

Learning[*] through Citizen Science:

An Aspirational Vision and Ten Questions to Prompt Reflection on Practice

CSA's Education Working Group has taken on as its **mission to enable, inspire, investigate, and facilitate effective integration of scientific and educational goals, practices, and outcomes in citizen science**. We offer the Citizen Science Association community the following vision for what learning, and benefit to learners, is possible through participation in citizen science.

Through participation in citizen science, people of all ages and backgrounds contribute to science while building passion for and understanding of scientific ways to investigate the natural world.

One of the powerful things about the citizen science community is the great diversity of projects. This diversity is visible in the topics being pursued and where, but also in how programs are designed and for what goals, the communities of people they engage, the protocols used – the list goes on. This extraordinary diversity serves the community well, encouraging innovation and invention. It also serves participants well: there is probably a perfect project for everyone.

The Education Working Group sees the potential of these diverse projects to reinvigorate civic engagement, broaden participation in all levels of science, awaken the curiosity and joy and caring in all kinds of people, ignite passions for looking and learning and questioning and discovering, and welcome diverse learners with diverse interests, knowledge, talents, and motivations. We see opportunity for citizen science to be used in formal and informal settings to achieve these outcomes while contributing to scientific knowledge. We see this as essential to engaging people in addressing the world's wickedly complex problems.

We invite citizen science program designers and staff to reflect on their work through an aspirational lens. The following questions have no right answers. Our intention is explicitly not to encourage all citizen science programs to approach learning in the same way! We do hope to inspire citizen science programs to consider the many ways they do and might serve, inspire, and support current and future participants.

1. How have you articulated your program's learning objectives and made them visible?
2. How have you articulated your program's science objectives and made them visible?
3. How have you helped your participants to see where their contributions fit in the scientific research enterprise?
4. By what mechanisms have you welcomed your participants into the scientific community?
5. How have you provided opportunities for learners with diverse skills and interests to contribute to the research being done? How have you embraced diverse learning pathways and learning goals? How do diverse participants find role models? What are the ways that differently talented participants may contribute to the research effort?

6. How have you supported participants' growing identities as "scientists" and science-capable learners who see science as part of their lives?
7. How does your program facilitate social interaction among diverse novices, learners, and experts to support their learning? How does your program leverage divergent perspectives to strengthen the science and learning outcomes?
8. How do participants in your program use skills and knowledge from other disciplines or endeavors as part of their activities?
9. How do participants in your program experience the unpredictable, sometimes messy nature of research and discovery?
10. How do you share control over who poses research questions, who performs analysis, and who benefits from research?

[*] When we say "learning," we are referring to learning that transforms the learner – that expands ideas, interests, sense of self, skills, etc. – not to the mastery of program protocols required for participation.

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