

Report Brief:

NASA STEM Engagement K-12 Stakeholder Needs Assessment/Gap Analysis Evaluation

October 2022

In order to spark student interest in STEM, NASA works to provide support and resources to educators and educational institutions. (See Figure 1 for an overview of NASA’s goals for its STEM Engagement programs). To serve K-12 students, NASA strives to:

1. Develop and offer evidence-based opportunities to engage students in learning unique to NASA beyond the classroom.
2. Use evidence-based strategies, NASA STEM practitioners, learning opportunities, content, and resources to enhance student STEM experiences in schools and other educational venues.
3. Create and offer students authentic learning and research opportunities where students can bolster their STEM studies, generate further interest in STEM, and encourage/support greater achievement in STEM subjects.

To ensure that NASA continues to build and maintain programs that accomplish the goals outlined in Figure 1, NASA’s OSTEM seeks to understand the perceptions and needs of stakeholders and participants in NASA STEM Engagement K-12 activities, resources, and programs. Investigations are conducted to understand how NASA’s K-12 programs are working to inspire K-12 students of diverse backgrounds to engage in STEM activities, research, and careers and how programs can better meet educator needs.

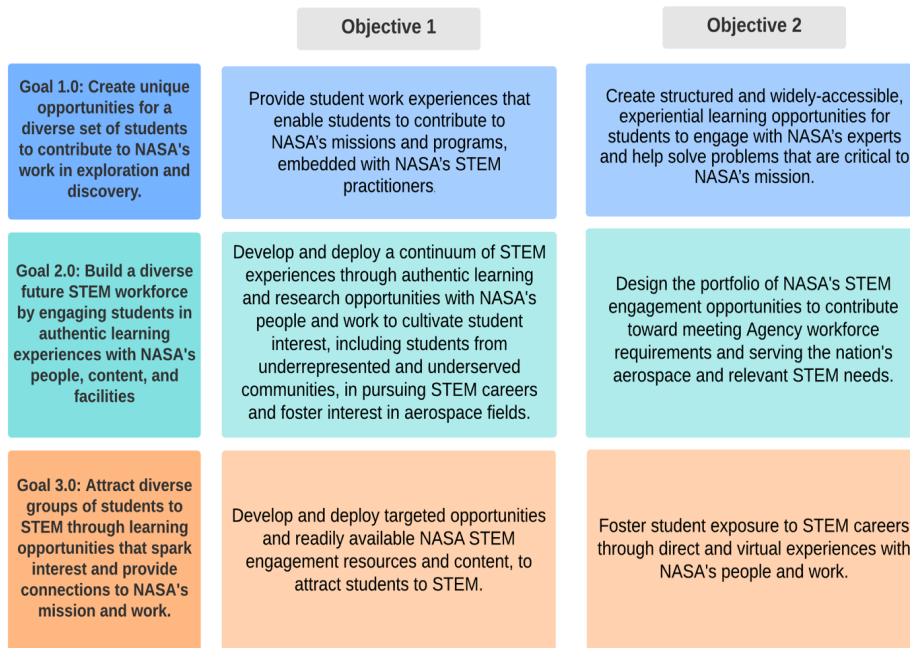


Figure 1. Goals and objectives for NASA STEM Engagement.

Purpose of the Report Brief

Building on the work of the internal 2021 NASA STEM Engagement K-12 Comprehensive Evaluation Study, this evaluation study had an external focus. Whereas the 2021 NASA STEM Engagement K-12 Comprehensive Evaluation Study identified the current state of K-12 activities across NASA and proposed a common vision, goals, and objectives for K-12 programs and activities, the 2021-2022 K-12 Stakeholder Needs Assessment and Gap Analysis, examined stakeholder experiences in using NASA STEM Engagement K-12 activities.

