

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.

2 RAISE AWARENESS OF AND ASPIRATIONS FOR CITIZEN SCIENCE FOR LEARNING

Over 60 people attended the session in which the Education Working Group shared their draft vision, mission, core values, and core practices. Almost that many contributed comments on these drafts. One critique – that published values and principles might be interpreted as a “normative manifesto” that could diminish or discourage the rich diversity of thought and practice – caused us to reframe the ideas as questions to prompt reflection on practice. We hope that this more open-ended approach provokes thinking and spurs action, but stops appropriately short of telling any program how it ought to function.



Integrating comments from workshop participants and additional experts from STEM education and citizen science, the Education Working Group revised the drafted values and practices into the following list of **questions to prompt reflection on the use of citizen science for STEM learning**.

- ❖ Do you articulate your programs’ learning objectives and make them visible?
- ❖ Do you articulate your programs’ science objectives and make them visible?
- ❖ Do you support participants’ growing identities as “scientists” and science-capable learners who see science as part of their lives?
- ❖ Do you help your participants to see where their contributions fit in the scientific research enterprise?
- ❖ Do you welcome your participants into the scientific community? By what means?
- ❖ Do participants in your program experience the unpredictable, sometimes messy nature of research and discovery?
- ❖ Do you provide opportunities for learners with diverse skills and interests to contribute to the research being done? Do you accommodate learners or educators with different learning goals? Do you offer opportunities for differently talented participants to contribute to the research effort?
- ❖ Do participants in your program use skills and knowledge from other disciplines or endeavors as part of their activities?
- ❖ Do you offer participants role models? Are those role models diverse in interests, race, careers, age, ethnicity, background, experience in the project, etc.?
- ❖ Does your program facilitate social interaction among diverse novices, learners, and experts to support their learning? Does your program leverage divergent perspectives to strengthen the science and learning outcomes?
- ❖ Do you share control over who poses research questions, who performs analysis, and who benefits from research?

1 OVERVIEW

We held a workshop as part of the two-day Citizen Science 2015 Conference. **The overarching goal for this workshop (and the ongoing work of the Education Working Group of the Citizen Science Association (CSA)) was to expand and improve the use of citizen science in formal and informal STEM education to pursue the breadth of learning outcomes being pursued in those settings.**

Within this goal, the working group recognized particular opportunities:

1. **Raise awareness and aspiration** in the citizen science field for what learning outcomes might be achieved through participation;
2. **Uncover the cultural forces, factors, constraints, and assets of each stakeholder in citizen science for learning** to bridge the diverse worlds of research science, STEM education, and public engagement and enable effective collaboration;
3. Begin to **identify the tools, resources, and research needed** to overcome barriers and expand the effective integration of citizen science and STEM learning experiences.

To create structure around these opportunities, the working group prepared draft language for a vision, mission, core values, and core practices for citizen science in learning (see box at left). We also prepared an empty table with prompts to encourage attendees to think deeply about the audiences they hope to engage in their programs (see box at right).



Workshop participants and Education Working Group member Sandra Henderson; photo credit Mary Ford

3 BRIDGING DIVERSE PROFESSIONS AND COMMUNITIES

The Education Working Group has observed that the professionalism and research-based practices of the STEM learning field are often underestimated by scientists and citizen science practitioners. Building appreciation and understanding across these professions is the essential first step to expand and improve the use of citizen science in STEM learning. The following table was our vehicle for launching this discussion.

Audience/partner/practitioner group	Cultural forces and factors influencing participation	Assets and attributes they bring to effort	Barriers to their participation	Resources, tools, trainings, mechanisms to overcome barriers	Benefit of this group’s participation to them and to research
Scientists					
Resource managers					
Citizen science practitioners					
K-12 educators					
Informal educators					
Youth					
Adults					

4 EVALUATION

Joe Heimlich and Gary Timko of the Lifelong Learning Group and COSI conducted an evaluation of the overall conference and this workshop. A convenience sample was used to select 35 attendees of this workshop for interviews. The full evaluation report is available at <http://www.informalscience.org/citizen-science-conference-full-evaluation-report>.

Evaluation results show that **overall participants felt very positive about the conference and the field of citizen science**. In interviews **education workshop attendees expressed diverse priorities for CSA attention**. Interestingly, individuals tended to identify their own priorities differently from what they see as important for the field of citizen science.

5 NEXT STEPS

Multiple rounds of community input and synthesis have begun to inform a research, development, and action agenda, but fall short of identifying priorities. Clearly, we must:

- Uncover the cultural forces and factors at play for each group of participants (e.g., the very different cultures of “scientists,” “educators,” and “the public”);
- Assess which barriers to participation are most significant for which audiences;
- Develop or enhance resources to overcome these barriers and broaden participation.

The Education Working Group sees an opportunity to use the questions to prompt reflection on practice as a tool for individual citizen science programs to develop and articulate program goals and corresponding indicators. We are planning to use the questions as the organizing structure around which to solicit exemplars from the field for presentation at the 2017 Citizen Science Association meeting. While we are interested in stories “from the field” that illustrate promising practices, we are most interested in soliciting from program leaders what they have learned from the design decisions they have made. In the near-term, we are drafting a manuscript for submittal to *Citizen Science: Theory and Practice*, the new journal of the Citizen Science Association.

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