Programmatic Evaluation of The IlluminationSpace Hub

Prepared May 2023

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CASE scholars are engaged in all aspects of research, development and evaluation of various educational reform efforts, ranging from providing and evaluating teacher professional development, to instructional interventions, to large scale assessment activities. With nearly four decades of experience, CASE has demonstrated success in developing and evaluating educational innovations and reforms; using state-of-the-art quantitative analytics; and providing technical assistance in strategic planning to educational programs. CASE is also committed to developing and strengthening the connections among and between educational theory, research, evaluation, and communities of practice.

INTRODUCTION

The CUNY ASRC IlluminationSpace Hub (IS HUB) is a Harlem-based Center for STEM Education, Outreach and Science Communication designed to broaden opportunities and support retention of students who are underrepresented in STEM. The hub is housed at the

Advanced Science Research Center at the CUNY Graduate Center (CUNY ASRC). This state-of-the-art facility supports research in five increasingly connected and critical areas of discovery: nanoscience, photonics, structural biology, neuroscience, and environmental science. CUNY ASRC opened its doors in 2014 with a mandate to elevate interdisciplinary science across CUNY and greater New York City. Creating a more inclusive, diverse STEM community is a critical component to fostering the competitive, highly skilled talent needed to achieve this mandate. There are four primary components of the IS Hub's program model; 1) Youth Programs; 2) Community Sensor Lab (CSL); 3) the Science Communication Academy; and the 4) Digital Community. Each component uses a variety of technological tools to share information and teach STEM skills that can address community needs, connect scientists and communities around shared interests, and provide on ramps to STEM careers.

The IS HUB **Youth Programs** aim to partner with NYC public schools, teachers and other CUNY programs to provide STEM educational opportunities to underserved populations. The field trip program is designed to benefit young student visitors and educators/teachers as well as undergraduate science explainers and CUNY ASRC research volunteers who learn STEM outreach and youth mentorship skills. Field trips and other outreach programming are facilitated by a coordinator and team of undergraduate interns, known as science facilitators. There are virtual and in-person field trips for students, virtual classroom resources, an on-going and intentional pairing of students with ASRC researchers and a new STEM teacher residency program that will launch in the fall 2023.

The **Community Sensor Lab** is a series of workshops that trains high school students and community members to build low-cost environmental monitoring sensors, which provide data that can be used to help communities address their environmental concerns and advance environmental justice. Training curriculum revolves around building and designing environmental monitoring devices with simple, low-cost DIY electronics. Through different project-based modules, students learn the basics of sensor technology, how to troubleshoot systems, the literature and terminology of sensors and microcontrollers, and related STEM skills. Furthermore, given the community-science nature of the project modules, the curriculum also incorporates skills-building in public speaking, social media documentation, open-access technology, and community outreach.

The **Science Communication Academy** engages CUNY STEM faculty and graduate students in learning and practicing how to communicate complex science to diverse audiences. In addition, participants also learn how to advocate for STEM and STEM based projects in the

interest of communities and the general public. Through webinars and workshops, participants learn how to communicate science effectively and with varied audiences. In addition, each year the IS HUB offers a paid, science communication fellowship that pairs STEM graduate students with CUNY journalism graduate students in the health and science reporting track to explore the components of effective science communication. The fellowship culminates with a final project that creates and distributes lay friendly science content to a general audience.

The **Digital** Community will serve as the access point for the IS Hub's public engagement efforts and goals. This platform will provide guidance that facilitates general-public use of open-source STEM technologies and published research; touchpoints that foster research collaboration between local BIPoC communities and CUNY scientists; information that assists with data-driven policy change; and science advocacy training opportunities for communities. The IS Digital Community will also aggregate, utilize and disseminate data and outputs created by other programmatic components, providing community members with a clear snapshot of the IS Hub's work over time.

