

A 3-year Evaluation of NASA Astronomy Days and Educator Workshops at the North Carolina Museum of Natural Sciences

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Introduction

Fading student interest in STEM subjects (i.e., science, technology, engineering, mathematics) is a problem. As students transition from elementary school to high school, their interest in STEM careers also declines (Murphy & Beggs, 2003; VanLeuvan, 2004), with recent reports suggesting that 52% of high school students have no interest in pursuing STEM careers (ACT, 2014). Interest and attitudes are important; high levels of interest in science leads to higher engagement, self-efficacy, achievement, and a greater likelihood of pursuing STEM careers (e.g., Lent, Lopez, & Biescke, 1991; Planet, Baylor, Derr, & Rosenberg-Kima, 2009; Singh, Granville, & Dika, 2002). Thus, students need support to encourage their interest and participation in the sciences.

To increase levels of science interest, knowledge, and engagement, the North Carolina Museum of Natural Sciences built the Nature Research Center (NRC) wing, providing students with free, hands-on STEM opportunities. Through various events (e.g., Astronomy Days) and workshops (e.g., NASA educator workshops), the museum offers North Carolina visitors unique opportunities to engage in space science.

For the current study, the North Carolina Museum of Natural Sciences contracted with Magnolia Consulting, LLC to conduct a 3-year formative and summative evaluation of NASA educator workshops and Astronomy Days events as part of a NASA grant. This final report provides an overview of the study design, summative findings, and a summary of results.

Study Design

The purpose of the formative and summative evaluation was to gauge public perceptions of the utility and quality of workshops and programs offered by the North Carolina Museum of Natural Sciences. Specifically, key evaluation questions included the following:

1. To what extent did the project increase educators' knowledge regarding ways to incorporate concepts related to STEM and NASA in their middle and high school curricula?
2. To what extent did the project affect educators' skills and behaviors regarding the incorporation of STEM and NASA themes into their curricula?
3. To what extent did the project increase middle and high school students' awareness, interest, and engagement regarding STEM disciplines and careers, as well as NASA and its missions?
4. What components of Astronomy Days were particularly successful and what could be improved?
5. What components of the educator workshops were particularly beneficial to participants?

Museum educators used formative annual reports and progress reports to improve future programming experiences (see evaluation questions 4 and 5). This final summative report includes 3-year project findings for evaluation questions 1-3.

Methods

Evaluators worked with the Museum to develop surveys and observation protocols for educator workshops and Astronomy Days.

Educator Workshops

During the project period, the Museum hosted 11 NASA educator workshops, which were provided at no cost to participants.¹ Evaluators developed two surveys to gauge participant perceptions of workshops. The first survey, which all workshop participants completed immediately following the workshop, gauged participants' initial perceptions. The second survey, which a sample of participants completed six months after the workshop, gauged their longer-term perceptions. Each year, one participant randomly selected from the first or second survey pool received a \$25 Amazon.com gift card for completing the survey.

Astronomy Days

The Museum hosted three annual Astronomy Days events during the project period. Astronomy Days events included a variety of free astronomy-themed exhibits, activities, and presentations appropriate for diverse audiences. To evaluate visitor perceptions of Astronomy Days, evaluators created observation protocols to measure instructional strategies and delivery, instructor knowledge, and participant engagement. Additionally, evaluators and Museum staff developed two short surveys gauging visitor perceptions of Astronomy Days. A sample of visitors completed the first survey immediately after Astronomy Days, and a subset of the initial sample group completed a second survey six months later. Each year, three randomly selected participants received a \$50 Amazon.com gift card for completing the survey at the event, and one randomly selected participant received a \$50 Amazon.com gift card for completing the follow-up survey.

¹ As part of the NASA grant, the Museum received funding for four educator workshops each year, but there was limited funding in Year 3. As a result, Museum staff received a project extension and provided an additional two educator workshops in 2013-2014.

Participant Characteristics

This section of the report describes characteristics of participants who completed a NASA educator workshop survey or an Astronomy Days survey. A total of 173 workshop participants completed an initial survey immediately following NASA educator workshops, and 55 workshop participants completed a follow-up survey six months later. During or immediately after the Astronomy Days event, 491 participants completed an initial survey, and 114 participants from the initial sample completed a follow-up survey six months later.

Educator Workshops

NASA educator workshop participants reported having a college education or higher, with 47% holding a bachelor's degree and 44% holding a master's degree (Figure 1). Participants came from a mix of rural (35%), urban (33%), and suburban (32%) K-12 schools.

Teachers comprised most participants in the workshops (88%). Another 11% held other roles (e.g., museum educator, informal educator) and 2% held administrator roles. Workshop participants reported teaching at the following levels:

- middle school (36%)
- elementary school (34%)
- high school (22%)
- college (3%)
- other (5%)

Educators who completed surveys reported teaching for an average of 11.5 years (range 0.25-38), and the majority reported teaching science (47%) and/or other subjects (53%). Other subjects included language arts, writing, astronomy, engineering, 4H, and horticulture.

Across the project period, participating teachers reported reaching an average of 1,095 students yearly (range 5-72,000).² By providing workshops for these educators, Museum staff supported 170,820 students taught by 156 educators.

