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# CAISE Practice and Research Initiative

As part of its ongoing Practice-and-Research (PaR) initiative, the Center for Advancement of Informal Science Education (CAISE), in collaboration with the National Science Foundation's (NSF) Advancing Informal STEM Learning (AISL) program, has engaged cross-sector groups of informal STEM learning practitioners and researchers through a trajectory of activities that include surveys, conference calls, an online forum, and a recent convening to explore, discuss, and brainstorm about the existing and potential relationships between practice and research in the field.

The PaR initiative builds on the work and outcomes of prior NSF-funded conferences such as Center for Informal Learning and Schools, In Principle in Practice, Building Capacity and Collaboration at the Intersection of the Learning Sciences and Informal Science Education, and the 21st Century Learning in Natural History Settings, as well as the National Academy of Science / National Research Council's consensus study, Learning Science in Informal Environments and the related practitioner volume, Surrounded by Science.

Initiative topics currently under investigation are how the work of practitioners and researchers influences the decision-making processes of each, the need for and feasibility of creating informal STEM learning research and development agendas, and what kinds of mechanisms, structures, and other resources are needed to further support dialogue among the informal STEM learning community of professionals who contribute to the field's growing body of knowledge.

At the CAISE PaR convening held January 31-February 1, 2013, Richard Duschl, NSF Division Director, Division on Research and Learning in Formal and Informal Settings, contextualized the importance of the interplay between practice and research through the lens of a new direction at NSF to develop Core R&D areas within the Education and Human Resources (EHR) directorate. EHR is currently exploring three broad areas — STEM learning and learning environments; broadening participation; and STEM workforce development — as potential focal points for its core activities.

Practice-and-Research convening participants identified areas of opportunity for further exploration and potential resource-generation, and grappled with the notion of a research and development agenda for the field writ large that would reflect the multiple agendas of the variety of informal STEM learning sectors and range of grain sizes of potential research questions that would usefully inform practice. Following on a process successfully employed by the 21st Century Learning in Natural History Settings conference, convening participants addressed considerations that could lay the groundwork for developing an agenda or agendas identifying the field's values, for example, and how they inform an overarching vision. The PaR working group brainstormed a vision of informal STEM learning and identified these shared values:

> Designers, researchers and evaluators of informal STEM learning experiences and settings value processes and approaches such as inquiry and making, that provide multiple levels of engagement with phenomena, materials, tools and concepts that set learners on self-directed trajectories of curiosity, exploration, and identity, as well as knowledge and skill-building.
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> Informal STEM learning practitioners, researchers, and evaluators seek to create broader access to experiences, tools, and settings through understanding community and socio-cultural challenges and issues, finding innovative ways to chart the learning path of the individual and broadening participation.
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> Informal STEM learning professionals recognize that schools have been adopting customized, self-paced pedagogies and methodologies that have been associated with informal settings. The field welcomes these developments as part of the advancement of the larger STEM learning ecology.
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> The field's values and goals align well with NSF's research and development priorities of broadening

participation, learning and learning environments, and STEM workforce development.

Informal STEM learning contributes to the health and economic well being of the nation by enhancing 21st-century skills such as critical thinking and problem solving, creativity and innovation, and communication and collaboration. Informal learning environments are spaces where learners of all ages are free to explore, learn, and practice these skills.

Knowledge is as important as values in creating a vision, and a variety of informal STEM learning sources of knowledge need to be indexed, represented, and circulated; for example, craftsman-like practitioner knowledge and knowledge from a range for social sciences.

Informal STEM learning by its nature relies on a plurality of types of evidence that inform practice. The field must continue to seek out and assemble a breadth of convincing evidence for its claims, which give substance to the vision.

The National Academy/NRC Learning Science in Informal Environments and Surrounded by Science reports point to evidence of learning in ISE, as well as the gaps in knowledge from which a research and development agenda might be created. The informal STEM learning field needs to build on this work, framing and affirming what is known and embracing the opportunities for creating and applying new knowledge. Across the sectors of the field, exemplary work is being designed, implemented, and evaluated with the knowledge of what has been tested and learned by others. Research provides evidence to use as an important tool for making decisions about designing environments, programs, activities, and experiences.

Upcoming newsletter articles will explore strategic framing and potential guiding questions for informal STEM learning research and development agendas as well as existing and potential mechanisms, web infrastructure, and other resources for supporting more dynamic interplay between practice and research in the field. In the meantime, CAISE welcomes and encourages comments about the ongoing work of the PaR initiative outlined above as well as examples of existing or work-in-progress research agendas in other sectors and professional communities on the Discussion page of the CAISE convening wiki, which includes notes from the convening and an archive of the online forum on practice and research that preceded it.



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