As we explain in detail later, our findings suggest that IS HUB is well conceived, implemented and continuing to expand. Three out of the four "pillars" of the program are fully operational, and the fourth pillar (the digital community) is under active development.

This report is written and prepared by the evaluator. The organization of this report is straightforward; I begin by describing the methods and techniques used to conduct the evaluation, and then go on to provide additional detail on the data collected. The report closes by summarizing our findings, including project goals for the upcoming year and offering recommendations to the project's management team as it continues to develop the IS HUB.

EVALUATION METHODOLOGY

The evaluation used a mixed methods approach, relying on both qualitative and quantitative data and information to study the salient components of the ASRC IS HUB. The multi-methods evaluation is using a wide range of data collected by the project staff and the evaluator. Data include observations and notes from project meetings. Internal data collected by the project staff (e.g., survey responses), artifacts collected during project activities (e.g., dissemination activities), and data collected by the evaluator such as observation of focus groups and analysis of the project website are being used to document and assess the work.

The evaluation synthesizes evidence from different sources to draw conclusions about overall progress and to answer the evaluation questions. Reoccurring themes that are found within and across data sources are identified. Confidence in the evaluation conclusions will increase with consistent findings across different sources.

The goal of this evaluation report is to answer the following questions:

- How effective was the program in expanding and growing the four components of the program; 1) youth programs; 2) Community Sensor Lab; 3) the Science Communication Academy; and the 4) Digital Community?
- Specifically, how effective was the program in reaching project benchmarks such as expanding participation (including students of color who are traditionally underrepresented in STEM fields) and developing materials in the following model areas: 1) field trip participation 2) CSL participants and community partnerships; participation in CYS webinars; and 4) participation in the science communications fellowship.
- How effective was the program in impacting the stakeholders it serves?

To address the above questions, evaluation activities consisted of the following:

- Documentation and review of the IS HUB website.
- Analyze selected historical surveys. Collaborate with the project team to design future surveys, interview protocols and focus group protocols. Surveys will assess not only student, participant and stakeholder perceptions of program quality, but outcomes as aligned with program goals.
- Participate and document project meetings and other events such as focus groups.
- Conduct interviews with project staff to discuss program successes and opportunities for program improvements.

EVALUATION FINDINGS

The following report presents results from: 1) selected surveys 2) highlights from a focus group and 3) an analysis of the project website. The report is organized in the following way: findings and results are presented around each of the four pillars of the program and then lastly, the IS HUB website.

Youth Program and Field Trips

The following section describes the findings regarding the arm of the project that covers youth programs/field trips. First, we review surveys finding for virtual field trips, followed by findings from in-person field trips.

Virtual Field Trips

Virtual field trips were conducted during the pandemic pause. Virtual field trips allow teachers and students to "virtually" visit the IlluminationSpace. Below in Table 1, students report their viewpoints on science, the role of scientists and the presentations. As you can see, students gave high ratings to various aspects of the experience. In particular, students responded with high levels of agreement to statements that the speakers were knowledgeable, "science is exciting to me" and the "presentation was easy to follow and understand." Students also were likely to disagree with such statements as 'science is confusing to me" and 'I find scientists intimidating to me."

Table 1. Student ratings of virtual field trips: April 2020 (n=23)

Statement	Level of agreement					Weighted Average
	Strongly Disagree (1)	Disagree (2)	Neither agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	
Science is exciting to me	0 0.00%	0 0.00%	2 8.70%	7 30.43%	14 60.87%	4.52
I would like to be a scientist after I finish school	2 8.70%	3 13.04%	7 30.43%	5 21.74%	6 26.09%	3.43
I learned something new today that I will share with someone else	0 0.00%	0 0.00%	1 4.35%	11 47.83%	11 47.83%	4.43
The presentation given today was easy to follow and understand	0 0.00%	0 0.00%	0 0.00%	9 39.13%	14 60.87%	4.61
Science is confusing to me	0 0.00%	9 39.13%	8 34.78%	5 21.74%	0 0.00%	2.70
I learned more about CUNY today	0 0.00%	0 0.00%	2 8.70%	12 52.17%	9 39.13%	4.30
I find scientists intimidating	4 17.39%	7 30.43%	10 43.48%	0 0.00%	2 8.70%	2.52
I plan to research more about what I learned today	1 4.35%	1 4.35%	7 30.43%	10 43.48%	4 17.39%	3.65
I will recommend the ASRC to others	0 0.00%	0 0.00%	2 8.70%	13 56.52%	8 34.78%	4.26
Science is important to my everyday life	0 0.00%	0 0.00%	3 13.04%	9 39.13%	11 47.83%	4.35