Astronomy Days

Astronomy Days survey participants were diverse and representative of the larger Astronomy Days visitor population. Seventy-four percent of Astronomy Days survey participants self-classified as Caucasian, 8% self-classified as other, 7% self-classified as Asian, followed by African American (7%), Hispanic (3%), and American Indian (2%).

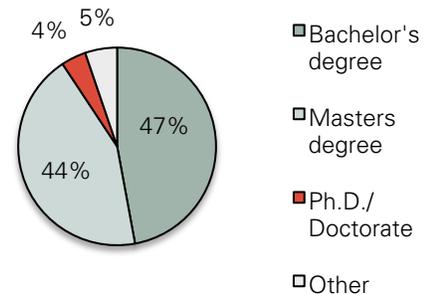


Figure 1. Workshop participants' reported highest earned degree (n = 172 participants from 2011-2014).

² Two workshop participants reported reaching a large number of students yearly. More specifically, a Museum educator reported reaching 72,000 students per year and an informal science educator reported reaching 10,000 students per year.

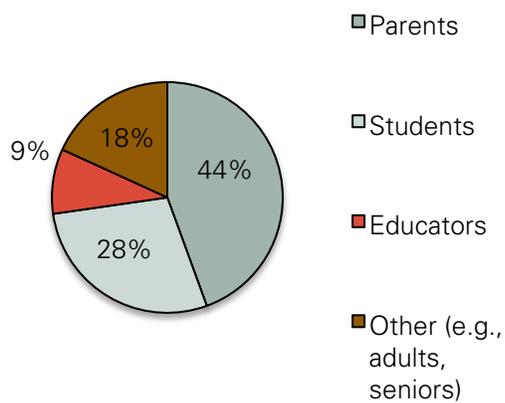


Figure 2. Astronomy days survey participants (n = 491).

A large percentage of Astronomy Days survey participants were parents (44%) or students (28%) (Figure 2). An additional 18% self-classified themselves into an “other” category (e.g., adults, researchers, seniors), and the remaining 9% reported they were educators. The majority of adults who completed Astronomy Days surveys reported holding a four-year degree (55%) or a master’s degree (24%). The remaining 21% of adults held a high school diploma (6%), an associate degree (6%), a doctoral degree (6%), or other degree (2%). Of the student survey participants, 36% were in elementary school, 26% were in middle school, 24% were in high school, 12% were college undergraduate students, and 2% were in graduate school.

Findings

The following section provides aggregated findings over the 3-year period for Astronomy Days and NASA educator workshops. Evaluators provided disaggregated yearly findings in the Appendix.

KEY QUESTION:

To what extent did the project increase educators' knowledge regarding ways to incorporate concepts related to STEM and NASA in their middle and high school curricula?

To gauge immediate changes in STEM and NASA knowledge for integrating concepts into curricula, evaluators asked participants to rate workshop effectiveness in helping them to be more knowledgeable about space-related topics, issues, and resources (7-point scale ranging from 7, *very much more*, to 1, *not at all*) and in helping them to achieve workshop-related, knowledge-based goals and objectives (5-point scale ranging from 5, *very effective*, to 1, *very ineffective*). Overall, 98% of all participants indicated the workshops helped them to be at least *somewhat knowledgeable* (4) about space-related topics, issues, and resources (Figure 3), and in 96% of all survey responses, participants indicated workshops were *effective* or *very effective* at helping them to achieve workshop-related goals and objectives (Figure 4).

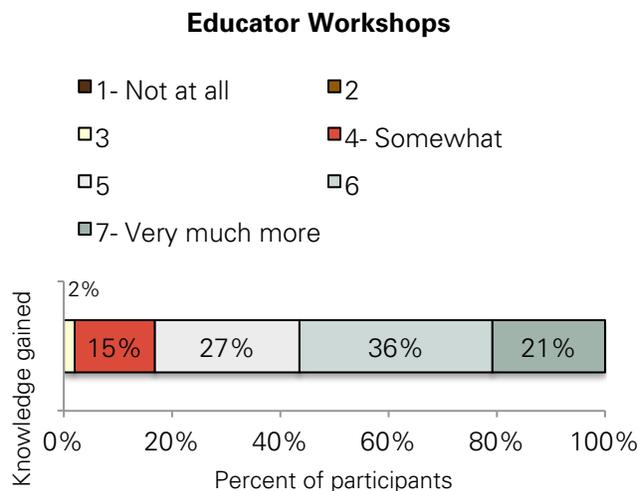


Figure 3. Educators reported level of knowledge gained immediately after participating in workshops (n = 171 participants from 2011-2014).

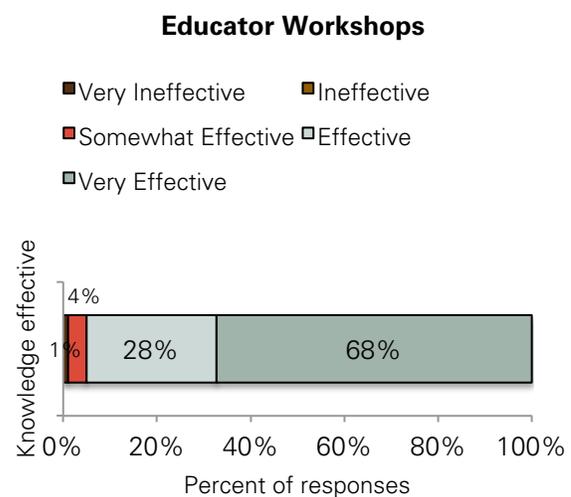


Figure 4. Educators reported effectiveness of workshops in helping educators to achieve workshop-related, knowledge-based goals (n = 675 responses from 2011-2014).

