

BOARD ON SCIENCE EDUCATION

NASA's Science Activation Program: Achievements and Opportunities

Report Prepared by the Committee to Assess Science Activation
for the NASA Science Mission Directorate



Study Charge: Overview

Assess the SMD's Science Activation (SciAct) program's efforts towards meeting the following objectives: (1) enable STEM education, (2) improve U.S. scientific literacy, (3) advance national education goals, and (4) leverage efforts through partnerships.

The review will provide an independent, authoritative forum for identifying and discussing SciAct issues in Earth and Space Science related to NASA SMD's SciAct program and will include the following:

Study Charge: Overview

Concise written assessment of the status of the SMD Science Activation program including **feedback on improving the program**. The assessment will be based on **evidence gathered by the committee at its in-person and virtual meetings** and on **established principles for evidence-based science education** as summarized in previous reports from the Board on Science Education.

The committee's assessment final report may include **findings and conclusions related to management of and priorities for the next phase of the program**, including the identification of any gaps in the SciAct approach, given new advances in science education pedagogy and recent Decadal recommendations. The assessment will be subject to review in accordance with NASEM's institutional policies.

Committee and Staff

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Conclusions – SciAct Objectives

- NASA has a unique role to play in the STEM education landscape.
- The current four SciAct objectives can inform a vision for the program, but they are too broad to be useful in identifying actionable targets and desired outcomes.
- More specifically, improving science literacy at the national level is one of the four SciAct objectives. It is not clear that there is an agreed upon definition of science literacy across the projects.

Recommendations – SciAct Vision and Objectives

- Undertake a visioning process that would draw upon the following:
 - Current research on learning and design,
 - New Federal STEM plan,
 - Evidence-based approaches to broadening participation.
- Consider how SciAct fits within and contributes to the larger STEM education ecosystem.
- This work should provide the foundation for developing actionable and measurable portfolio goals.

Conclusions – Characterizing the Portfolio

- NASA has developed a portfolio of diverse projects reaching a broad range of communities across the U.S. that utilize NASA's resources.
- SciAct has enabled partnerships with groups external to NASA that have expertise in education and learning that provide significant added value for NASA.

Conclusions – Transitioning from the 1% model to Science Activation

- The change from the previous 1% model has been significant. It has eliminated redundancy, but it has also resulted in some missions not feeling adequately represented.

Recommendation – Transitioning from the 1% model to Science Activation

- SciAct should build ongoing opportunities for dialogue with NASA Science Mission Directorate's missions and scientists.

Conclusions – Evaluation

- Evaluation currently focuses on individual projects, not the entire portfolio. Among the evaluators, there is interest in contributing to a broader understanding of what is working well, what can be improved and where there are opportunities that can be further leveraged across the portfolio. Given the current design and program resources, there are limits to how much this is possible.
- Sharing ideas across projects has been powerful for participants. These kinds of collaborations can be built upon and strengthened in the future.

Recommendations – Evaluation

- SciAct should create an independent mechanism to obtain ongoing, real time advice to inform a visioning process, drawing upon the following expertise:
 - learning and design,
 - the policy context of STEM education,
 - partnering with local communities,
 - broadening participation in STEM.
- With input from outside experts, SciAct should consider whether and how a portfolio-level evaluation could strengthen the focus of the program and ensure that projects in the portfolio are effectively meeting overarching SciAct program goals and objectives.

Conclusions – STEM Learning and Use of NASA Assets

- There is a range of design intervention strategies that are used across the portfolio. Each project uses different theories of learning in their project design and often that theory of learning is not made explicit.
- Current research on learning emphasizes the importance of learner-centered and community-centered instructional design and practices. Awardees have had uneven success at mobilizing NASA assets while also being responsive to the needs of learners and communities.
- The portfolio lacks a coordinated effort to incorporate evidence-based practices in translating the expertise of subject matter experts (SME's) in developing and implementing educational materials and learning experiences (e.g. translating data-sets, engaging in public outreach).

Recommendation – STEM Learning and Use of NASA Assets

- SciAct should articulate how it expects that the portfolio will leverage NASA assets, how partnerships and networks will be built, and an associated theory of change that hypothesizes how these actions will lead to desired, measurable outcomes.

Conclusion – Broadening Participation

- Broadening participation is a stated intention of SciAct, as such it should be clearly defined so that grantees can have greater and more uniform impact in this area.

Recommendation – Broadening Participation

- SciAct should identify ways that the portfolio as a whole could draw upon and implement evidence-based strategies for broadening participation.
- SciAct should deepen its commitment to broadening participation by using evaluation measures that go beyond counting numbers of individuals who represent specific groups.

Conclusion – Networks

- Projects within the SciAct portfolio use a variety of design strategies to translate NASA's assets (SMEs, media assets, scientific instruments, datasets) to support learning in STEM. Currently, there are limited mechanisms for gathering, synthesizing, and sharing these innovations across the portfolio or for learning from cases of success or failure.

Recommendation – Networks

- SciAct must consider whether the development of a coordinated learning network of awardees across its portfolio is a program priority.
- Minimally, SciAct needs to develop more systematic mechanisms for projects to share best practices and learn from successes and failure.
- If a coordinated network is prioritized, the program must provide the necessary infrastructure to support the work.

Conclusions: Moving into Phase 2

- The SciAct program is at an important inflection point in its history. The second phase of the program presents an opportunity for iterative improvement and refocusing on both the individual project level and the portfolio as a whole.
- While continuing existing awards may allow for continuity and support an environment of collaboration and partnership amongst existing awardees, lack of competition or opportunities to fund new projects may stifle the evolution of the portfolio.

Recommendations for Phase 2

- SciAct should use the opportunity provided by Phase Two to reflect on the current portfolio within the context of the new vision, goals and logic model.
- SciAct should critically review and guide existing projects, be explicit about the rationale and criteria for including new projects, and consider how best to integrate them into the existing portfolio.
- An important area for consideration is how to ensure that underserved communities receive more focused attention in the next phase of the program.

Thank you!