Statement	Level of agreement					Weighted Average
	Strongly Disagree (1)	Disagree (2)	Neither agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	
The speakers were knowledgeable	0 0.00%	0 0.00%	0 0.00%	4 17.39%	19 82.61%	4.83
The presentation was immersive and exciting	0 0.00%	0 0.00%	3 13.04%	11 47.83%	9 39.13%	4.26
I would like the ASRC to do more trips online	0 0.00%	1 4.35%	7 30.43%	7 30.43%	8 34.78%	3.96

Responses to the open-ended question, “when listening in (to the presentation), I thought about?”, were sorted into categories determined by the responses. Table 2 displays the frequencies of the top four categories. As indicated below, the most frequent response reported by the respondents was that they that they were learning a lot. The second most frequent response was becoming more knowledgeable about the topic. Students used the word “informative” often in their comments. One student felt inspired wrote that “*I want to pursue a career in science because it is very interesting.”*

Table 2. Response categories to: When listening in, I thought about…

Category	Frequency
Learning a lot	7
Becoming knowledgeable	3
Interested in science	2
Interested in careers in science	1

The same process was applied to responses to “what was your favorite part?”. Table 3 below, displays the frequencies to the top four categories. Students most often responded by citing certain science topics. The second most favorite aspect of the virtual field trip was the tour. Specifically, students reported that they enjoyed hearing about the home remedies such as *“honey”*. Several students reiterated that they enjoyed the “tour”. One student even noted that the virtual aspect of the tour was a strong positive, “*it's nice how I don't have to be there in-person for convenience, but I can still learn about the topic”.*

Table 3. Response categories to: What was your favorite part?

Category	Frequency
Specific science topics	4
Tour	3
Presentation	2
Overall enjoyment	2

In the spring of 2021, students reported their perceptions after a virtual field trip. Statements having to do with the speakers and the actual presentation got the highest ratings with the statement that "the speakers were knowledgeable" receiving the highest level of agreement. Consistent with ratings in 2020, these students also expressed high levels of disagreement to negative statements such as "science is confusing to me" and "I find scientists intimidating."

Table 4. Student ratings of virtual field trips: Spring 2021 (N=60)

Statement	Level of agreement					Weighted Average
	Strongly Disagree (1)	Disagree (2)	Neither agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	
Science is exciting to me	2 3.33%	3 5.00%	13 21.67%	19 31.67%	23 38.33%	3.97
I would like to be a scientist after I finish school	13 21.67%	15 25.00%	15 25.00%	10 16.67%	7 11.67%	2.72
I learned something new today that I will share with someone else	2 3.33%	6 10.00%	11 18.33%	18 30.00%	23 38.33%	3.90
The presentation given today was easy to follow and understand	0 0.00%	1 1.67%	8 13.33%	19 31.67%	32 53.33%	4.37
Science is confusing to me	11 18.33%	15 25.00%	21 35.00%	10 16.67%	3 5.00%	2.65
I learned more about CUNY today	1 1.67%	0 0.00%	19 16.67%	20 33.33%	29 48.33%	4.27
I find scientists intimidating	26 43.33%	14 23.33%	10 16.67%	6 10.00%	4 6.67%	2.13
I plan to research more about what I learned today	10 16.67%	10 16.67%	10 33.33%	11 18.33%	9 15.00%	2.98
I will recommend the ASRC to others	2 3.33%	3 5.00%	16 26.67%	22 36.67%	17 28.33%	3.82
Science is important to my everyday life	2 3.33%	4 6.67%	8 13.33%	13 21.67%	33 55.00%	4.18
The speakers were knowledgeable	0 0.00%	0 0.00%	6 10.00%	9 15.00%	45 75.00%	4.65
The presentation was immersive and exciting	2 3.33%	3 5.00%	9 15.00%	21 35.00%	25 41.67%	4.07