Evaluators also asked for open-ended feedback on specific skills gained immediately after the workshop to learn more about anticipated knowledge integration in classrooms. The most common themes related to accessing new resources to use in teaching (7% of participants),

learning new ways to teach (7% of participants), and learning ways to integrate new topics into the classroom (7% of participants).

KEY QUESTION:

To what extent did the project affect educators’ skills and behaviors regarding the incorporation of STEM and NASA themes into their curricula?

To assess the extent to which the project affected educators’ skills and behaviors, evaluators asked questions about anticipated use of NASA activities in the classroom setting. Specifically, evaluators asked questions related to the likelihood of using workshop activities immediately after the workshop (on a 5-point scale ranging from 5, *extremely likely*, to 1, *very unlikely*) and whether teachers actually used workshop resources six months later. In 91% of survey responses, participants reported they would be *likely* or *extremely likely* to use various workshop activities in their own teaching (Figure 5). At the six-month follow up survey, 98% of respondents reported using at least one topic or resource in their own teaching.

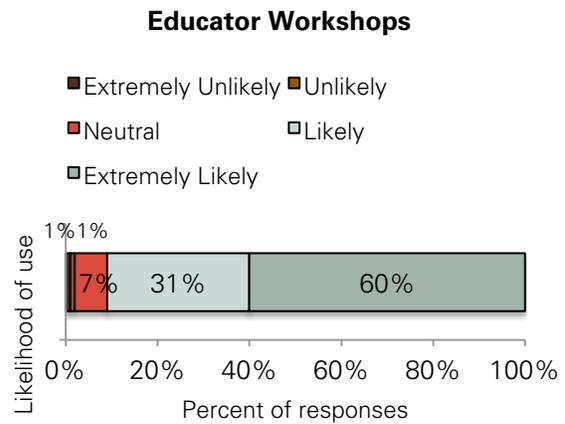


Figure 5. Educators’ reported likelihood of using workshop activities in their own teaching (n = 934 responses from 2011-2014).

KEY QUESTION:

To what extent did the project increase middle and high school students’ awareness, interest, and engagement regarding STEM disciplines and careers as well as NASA and its missions?

The museum believed that providing enjoyable and interesting Astronomy Days events would increase student interest in NASA and STEM. To assess visitor enjoyment and interest in Astronomy Days events, evaluators asked participants to rate their level of enjoyment and interest.³ On a 4-point scale ranging from 4, *very enjoyable*, to 1, *not at all enjoyable*, 99% of K-12 students and 99% of adults rated Astronomy Days as *enjoyable* or *very enjoyable* (Figure 7). Additionally, on a 4-point scale ranging from 4, *very interesting*, to 1, *not at all interesting*, 99% of K-12 students and 98% of adults agreed that Astronomy Days was *interesting* or *very interesting* (Figure 8). Evaluators confirmed high levels of visitor enjoyment and interest during events based on observations. Students and adults smiled, asked questions, and eagerly participated in hands-on activities.

Visitor enjoyment and interest in Astronomy Days likely supported increased interest in NASA and STEM careers and increased understanding of space exploration. As a result of attending

³ Because of the various age ranges of participants, evaluators examined mean ratings of K-12 students and adults separately.

Astronomy Days, 94% of K-12 students and 90% of adults reported their interest in NASA and STEM careers had increased *some* or *a lot* on a 4-point scale ranging from 4, *a lot*, to 1, *not at all* (Figure 10), suggesting positive effects of participation. Participants also rated how much more they understood about the importance of space exploration on a 3-point scale (3, *more*, 2, *the same*, and 1, *less*). Overall, 82% of K-12 students and 77% of adults thought they understood *more* about the importance of space exploration immediately following participation in Astronomy Days (Figure 9).

To measure immediate contributions of specific Astronomy Days events to increases in participant awareness, evaluators asked for open-ended feedback on which events promoted an increased understanding of space science and exploration. The majority of K-12 students (76%) and adults (76%) reported at least one event increased their awareness of space science and exploration. The top three events mentioned by K-12 students and adults included various presenters/presentations, NASA, and the Astronomy Days event in its entirety (Table 1). Evaluator observations confirmed high levels of understanding at Astronomy Days events. For example, following the events, students and adults had several questions for presenters and appeared engaged in post-presentation discussions.

Table 1. K-12 student and adult perceptions of which Top 8 Astronomy Days events led to an increased awareness of space science and exploration (n = 413)

Events leading to increased awareness of space science and exploration	K-12 students (n = 166)	Adults (n = 247)	Total (n = 413)
NASA	18% (30)	18% (44)	18 % (74)
Presenters/Presentations	20% (34)	13% (33)	16% (67)
Other	13% (22)	16% (39)	15% (61)
Everything	11% (19)	12% (29)	12% (48)
Telescopes	5% (8)	9% (22)	7% (30)
Movies	5% (9)	7% (17)	6% (26)
Activities/Demonstrations	6% (10)	4% (10)	5% (20)
Rockets	7% (12)	2% (6)	4% (18)

Note. Numbers in parentheses represent total number of responses for each category.

