emphasizes canonical science content. In contrast, "science-as-culture" emphasizes the relevance of science to students' community culture, e.g., their health systems, the media, and local and global economic industries. A curriculum policy based on the "science-as-culture" heuristic would draw on the scientific understanding most critical to advancing understanding of their communities. In this chapter, Aikenhead poses a pithy question regarding cultural relevance:

[T]he most fundamental question for cultural relevance is not so much "Relevance to whom?" "Relevance to what?" or "Who decides?" but rather "Relevant to which enculturation process?"—enculturation into students' local, national, and global communities (one facet of a humanistic perspective in school science advanced by this book), or enculturation into a scientific discipline (the pipeline's status quo). (p. 47)

In juxtaposing these ideological choices again and again throughout the book, Aikenhead effectively makes explicit, and unsatisfactory, our existing approaches to and underlying assumptions about the purposes of science education. In chapter 3 specifically, he leaves us with research that explores effective processes for formulating curriculum policy, focusing on the process of deliberative inquiry, a "structured and informed dialogic conversation among stakeholders who, face to face, help government officials reach a decision on curriculum policy by discussing and reexamining their own priorities (i.e., values) along with their reading of relevant research" (p. 51). In doing so, he leaves science educators with a recommended course of action. However, Aikenhead is not naive about the challenges that an overhaul of the pipeline curriculum implies.

In chapters 4–6, Aikenhead outlines three major areas of research that will affect the successful enactment of deliberative inquiry in the service of a humanistic science curriculum policy: research on classroom materials, teacher orientation, and student learning. Throughout these chapters, Aikenhead provides research-based literature from around the globe that informs the benefits and challenges of humanistic approaches to school science, practical suggestions about enacting humanistic school science, existing gaps in the literature, and recommendations for future research topics and methodological and theoretical approaches.

Aikenhead sees the emerging field of culture studies in science education as fertile ground for research about humanistic approaches to school science. While "the dominant pipeline ideology seeks to enculturate all students into scientific disciplines by means of transmitting the culture of science to them..., [h]umanistic school science provides alternative cultural transmissions to students" (p. 107), Aikenhead argues that most students "experience school science as a cross-cultural event" (p. 109). Chapter 7 synthesizes research that provides

robust, useful information for hopeful humanistic science educators, such as guidelines for respecting students' cultures, differences between goals of indigenous sciences and Western science, and practical issues related to cross-cultural teaching.

I found this book compelling and provocative. I am hopeful about its potential to spark critical dialogue about the future of science education. The book covers an immense amount of territory and perspectives, in surprisingly few pages, which facilitates the book's accessibility for broad audiences. Aikenhead's writing style is evenhanded and clear. He avoids language and frameworks that would alienate potential critics. Throughout the book, one gets a sense of Aikenhead's quiet urgency about and passion for humanistic science education. And his insistence on making evidence-based arguments for humanistic approaches, rather than championing the humanistic perspective from purely philosophical positions, strengthens his argument.

However, Aikenhead is aware of the book's potential to spark controversy. Indeed, a central message in the book, which I applaud vigorously, is to encourage science education researchers to pay closer attention to the various contexts, and especially the political context, of reform: "The most effective research will explore *the interaction of political power with research, policy, and practice*" (p. 129, emphasis in original). Science educators cannot continue to do their research in a historical, social, cultural, and political vacuum. Aikenhead makes a strong argument for why this is the case and forces our attention on various contextual influences.

I recommend this book to those who never thought to question the purpose of science education or the reasons why, in 150 years, our science education curriculum has continued to serve the status quo so well. And, I recommend the book to those who constantly question the purpose of science education, those who have made it their job to do so. The book will inform both audiences, sparking questions where there may have been none before and providing concrete direction for those who have been asking these questions for a long time. The book provides a convincing account of the *educational credibility* of humanistic school science. Aikenhead's point is that we now need to focus on upping the *political credibility* of humanistic school science.