Statement	Level of agreement					Weight-ed Average
	Strongly Disagree (1)	Disagree (2)	Neither agree nor Disagree (3)	Agree (4)	Strong-ly Agree (5)	
I would like the ASRC to do more trips online	4 6.67%	3 5.00%	15 25.00%	13 21.67%	25 41.67%	3.87

Using the same process as above, the responses to the open-ended question, “when listening in (to the presentation), I thought about?”, were sorted into categories determined by the responses. Table 5 presents the top four categories of the open-ended responses to “when listening in, I thought about?”. The responses indicate that students had positive impressions about science in general. They also expressed interest and curiosity about topics and thought they were learning a lot.

Table 5. Response categories to: When listening in, I thought about…

Category	Frequency
General positive thoughts about science	29
Interested and curious	14
Learning a lot	7
Importance of science and learning	4

Table 6 reports the level of agreement to a set of statements (different statements than above) for virtual field trips in the summer of 2022. The IlluminationSpace field trip was well received, with notable favorite parts including the neuroscience application space, protein structure demo, games, and interactive visuals. Participants suggested that the IlluminationSpace could be improved by incorporating more 3D elements and making sure all applications are fully functional. In terms of the virtual experience, participants enjoyed the close-up view of spaces and the detail provided. Suggestions for improvement included incorporating more 3D and interactive elements and making movement easier. Participants expressed interest in seeing more virtual tours and interactive experiments. Overall, participants were impressed by the IlluminationSpace and expressed gratitude for the opportunity to attend.

Table 6. Summer 2022: Virtual field trip participant level of agreement (n=10)

Statement	Level of agreement					Weighted mean
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	

The IlluminationSpace is fun and engaging	0 0.00%	0 0.00%	0 0.00%	5 50.00%	5 50.00%	4.50
The IlluminationSpace is easy to use	0 0.00%	0 0.00%	3 30.00%	2 20.00%	5 50.00%	4.20
I learned something new in the IlluminationSpace	0 0.00%	0 0.00%	1 10.00%	1 10.00%	8 80.00%	4.70
I would like to spend more time in the IlluminationSpace	0 0.00%	1 10.00%	1 10.00%	4 40.00%	4 40.00%	4.10
The new virtual experience is fun and engaging	0 0.00%	0 0.00%	2 20.00%	5 50.00%	3 30.00%	4.20
The new virtual experience is easy to use	0 0.00%	1 10.00%	1 10.00%	4 40.00%	4 40.00%	4.10
I learned something new in the virtual experience	0 0.00%	0 0.00%	2 20.00%	3 30.00%	5 50.00%	4.30
I would like to spend more time exploring the virtual experience	0 0.00%	1 10.00%	1 10.00%	3 30.00%	5 50.00%	4.20
I would like the ASRC to do more trips online	0 0.00%	0 0.00%	4 40.00%	4 40.00%	2 20.00%	3.80

In-Person Field Trips

In-person field trips resumed with more regularity in 2022 as COVID restrictions eased. It is important to note that this data reflects only the students who responded to surveys. As indicated below in table 7, most respondents attend middle or high school. The majority of students reported their ethnicity as Black or African American. The second highest group reported is Latino/ Hispanic. Most students reported living in the Bronx or Manhattan. More females than males participated in the field trips.