To gauge long-term outcomes of participation in Astronomy Days, evaluators asked follow-up survey participants several questions related to interest in NASA and STEM careers, and the extent to which Astronomy Days influenced their interest. On separate 4-point scales ranging from 4, *a lot*, to 1, *not at all*, 95% of visitors rated their interest in NASA as *some* or *a lot* and 95% rated their interest in STEM careers as *some* or *a lot* at the six-month follow-up (Figure 11). On separate 5-point scales ranging from 5, *to a great extent*, to 1, *to no extent*, 43% of visitors attributed their interest in NASA and 40% attributed their interest in STEM careers *to much* or *great extent* to Astronomy Days (Figure 12).

Evaluators also asked two questions related to long-term STEM and NASA engagement outcomes of Astronomy Days participation. Since participating in Astronomy Days, follow-up survey participants reported:

- attending other activities offered by the Museum (39%),
- searching for additional information on NASA missions (32%),
- searching for additional information on STEM disciplines (15%), and
- searching for additional information related to NASA or STEM careers (14%).

Additionally, follow-up survey participants engaged in various STEM activities. Specifically, visitors used knowledge acquired from Astronomy Days participation to pursue interests or hobbies (44%), to educate others (36%), and applied knowledge in school or work (20%).

To assess the degree to which workshop participation increased middle and high school student STEM and NASA interest, evaluators asked workshop participants to rate their likelihood of engaging in future activities immediately after the event (on a 5-point scale ranging from 5, *extremely likely*, to 1, *extremely unlikely*) and to report whether they completed the same or similar activities six months later.⁴ Immediately after the workshops, participants indicated they were *likely* or *extremely likely* to

- attend future workshops offered by the Museum (99%),
- search for additional information on NASA missions (97%),
- search for additional information on STEM disciplines (94%), and
- search for additional information related to NASA or STEM careers (89%) (Figure 6).

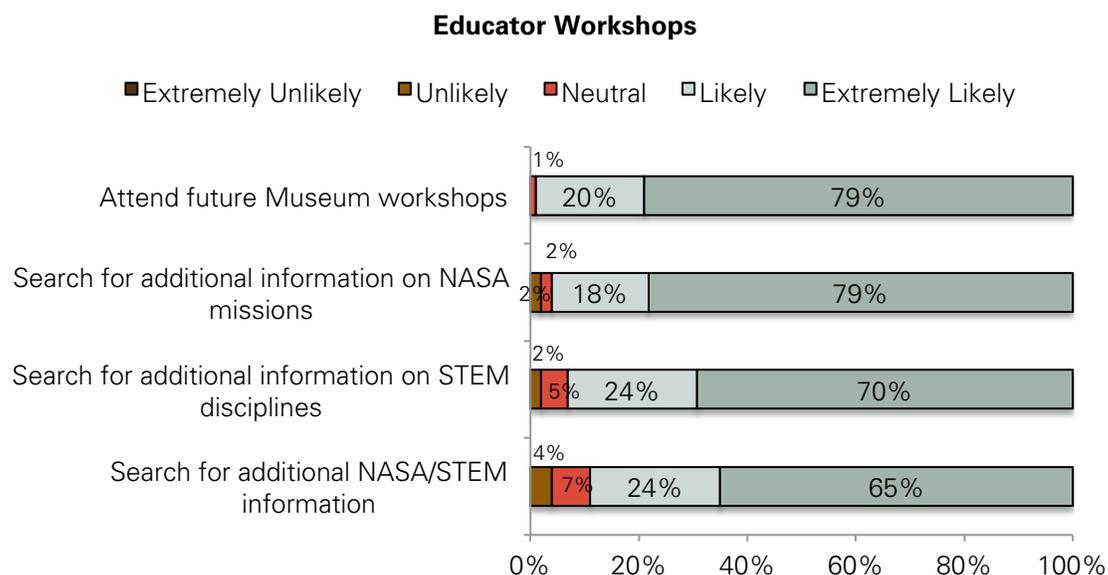


Figure 6. Educators reported likelihood of engaging in future STEM and NASA activities immediately after workshops (n = 168 participants from 2011-2014).

Six months following each NASA educator workshop, out of 55 respondents,

- 84% searched for additional information on NASA missions,
- 64% searched for additional information on STEM disciplines,
- 51% attended other workshops offered by the Museum, and
- 42% searched for additional information related to NASA or STEM careers.

⁴ Evaluators believe students can benefit from increased educator STEM and NASA engagement.

