Connecting Formal and Informal Science Learning through School-Community Partnerships

Summary

To improve science education for culturally and linguistically diverse students, schools and communities can create “mutual benefit partnerships” to identify and address local problems. The example of the Chicago River Project illustrates how such partnerships can connect formal learning contexts with the rich ways communities experience science outside of school.

This article addresses the question of how to engage culturally and linguistically diverse students in rigorous science learning by connecting classroom science with the everyday ways students experience science outside of school. In order to support formal education in incorporating students’ informal science “funds of knowledge” while helping learners see how school and life learning are related, the authors call for a “connected science” that unites classroom science with community science through “mutual benefit partnerships.” These partnerships have four design principles. They should:

1. Address a current unsolved but consequential community problem
2. Build partnerships between the school and its community and local businesses
3. Use inquiry methods of problem-based learning
4. Result in student-developed products that benefit all partners

Research Design

This article describes the Chicago River Project, a mutual benefit partnership that took place at a public elementary school serving predominately Mexican-American children. In this project, students identified the pollution of a local riverbank as a serious...
problem they wanted to fix. Based on this problem, teachers developed curricular goals around the question “What systems are we in and how do we affect these systems?” For example, the goals for science learning were to learn about soil erosion, water quality, and related topics. Social studies learning involved the history of the river. Language arts activities included letter writing and journaling, while mathematics goals had to do with data analysis and representation.

School teachers and students formed alliances with Friends of the Chicago River, the Chicago Academy of Sciences, artists, and Cap Sauers Holdings Nature Preserve to learn about conservancy strategies, political lobbying, water testing, and community beautification. The project also tapped parents’ knowledge about the earth, brought from rural Mexico.

The authors analyzed audiotapes, observation field notes, student work and instructional artifacts, and interviews to determine what kinds of activities students engaged in, what they learned, what kinds of knowledge and experiences were connected across formal and informal learning settings, and how the mutual benefit partnership design helped make those connections.

**Findings**

Through the Chicago River Project, students learned key science concepts related to water conservation, recycling, soil erosion, and water quality. Teachers noted that students gained skills in accessing information, developing questions, analyzing data, and sharing ideas. Students also got more interested in learning science as they prepared plans to restore the polluted riverbank and create a safe green space. They felt empowered and believed that they could use science to make a difference in the community.

This research reveals important design principles for developing mutual benefit partnerships that support problem-based learning across formal and informal settings.

- The real-world problem students address needs to be unanswered and interdisciplinary so that authority and knowledge are positioned equally between teachers and students and between the school and the community.
- The topic must be relevant both to school curricula and to students’ lives so that students can position themselves as legitimate participants in scientific inquiry.
- The problem must be both visible and accessible to students.
- The mutual benefit partnership must have “bidirectionality”: In addition to focusing on students’ academic learning, the collaboration results in student work that benefits all non-school partners.

Addressing these four features allows for expanded understandings of what counts as science, how science can be a source of agency for addressing real community issues, and how science knowledge from informal settings can link to the school experiences of linguistically and culturally diverse students.

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