Table 7. Demographics of in-person field trips 2022 (n=53)

	Spring thru Fall 2022
	N=53 (100.00%)
Student	
Elementary	1 (1.89%)
Middle	25 (47.17%)
High School	21 (39.62%)
College	5 (9.43%)
Graduate School	1 (1.89%)
Faculty	0 (0.00%)

Total for students	53 (100.00%)
Race/Ethnicity	
Asian	2 (3.85%)
American Indian or Alaskan Native	0 (0.00%)
Black or African American	23 (44.23%)
Black or African American/Asian	1 (1.92%)
Black or African American/Indian/Caribbean	1 (1.92%)
Black or African American/Latino	3 (5.80%)
Latino/Hispanic	21 (40.38%)
Latino/Hispanic/White	1 (1.92%)
White	0 (0.00%)
Other	0 (0.00%)
Total for race/ethnicity	52 (100.00%)
Borough of Residence	
Bronx	25 (48.08%)
Brooklyn	2 (3.85%)
Manhattan	21 (40.38%)
Queens	2 (3.85%)
Outside 5 boroughs	0 (0.00%)
N/A	2 (3.85%)
Total for borough	52 (100.00%)
Gender	
Female	35 (66.04%)
Male	13 (24.53%)
Non-Binary	3 (5.66%)
Prefer not to answer	2 (3.77%)
Total for gender	53 (100.00%)

Figure 1 below, represents the distribution of race/ethnicity for students that responded to the survey. As you can see, most students self-identified as Black/African American (44%) and Latino/Hispanic (40%). One of the aims of IS HUB is to expose BIPOC students to science in ways that will not only educate and trigger their interest but provide possible entry points to STEM careers.

Figure 1. Race & ethnicity of respondents to in-person field trip surveys: Spring thru fall 2022 (n = 52)