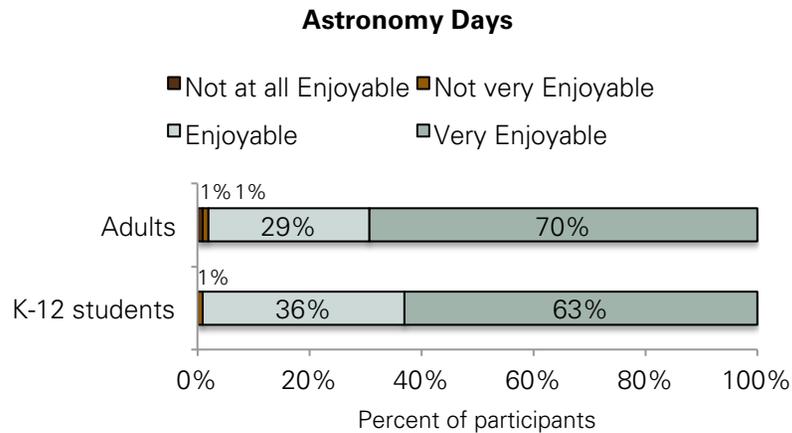


Figure 7. K-12 students and adults immediate ratings of enjoyment in Astronomy Days activities and demonstrations (n = 489 surveys from 2011-2013).

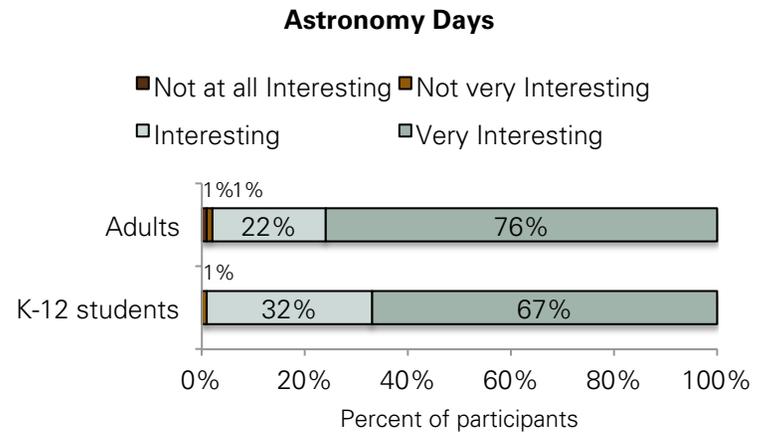


Figure 8. K-12 students and adults immediate ratings of interest in Astronomy Days activities and demonstrations (n = 450 surveys from 2011-2013).

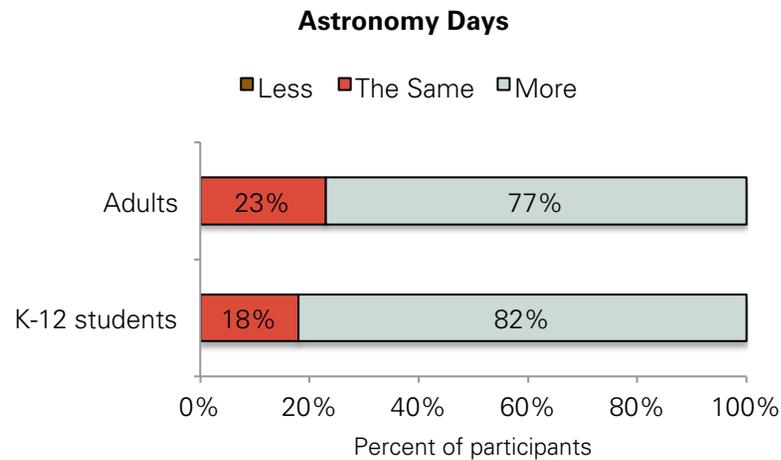


Figure 9. K-12 students and adults ratings of level of understanding about the importance of space exploration immediately after participating in Astronomy Days (n = 478 surveys from 2011-2013).

Astronomy Days

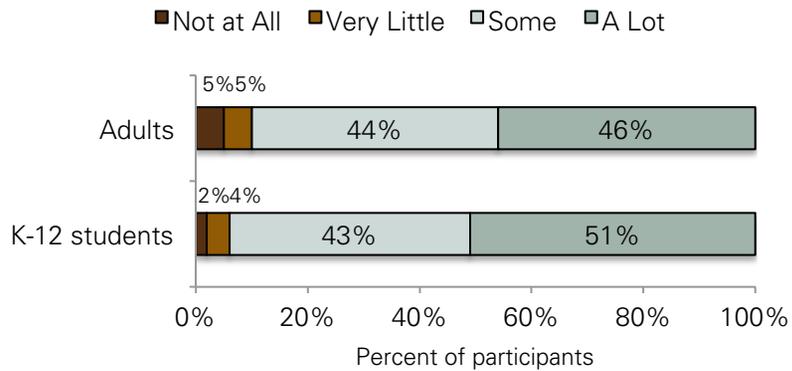


Figure 10. K-12 students and adults ratings of increased interest in NASA and STEM careers immediately after attending Astronomy Days (n = 472 surveys from 2011-2013).

