

Book Review

Science, Learning, Identity: Sociocultural and Cultural-Historical Perspectives.

Wolff-Michael Roth and Kenneth Tobin (Eds.).

Rotterdam, The Netherlands: Sense Publishers, 2007, 353 pages.

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To understand learning in science, we need to know much more than whether students have learned the proper explanation for how plants make their food or why there are seasons. We need to know how students are engaging in science and how this is related to who they think they are ... and who they want to be. (Brickhouse, Lowery, & Schultz, 2000)

For the past decade science educators have been responding to this call to pay greater attention to who students are, who they want to be, and who they can be through and in science. The aim of Roth and Tobin's edited book is to introduce the major ways that science educators have begun to conceptualize and study identity and science learning. It is a collection that brings together contributions from diverse scholars and provides space for them to engage dialogically with each other's contributions.

The stated purposes of the book are to "introduce science educators to the various dimensions of identity in science," "develop a new form of scholarship that is based on the dialogic nature of science as process and product," and to "achieve the two previous objectives in a readable but scholarly way" (p. vii). The first of these three comes through strongly in the selection of authors and chapters. A broad range of approaches are present, and identity is conceptualized in several contradictory and complementary ways. The second is, however, less apparent and also more difficult to achieve. Theories of identity have been making increasing contributions to our understanding of science learning for more than a decade, and those who have made these contributions are largely represented here. Their work has defined this new area of scholarship, and although the book does an excellent job of highlighting their contributions and extending the discussion, it is not a new form of scholarship in and of itself. Finally, the achievement of the readability goal varies greatly with the authors. Several chapters require an in-depth understanding of theoretical perspectives on identity and are written in dense philosophical language. This is the primary weakness of the book and holds it back from being a truly accessible introduction to the concept of identity.

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The major strength of the book is in its inclusion of a broad range of perspectives and approaches to identity. It is structured in four broad sections representing key aspects of identity research: Identity in Urban Science, Gendered Identities, Identity as Dialectic, and Discursive Constructions of Identity. Each section contains two to three chapters, some devoted to theoretical explorations of what the word *identity* should be taken to mean, some introducing and modeling analytic approaches, and others providing illustrative examples of learners' identities-in-practice. Each section concludes with a discussion chapter by the section authors and the editors. These are written as dialog scripts where the editors begin the discussion by asking questions of the group or individual authors. It continues in a conversational form with authors challenging each other's definitions and findings and looking for how their works complement and extend each other.

Given the diversity of authors and the dialogic approach, the unifying theme is sociocultural and cultural-historical approaches to identity: all the articles to some degree address not just individuals, but individuals-in-the-world. This approach encourages attending not only to the agency that individuals have in constructing identity, but also to the cultural constraints and resources of the environments and communities in which they are immersed. The authors return consistently to the dialectic relationship of agency and structure (or agency and passivity) in the formation and development of identity. "To contravene a reductionist approach, which places questions such as those at the core of this book into the heads of individuals, the contributors frame the issue of identity in terms of sociocultural and cultural-historical theories" (p. vii). Activity theory is at the foundation of many of the contributions and is central to most of the discussions between the authors.

There is, however, no central thesis or single approach to identity. Consistent with their goal of introducing the variety of ways that identity is studied and conceptualized, the authors draw on several key schools of thought and approaches to analysis (e.g., auto/ethnography, discursive positioning, and activity theory). Much of the book's strength lies in the efforts of the authors to define their approaches to and understandings of identity. Most provide clear and insightful descriptions of how they use identity-related words such as *culture*, *positioning*, *subjectivity*, *self*, *agency*, and *structure*.

For example, in Chapter 3, "Learning and Becoming Across Time and Space," Jrene Rahm focuses on three students' use of language to position themselves in science over several years and through their participation at various times in two community-based science programs. Her central argument is that learning and identity cannot be well understood over short time-scales and in isolated school-only episodes. Through highlighting changes, consistencies, and contradictions in each of the three cases, she strives "to convince the reader that learning and identity have to be studied as a complex system which means the study of its development within 'spaces' beyond schools and in terms of broader content areas than solely the academics" (p. 79).

