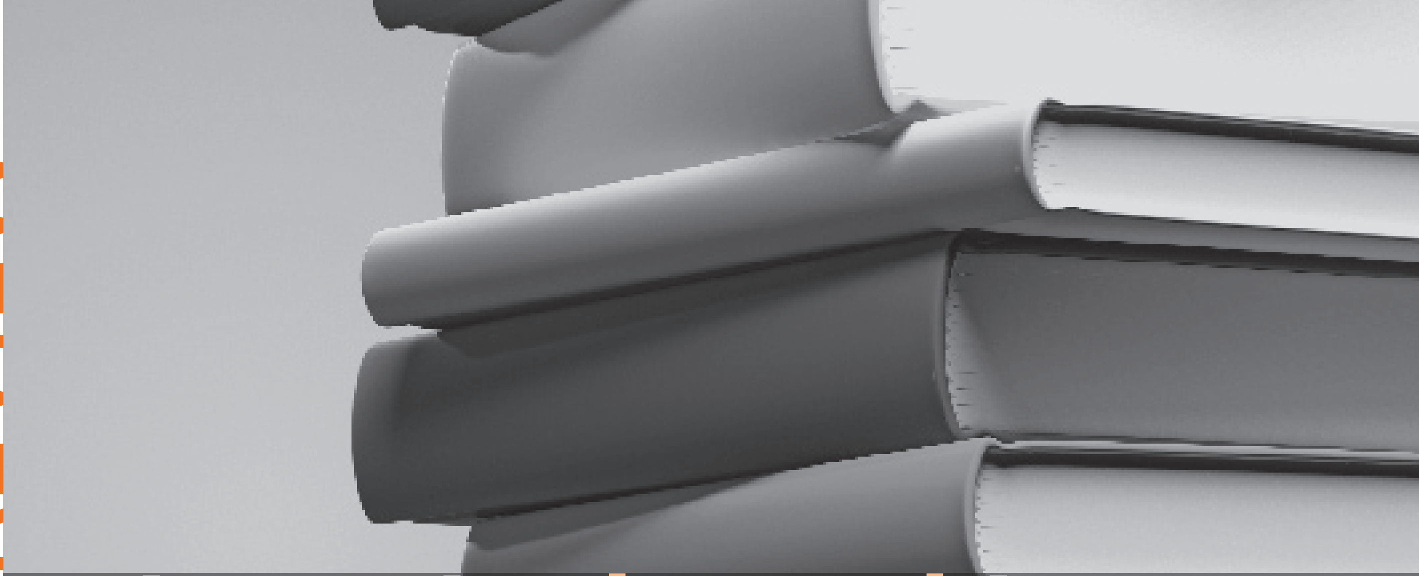


BOOK REVIEW

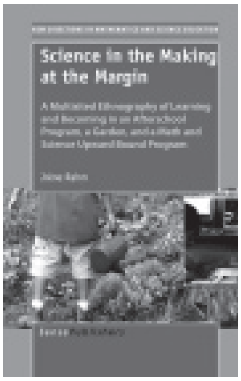
science in the making at the margin

Rahm, Jrene. (2010). ***Science in the making at the margin: A multisited ethnography of learning and becoming in an afterschool program, a garden, and a math and science Upward Bound program.*** **Rotterdam: Sense Publishers.**

Reviewed by Sara Hill, Ed.D.

These days, science, technology, engineering, and math (STEM) learning is a hot topic in afterschool education. For a field with a paucity of curricula, we have a surprising abundance of material that aims to help staff implement afterschool science programs. (See, for example, SEDL's *Afterschool Training Toolkit for Science* and TASC's *Science Afterschool: How to Design and Run Great Program Activities*.) For a field also marked by a lack of organized networks, we have a robust group of organizations that share information and resources on out-of-school time (OST) STEM learning—for example, the Informal Learning and Science Afterschool project run by the Program in Education, Afterschool, and Resiliency at Harvard University. I believe this emphasis results from a variety of pressures—the achievement gap in underserved and minority communities, for example, as well as the expectation that OST programs should help struggling schools raise their scores in this age of high-stakes testing and accountability.