Astronomy Days

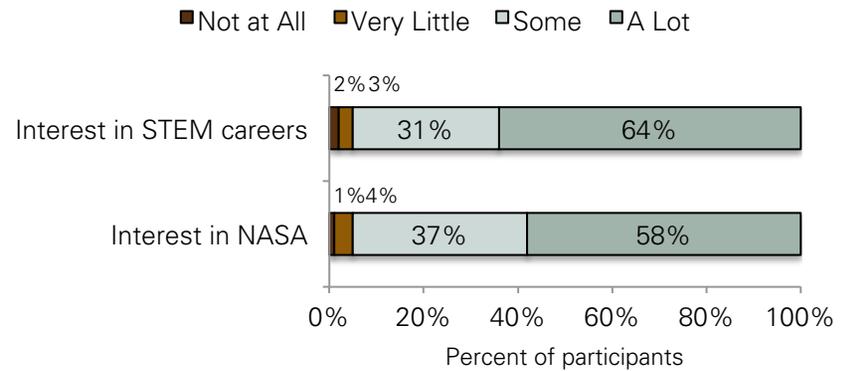


Figure 11. K-12 students and adults (combined) ratings of interest in NASA and STEM six months after attending Astronomy Days (n = 218 surveys from 2011-2013).

Astronomy Days

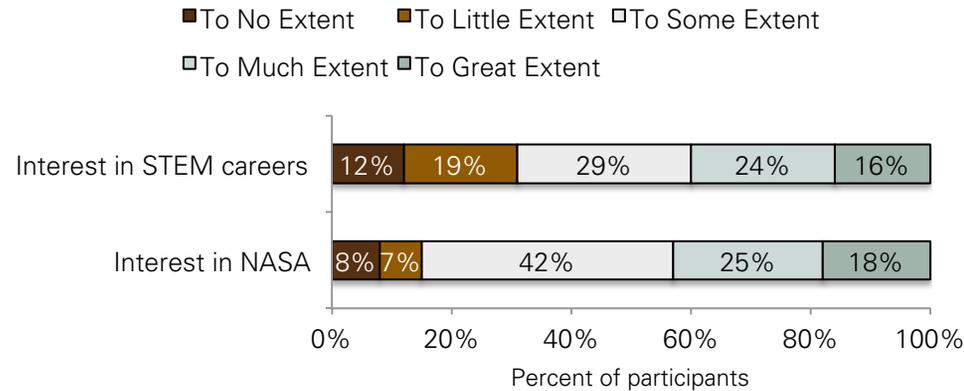


Figure 12. Extent to which K-12 students and adults (combined) attributed their interest in NASA and interest in STEM careers to Astronomy Days six months after attending the event (n = 254 surveys from 2011-2013).

Summary

For this evaluation, the North Carolina Museum of Natural Sciences set performance benchmarks related to key evaluation questions. These benchmarks and associated performance indicators are presented in Table 2. The museum met 10 out of 10 performance benchmarks for this project.

Astronomy Days

Survey findings and Astronomy Days observations suggest K-12 students and adults greatly enjoyed Astronomy Days and found the various activities interesting. Additionally, participants reported understanding more about the importance of space exploration. K-12 students and adults also reported having increased NASA and STEM interest and knowledge after the event.

Six months later, a follow-up sample of survey participants reported higher levels of STEM and NASA engagement, by using knowledge acquired from the yearly events in different aspects of their lives (i.e., pursuing hobbies or interests, educating others). Further, participants reported sustained interest in NASA and STEM, with many attributing this interest to Astronomy Days participation. Finally, several participants reported Astronomy Days participation motivated them to pursue other NASA and STEM activities (e.g., attending other museum activities, searching for additional NASA information).

Educator Workshops

Immediate and six-month follow-up surveys for the NASA educator workshops suggested participants gained astronomy knowledge and skills that they integrated into their existing curriculum. As a result, survey findings suggest educator workshops positively benefitted educators and their students.

Overall

Across three years of Astronomy Days and NASA educator workshops, visitors reported new or renewed interest and enjoyment in space science activities. Further, high levels of engagement during and after the events (e.g., using knowledge in their lives, sharing resources with students) emphasize high levels of participant appreciation for the different experiences.

Table 2. Evidence of meeting indicators

Evidence indicator set by museum	Percent of K-12 students	Percent of adults
Astronomy Days		
1) 75% of participants will report that they enjoyed Astronomy Days.	99%	99%
2) 75% of participants will report that the activities/demonstrations were interesting	99%	98%
3) 75% of participants will report increased knowledge in specific areas addressed by Astronomy Days	76%	76%
4) 75% of participants will report that they understand more about the importance of space exploration after participating in Astronomy Days	82%	77%
5) 60% of participants will indicate that their interest in NASA and STEM increased as a result of Astronomy Days immediately after the event.	94%	90%
6) 30% of participants will report that they applied some knowledge gained through the event in some aspect of their lives.	44% used knowledge to pursue hobbies or interests 36% used knowledge to educate others	
7) 40% of participants will report sustained interest in NASA and STEM over the six-month period following Astronomy Days, which they will attribute, at least in part, to participating in the event.	95% reported sustained interest in NASA and STEM 40-43% attributed interest to Astronomy Days	
8) 30% of participants will report that participating in Astronomy Days motivated them to pursue other activities related to NASA and/or STEM.	39% attended other museum activities 32% searched for additional NASA information	
Educator Workshops		
		Percent of responses where educators achieved knowledge-related workshop goals: 96%
9) 75% of participants will report that they gained knowledge and skills regarding ways to integrate astronomy activities into existing science, math, and language arts curriculum.	<i>n/a</i>	Percent of educators who reported being more knowledgeable about space-related topics: 98%
10) 60% of participants will report that they used the skills they learned to integrate specific astronomy activities into their existing science, math, and language arts curriculum.	<i>n/a</i>	Percent of educators reporting a likelihood of using activities: 91% Percent of educators using at least one activity in their instruction: 98%

Note. Red numbers indicate a particular indicator was not met.