In Chapter 10, "Identity in Activities: Young Children and Science," Maria Varelas and her co-authors focus their attention on four science-related activities: a classroom read-aloud, a hands-on sorting activity, whole-class mural

making, and two dyadic conversations between a researcher and a student. Their central theme is the dialectic interplay between students' identities and the activities. Through narrative descriptions of students' actions and illustrative excerpts from transcripts, they aim to illustrate: (a) the role that the activities played in shaping the identities of the students while they engaged in the activities, and (b) how the identities of the students interacted to create and recreate the activities. They borrow from Bakhtin (1981) the analogy of forces acting (or appearing to act) centripetally and centrifugally:

Identity plays a centripetal role within the activity structure ... An individual's self-hood brought together the elements of an activity in a particular manner ... On the other hand, the multiple participants' identities were pulling the activity in multiple directions, and multiple endpoints. In this way, identity was playing a centrifugal role in the activity structure. (p. 240)

In addition, how the authors use identity and related constructs is highlighted and further refined in the discussion chapters that follow each section. For example, in Chapter 11 (discussion chapter for the section Activity, Agency and Passivity), Roth probes Maria Varelas to connect her understanding of identity to the dialectic of agency and structure. These questions lead Varelas to respond with an insightful interpretation of her study in the framework of activities as conceived of by Marx and later, cultural-historical activity theorists. This level of detailed interpretation is not always possible in single chapters, and the discussion chapters (and Roth's probing) provide an important avenue for it. These discussions are valuable in illustrating the convergences and divergences of the authors' positions and arguments. This contributes to the book's success in introducing the audience to the expanse of approaches that address identity.

The weakness of the book, however, is in the sometimes uneven nature of the chapters. For example, how far each of the chapters is convincing in its argument(s) varies greatly. Chapter 10, for example, does not necessarily provide overwhelming depth or breadth of analysis, but it convincingly uses the cases to challenge the reader to think more broadly about the situational and temporal dimensions of identity. In comparison, Chapter 8, written by Roth and entitled "Identity in Scientific Literacy: Emotional-Volitional and Ethico-Moral Dimensions" comprises a theoretical argument for the importance of attending to the emotional-volitional domain and provides examples of student identity and involvement in community-based environmental science research. The difficulty is that the analytical link between the two is not made clear, and yet broad and strong conclusions are made at the end of the chapter such as, "The upshot of this is that few students develop science-related dimension of identity unless they participate in forms of activity that embody emotional-volitional and ethico-moral dimensions" (p. 182). The chapter makes clear that there are emotional-volitional and ethico-moral dimensions to the research that students conduct and that identity is involved in their actions and experiences. Not clear is the evidence for the dependent relationship stated in the closing of the chapter.

Similarly, other chapters are problematic because of insufficient examples or enough data to warrant the strength of the claims made. For example,

Chapter 2 by Stacy Olitsky and Chapter 13 by Bryan Brown and Gregory Kelly are interesting and offer promising ways of approaching identity, but would be more convincing describing as prototype analyses used to illustrate this potential rather than as full analyses warranting strong conclusions about the participants' identities and identity development.

Also, as mentioned above, the writing style and readability vary from chapter to chapter. For example, Chapter 13 by Brown and Kelly and Chapter 14 by Nancy Brickhouse and Pamela Lottero-Perdue are both readable and engaging. Their prose is clear and accessible, and their arguments are presented logically. Other chapters, for example, Chapters 8 and 9 by Roth and Hwang and Roth are dense with philosophical conceptualizations and theorizing. The reader must pay close attention to subtle differentiations in terms and usage and must actively work to draw connections in the continual multiplication of conceptualizations and dialectics. These chapters were at once stimulating and frustrating.

This also narrows the audience for the book. It is clearly intended for science educators with an understanding of the broad field of science education and key areas such as scientific literacy and science for all. But the challenging nature of these chapters seems aimed at those not only engaged in science education, but already familiar with identity research and wishing to develop their theoretical understandings. These chapters in particular could be intimidating and frustrating for students or other scholars looking for general introduction to the idea of identity studies in science.

As a whole, however, the book succeeds in providing an engaging overview of the breadth of work that can be described as addressing identity and science. It showcases how the concept of identity is being used as a framework and analytic lens in science education. In presenting widely varying approaches and engaging the authors in discussions with each other, it does an excellent job of mapping the territory of identity research and pushing it further. The authors do not shy away from stating their opinions explicitly or disagreeing with each other. The important overall message is that there is no single way to conceptualize identity, to gain access to its meaning, or use it as an interpretive lens. Instead, all these approaches make a varied landscape that can be captured under the term *identity*.

Reference

- Brickhouse, N.W., Lowery, P., & Schultz, K. (2000). What kind of girl does science? The construction of school science identities. *Journal of Research in Science Teaching*, 37, 441-458.