The study was conducted to learn more about external stakeholder perceptions of NASA STEM Engagement resources for K-12 students. Specifically, it investigated:

1. How stakeholders used NASA STEM Engagement K-12 resources
2. Stakeholder perceptions of those resources
3. How the resources spark student interest
4. How resources meet the needs underrepresented and underserved STEM students
5. Possible future opportunities for NASA STEM Engagement K-12 resources

WHO PARTICIPATED IN STUDY?

Evaluation Study Participants

NASA OSTEM identified 25 stakeholders who participated in NASA K-12 STEM Engagement activities. Of the 1,464 surveys successfully delivered to stakeholders, 312 surveys were completed. Table 1 provides more details about interview participants, Table 2 includes demographic data of the 312 survey respondents, and Table 3 provides details about the role of the survey respondents.

Table 1. Summary of Interview Participants by Program (n=25)

Program	Number of Participants	Role in program (participants may have served in more than one role)	Years of Experience	Works Directly with Students	Does Not Work with Students
CCLC	3	Administrator: 3	5-8	0	3
Earth	2	Administrator: 2	5-10+ years	0	2
EPDC	2	Administrator: 1 P.D. provider and teacher: 1	5-7 years	1	1
HERC	2	Teacher: 2	1-20 years	2	0
Mission Directorates	4	Teacher: 1 P.I.: 2 NASA SME: 1	1-15 years	3	1
NASA SPARX	4	Administrator: 4 Informal educator: 1	1-5 years	1	3
National STEM Innovation	3	Administrator: 1 P.I.: 1 Informal Educator: 1	1-7 years	1	2

Program	Number of Participants	Role in program (participants may have served in more than one role)	Years of Experience	Works Directly with Students	Does Not Work with Students
SPOCS	2	Administrator: 2 Informal Educator: 1	1-2 years	2	0
TEAM II	3	Administrator: 2 Informal educator: 1	4-25 years	1	2
Total	25	Administrators: 15 Informal Educators: 4 P.D. Provider: 1 P.I.: 3 Classroom teachers: 4 NASA SME: 1	1-25 years	11	14

Table 2. Stakeholder Demographics (n=312)

Characteristic	Number (Percent of Respondents)
Gender	
Female	231 (75.0%)
Male	73 (23.7%)
Do not wish to provide	4 (1.3%)
Unknown	4
Ethnicity	
Hispanic or Latino	35 (11.5%)
Not Hispanic or Latino	260 (85.5%)
Do not wish to provide	9 (3.0%)
Unknown	8
Race	
American Indian or Alaskan Native	1 (0.3%)
Asian	7 (2.3%)
Black or African American	23 (7.5%)
Native Hawaiian or Other Pacific Islander	1 (0.3%)
White	247 (80.5%)
Multiracial	15 (4.9%)
Do not wish to provide	13 (4.2%)
Unknown	5
Stakeholder STEM under-represented status	
Under-represented race/ethnicity	83 (26.9%)
Unknown	3

Table 3. Stakeholder Role (n=312)

Characteristic	Survey Respondents
Primary nature of interaction with NASA STEM Engagement resources	
Educator using NASA resources in K-12 classroom	133 (43.2%)
Educator using NASA resources in an out-of-school program or informal setting	136 (44.2%)
Higher education faculty using NASA resources in my coursework or outreach programs	6 (1.9%)
Administrator in a school or other organization where NASA resources are used	33 (10.7%)
Unknown	4
Nature of work with students	
My primary role with is to work directly with students delivering NASA STEM Engagement resources/program content.	138 (44.7%)
I occasionally work directly with students using NASA STEM Engagement resources.	140 (45.3%)
I do not work directly with students.	31 (10.0%)
Unknown	3

HOW WAS STUDY CONDUCTED?