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Appendix. Tables with Percentages by Year

Table A1. Educator workshop ratings of increased participant knowledge related to space topics, issues, and resources as a result of participating in workshops

Category	Year 1 (n = 81)	Year 2 (n = 59)	Year 3 (n = 31)	Total (n = 171)
7- Very much more	17% (14)	20% (12)	32% (10)	21% (36)
6	35% (28)	36% (21)	39% (12)	36% (61)
5	28% (23)	27% (16)	23% (7)	27% (46)
4- Somewhat	16% (13)	17% (10)	7% (2)	15% (25)
3	4% (3)	--	--	2% (3)
2	--	--	--	--
1- Not at all	--	--	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A2. Educator workshop ratings of effectiveness in helping participants achieve workshop-specific goals (combined across multiple goals)

Category	Year 1 (n = 271)	Year 2 (n = 224)	Year 3 (n = 180)	Total (n = 675)
Very Effective	70% (191)	66% (147)	68% (122)	68% (460)
Effective	25% (67)	30% (67)	30% (54)	28% (188)
Somewhat Effective	5% (13)	3% (7)	2% (4)	4% (24)
Ineffective	--	--	--	--
Very Ineffective	--	1% (3)	--	<1% (1)

Note. Numbers in parentheses represent total number of responses for each category.

Table A3. Educator workshop ratings related to likelihood of using workshop activities and resources in teaching (combined across multiple activities and resources)

Category	Year 1 (n = 563)	Year 2 (n = 268)	Year 3 (n = 103)	Total (n = 934)
Extremely Likely	56% (317)	65% (174)	64% (66)	60% (557)
Likely	34% (190)	28% (76)	25% (26)	31% (292)
Neutral	8% (46)	6% (15)	9% (9)	7% (70)
Unlikely	2% (9)	1% (3)	2% (2)	1% (14)
Extremely Unlikely	<1% (1)	--	--	<1% (1)

Note. Numbers in parentheses represent total number of responses for each category.

Table A4. Educator workshop ratings of reported likelihood of searching for additional information on NASA missions immediately after the workshop

Category	Year 1 (n = 82)	Year 2 (n = 57)	Year 3 (n = 29)	Total (n = 168)
Extremely Likely	74% (61)	81% (46)	86% (25)	79% (132)
Likely	22% (18)	16% (9)	10% (3)	18% (30)
Neutral	1% (1)	2% (1)	3% (1)	2% (3)
Unlikely	2% (2)	2% (1)	--	2% (3)
Extremely Unlikely	--	--	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A5. Educator workshop ratings of reported likelihood of searching for additional information on STEM disciplines immediately after the workshop

Category	Year 1 (n = 82)	Year 2 (n = 57)	Year 3 (n = 29)	Total (n = 165)
Extremely Likely	68% (56)	72% (41)	66% (19)	70% (116)
Likely	21% (17)	25% (14)	31% (9)	24% (40)
Neutral	10% (8)	2% (1)	--	5% (9)
Unlikely	1% (1)	2% (1)	3% (1)	2% (3)
Extremely Unlikely	--	--	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A6. Educator workshop ratings of reported likelihood of attending future Museum workshops immediately after the workshop

Category	Year 1 (n = 82)	Year 2 (n = 48)	Year 3 (n = 29)	Total (n = 159)
Extremely Likely	78% (64)	84% (39)	79% (23)	79% (126)
Likely	22% (18)	14% (8)	21% (6)	20% (32)
Neutral	--	2% (1)	--	1% (1)
Unlikely	--	--	--	--
Extremely Unlikely	--	--	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A7. Educator workshop ratings of reported likelihood of searching for additional information related to NASA or STEM careers immediately after the workshop

Category	Year 1 (n = 81)	Year 2 (n = 57)	Year 3 (n = 29)	Total (n = 167)
Extremely Likely	65% (53)	68% (39)	59% (17)	65% (109)
Likely	21% (17)	28% (16)	24% (7)	24% (40)
Neutral	9% (7)	4% (2)	10% (3)	7% (12)
Unlikely	5% (4)	--	7% (2)	4% (6)
Extremely Unlikely	--	--	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A8. K-12 students and adults immediate ratings of enjoyment in Astronomy Days activities and demonstrations

Category	Year 1		Year 2		Year 3		Total	
	K-12 students (n = 21)	Adults (n = 70)	K-12 students (n = 45)	Adults (n = 110)	K-12 students (n = 121)	Adults (n = 122)	K-12 students (n = 187)	Adults (n = 302)
Very Enjoyable	76% (16)	76% (53)	62% (28)	68% (75)	61% (74)	69% (84)	63% (118)	70% (212)
Enjoyable	19% (4)	24% (17)	38% (17)	31% (34)	39% (47)	30% (37)	36% (68)	29% (88)
Not very Enjoyable	5% (1)	--	--	--	--	1% (1)	1% (1)	<1% (1)
Not at all Enjoyable	--	--	--	1% (1)	--	--	--	<1% (1)

Note. Numbers in parentheses represent total number of responses for each category.