What, exactly, goes on during afterschool science, is still "inside a black box." Few studies have looked closely at programs and curricula in operation in order to analyze *how* these programs are helping, or not helping, youth become more skilled in STEM. Jrene Rahm's book *Science in the Making at the Margin* attempts to shed light on the actual workings of OST science programs.



Because it is an ethnography, the book provides a "thick description" (Geertz, 1973) of three science programs, two in Canada and one in the U.S. One is a girls-only science afterschool program run by a community-based organization, another a gardening and science program located at a botanical garden, and another a mentoring program affiliated with the science division of a university. As is typical for ethnographic researchers, Rahm collected data from a range of sources over an extended period of time—in this case, years. In several instances, she played the role of participant-observer in program activities, developing relationships with several of the youth and following them across OST programs. Again in line with the ethnographic method, Rahm focused on the *cultures* of the programs, studying "participant structures" and how the youths' discourse displayed how "science was talked into being" (Rahm, 2010, p. 33). Rahm used similar methods in an article published in this journal some years ago (Rahm & Grimes, 2005).

Rahm's research questions included, among others, "What do *doing science* and *meaning making in science* look like?" Rahm wanted to observe how science and meaning making in these three programs were achieved through youths' interactions with others and the "artifacts" or tools of science. The theoretical framework, highly appropriate in this context, was drawn from socio-historical theory, whose premise is that learning is a socially organized, cultural process that is highly dependent on supportive structures and guidance (also called *scaffolding*). Socio-historical theory is also the genesis of notions of *communities of practice,* a concept that framed Rahm's focus on how youth appropriated the language and skills of the community of scientists as they engaged in that community's practices, used its language and tools, and became members of it.

For example, youth in one program had a hard time articulating hypotheses, a habit of mind particular to science. In addition, the youth had to learn new values and behaviors, such as "ways of seeing."

The major findings of this study will not be surprising to those who are currently implementing STEM programs in OST. However, the findings are important in that they substantiate experiences with youth and point to ways that programs can improve offerings and better understand the challenges of implementation. Some of the most relevant findings are these:

- Programs need qualified staff who can go beyond the superficial in science education. OST staff could be trained in science, or scientists could learn to work with youth in OST settings as do teaching artists and other disciplined-based OST instructors.
- Science projects require extended time. For example, one project Rahm documents was a study of an area of forest devastated by fire. The multiple-year program allowed youth to document patterns of re-growth that they would not have been able to observe in a shorter-term program.
- Youth need to acculturate to a new culture: that of the community of scientists. The youth Rahm observed had to acquire new terminology. For example, youth in one program had a hard time articulating hypotheses, a habit of mind particular to science. In addition, the youth had to learn new values and behaviors, such as "ways of seeing." This learning involved practice and deep engagement in the process of making science, along with relationships with scientists and the scientific community.
- Young people's prior knowledge of science comes from school-based experiences, which tend to be narrow and scripted. Because OST science programs are often inquiry-based, youth have to re-conceptualize their understandings, to learn that science "in real life" is often tentative and emergent.

The audience for this book will be primarily graduate students in science education or OST education. The book could have been better edited; the amount of "thick description" buries many of the findings and important insights, and some sentences are awkwardly constructed. In addition, some sections seem less relevant than others; a chapter on motivation, for example, could have been a separate article. Nonetheless, this is an important study that ultimately makes a valuable contribution to our field. A shorter piece consolidating its findings and pitched at youth practitioners would be valuable.

References

Geertz, C. (1973). *The interpretation of cultures: Selected essays.* New York, NY: Basic Books.

Rahm, J., & Grimes, K. (2005). Embedding seeds for better learning: Sneaking up on education in a youth gardening program. *Afterschool Matters*, *4,* 33–41.

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Photos were taken by youth participating in the West Michigan Center for Arts & Technology (WMCAT) in Grand Rapids, Michigan. WMCAT provides high school students with an inspiring environment where each person can develop a lifelong advantage in critical thinking and problem-solving skills through art education. In collaboration with Grand Rapids Public Schools, WMCAT serves over 350 high school students annually through programs in black-and-white photography, digital film, web design, fiber art, digital photography, and fine art.