Details of the 2021-22 Evaluation

The 2021-22 K-12 Stakeholder Needs Assessment and Gap Analysis report asked the following questions:

1. How are stakeholders using NASA STEM Engagement K-12 activities to engage diverse students and to spark student interest in STEM?
2. What are the strengths and weaknesses of NASA STEM Engagement K-12 activities?
3. What challenges do stakeholders experience in using NASA STEM Engagement K-12 activities?
4. What are some future NASA STEM Engagement K-12 opportunities that stakeholders are interested in?

This study used utilization-focused evaluation approach that used two modes of data collection:

1. Participant surveys
2. Phone interviews with a sample of participants

Data Analysis

This study used both quantitative (surveys) and qualitative (interviews) analysis methods. Quantitative data were summarized using descriptive statistics such as numbers of respondents, frequencies and proportions of responses and averages of responses when responses categories were assigned to a Likert scale. Structured and emergent coding was used for the qualitative data to identify the most common themes in responses.

WHAT DID WE FIND OUT?

Summary of Findings

Findings from the evaluation study revealed overall stakeholder satisfaction with NASA's STEM Engagement resources and a number of program strengths.

- Stakeholders had used a variety of NASA STEM Engagement K-12 programs/activities/resources in various settings (e.g., lesson plans/curriculum materials, videos, NASA speakers, and the NASA website).
- Stakeholders cited a variety of reasons for using NASA STEM Engagement resources—materials engage students, resource content aligns with curriculum and class needs/learning standards, the resources are of high quality, and they help build students' literacy.
- Stakeholders are using NASA STEM engagement resources to meet the needs of learners of various skill levels, finding them adaptable in targeted efforts to reach underserved groups of students.
- NASA STEM Engagement resources are effective at engaging students' interest.
- Strengths of the program included:
 - The usefulness and high quality of materials (well designed, engaging and authentic content, variety of topics) to teach students about space exploration and space science.
 - The focus in materials on skills important for student success and aligned with curriculum needs and standards.
 - The engaging nature of materials – especially lesson plans/activities and the website.
 - Representation of individuals from underrepresented groups, especially women, in materials.
 - The ease of accessing materials online
 - The ease of accessing information or content support for educators.
 - The ease of incorporating resources into curriculum.

WHAT CAN THE PROGRAM DO TO IMPROVE?

Stakeholders identified several areas of potential improvement that were used to generate recommendations for growth and improvement in resources moving forward. Those recommendations include:

- Engage more educators by:
 - conducting targeted outreach to early career and informal educators to increase familiarity with resources.
 - expanding the reach of the website and professional development activities.
 - continuing to align materials with curriculum and learning standards.
 - incorporate active learning strategies into materials.
- Investigate ways that NASA STEM Engagement resources can meet the needs of diverse learners from groups traditionally underrepresented and underserved in STEM by conducting targeted investigations of STEM-underserved locations to understand student and educator needs in these areas.

- Continue to develop high quality curriculum materials that:
 - Meet the needs of diverse learners.
 - Engage students in a variety of literacy skills by using principles of universal design.
 - Engage students' interests.
 - Include real-world content and authentic learning opportunities.
 - Foster connections with NASA subject matter experts.
- Review website design and consider ease of navigation and ways to streamline access to resources.
- Streamline administrative record keeping.
- Consider what future initiatives would most effectively expand the reach of NASA STEM Engagement K-12 resources to different content areas, younger grade levels, and expand professional development.

WHAT ARE THE KEY TAKEAWAYS?

NASA's K-12 STEM Engagement program provides a variety of resources that are flexible, adaptable, and engaging to a diverse range of students. Stakeholders are using these high quality and engaging resources to engage students, including those traditionally underserved and underrepresented in STEM, to inspire interest in STEM.

Stakeholders noted a number of strengths of NASA STEM Engagement K-12 activities, programs, and resources, indicating that NASA is effectively working toward its goal of creating learning opportunities for students that encourage them to pursue learning and future careers in STEM.

NASA's K-12 STEM Engagement program could be made even stronger by further targeting the development of materials for diverse learners and providing even more support to early career and informal teachers using the materials.