Table A9. K-12 students and adults immediate ratings of interest in Astronomy Days activities and demonstrations

Category	Year 1		Year 2		Year 3		Total	
	K-12 students (n = 21)	Adults (n = 70)	K-12 students (n = 45)	Adults (n = 110)	K-12 students (n = 121)	Adults (n = 119)	K-12 students (n = 187)	Adults (n = 263)
Very Interesting	81% (17)	74% (52)	53% (24)	62% (68)	70% (84)	69% (81)	67% (125)	76% (201)
Interesting	10% (2)	26% (18)	47% (21)	36% (4)	31% (37)	31% (37)	32% (60)	22% (59)
Not very Interesting	10% (2)	--	--	<1% (1)	--	<1% (1)	1% (2)	1% (2)
Not at all Interesting	--	--	--	<1% (1)	--	--	--	<1% (1)

Note. Numbers in parentheses represent total number of responses for each category.

Table A10. K-12 students and adults ratings of level of understanding about the importance of space exploration immediately after participating in Astronomy Days

Category	Year 1		Year 2		Year 3		Total	
	K-12 students (n = 21)	Adults (n = 68)	K-12 students (n = 45)	Adults (n = 108)	K-12 students (n = 119)	Adults (n = 119)	K-12 students (n = 185)	Adults (n = 293)
More	90% (19)	81% (55)	84% (38)	77% (83)	79% (94)	73% (87)	82% (151)	77% (225)
The Same	10% (2)	10% (13)	16% (7)	22% (24)	21% (25)	26% (31)	18% (34)	23% (68)
Less	--	--	--	<1% (1)	--	<1% (1)	--	--

Note. Numbers in parentheses represent total number of responses for each category.

Table A11. K-12 students and adults ratings of increased interest in NASA and STEM careers immediately after participating in Astronomy Days

Category	Year 1		Year 2		Year 3		Total	
	K-12 students (n = 21)	Adults (n = 68)	K-12 students (n = 45)	Adults (n = 105)	K-12 students (n = 116)	Adults (n = 117)	K-12 students (n = 182)	Adults (n = 290)
A Lot	62% (13)	53% (36)	49% (22)	45% (47)	50% (58)	43% (50)	51% (93)	46% (133)
Some	29% (6)	40% (27)	44% (20)	44% (46)	46% (53)	47% (55)	43% (79)	44% (128)
Very Little	5% (1)	3% (2)	7% (3)	5% (5)	3% (3)	6% (7)	4% (7)	5% (14)
Not at all	5% (1)	4% (3)	--	7% (7)	2% (2)	4% (5)	2% (3)	5% (15)

Note. Numbers in parentheses represent total number of responses for each category.

Table A12. K-12 students and adults (combined) ratings of increased interest in NASA six months after attending Astronomy Days

Category	Year 1 (n = 27)	Year 2 (n = 30)	Year 3 (n = 56)	Total (n = 113)
A Lot	78% (21)	33% (10)	62.5% (35)	58% (66)
Some	22% (6)	60% (18)	32.1% (18)	37% (42)
Very Little	--	7% (2)	3.6% (2)	4% (4)
Not at All	--	--	1.8% (1)	1% (1)

Note. Numbers in parentheses represent total number of responses for each category.

Table A13. K-12 students and adults (combined) ratings of increased interest in STEM careers six months after attending Astronomy Days

Category	Year 1 (n = 27)	Year 2 (n = 30)	Year 3 (n = 57)	Total (n = 105)
A Lot	74% (20)	60% (18)	50.9% (29)	64% (67)
Some	22% (6)	20% (6)	36.8% (21)	31% (33)
Very Little	--	7% (2)	1.8% (1)	3% (3)
Not at All	--	3% (1)	1.8% (1)	2% (2)

Note. Numbers in parentheses represent total number of responses for each category.

Table A14. Extent to which K-12 students and adults (combined) attributed their interest in NASA to Astronomy Days at the six-month follow-up survey

Category	Year 1 (n = 27)	Year 2 (n = 30)	Year 3 (n = 57)	Total (n = 114)
To Great Extent	18.5% (5)	13% (4)	21.1% (12)	18% (21)
To Much Extent	18.5% (5)	23% (7)	28.1% (16)	25% (28)
To Some Extent	55.6% (15)	40% (12)	36.8% (21)	42% (48)
To Little Extent	7.4% (2)	7% (2)	7% (4)	7% (8)
To No Extent	--	17% (5)	7% (4)	8% (9)

Note. Numbers in parentheses represent total number of responses for each category.

Table A15. Extent to which K-12 students and adults (combined) attributed their interest in STEM careers to Astronomy Days at the six-month follow-up survey

Category	Year 1 (n = 26)	Year 2 (n = 29)	Year 3 (n = 55)	Total (n = 110)
To Great Extent	19.2% (5)	17% (5)	15% (8)	16% (18)
To Much Extent	19.2% (5)	24% (7)	26% (14)	24% (26)
To Some Extent	23.1% (6)	21% (6)	36% (20)	29% (32)
To Little Extent	26.9% (7)	21% (6)	15% (8)	19% (21)
To No Extent	11.5% (3)	17% (5)	9% (5)	12% (13)

Note. Numbers in parentheses represent total number of responses for each category.