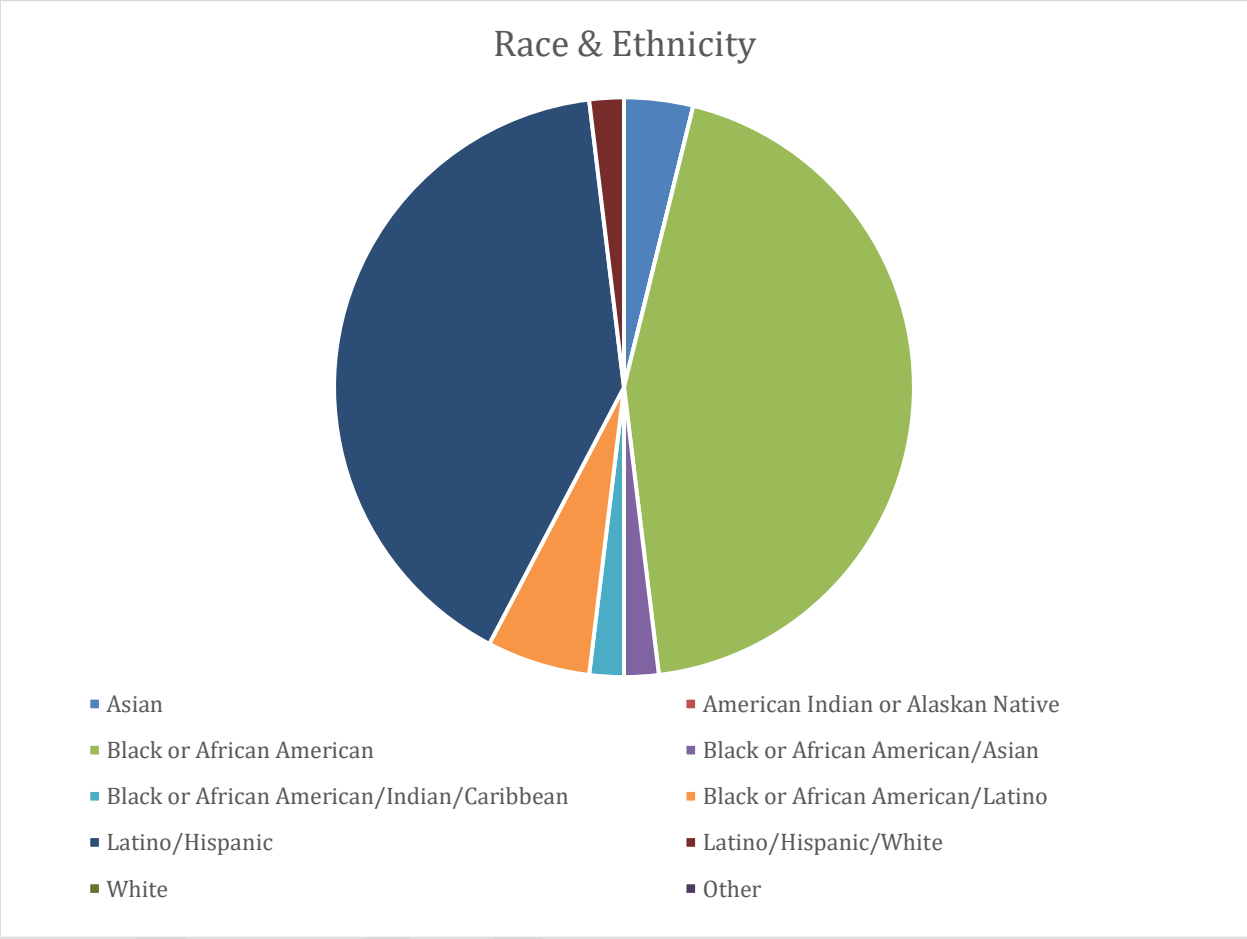

Table 8 below, reports the students' level of agreement to various statements. Students reported high levels of agreement to positive statements and low levels agreement to negative statements about science. Interestingly, the ratings are somewhat higher (and lower) compared to the ratings of virtual field trips (see tables above) but not substantively so. The data suggest that virtual field trips are a viable mode for informal science learning.

Table 8. Spring through fall 2022: In-person field trip participant level of agreement (n=51)

Statement	Level of agreement					Weighted mean
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	
Science is exciting to me	0 0.00%	1 1.92%	6 11.54%	21 40.38%	24 46.15%	4.30
I would like to be a scientist after I finish school	3 5.77%	14 26.92%	18 34.62%	7 13.46%	10 19.23%	3.13
I learned something new today that I will share with someone else.	1 1.92%	0 0.00%	7 13.46%	17 32.69%	27 51.92%	4.33
The presentation given today was easy to follow and understand.	0 0.00%	3 5.77%	5 9.62%	17 32.69%	27 51.92%	4.30
Science is confusing to me.	8 15.69 %	14 27.45%	11 21.57%	13 15.00%	5 9.80%	2.87
I learned more about CUNY today.	1 1.92%	2 3.85%	7 13.46%	16 30.77%	26 50.00%	4.23
I find scientists intimidating.	10 19.61 %	14 27.45%	15 29.41%	8 15.69%	4 7.84%	2.64
I plan to research more about what I learned today.	3 (5.77 %)	1 (1.92%)	16 (30.77%)	19 (36.54 %)	13 (25.00%)	3.73
I will recommend the ASRC to others.	0 (0.00 %)	3 (6.00%)	7 (14.00%)	16 (32.00 %)	24 (48.00%)	4.22
Science is important to my everyday life.	0 (0.00 %)	2 (4.000 %)	6 (12.00%)	18 (36.00 %)	24 (48.00%)	4.28
The speakers were knowledgeable.	0 (0.00 %)	0 (0.00%)	3 (6.38%)	10 (21.28 %)	34 (72.34%)	4.66
The presentation was immersive and exciting.	0 (0.00 %)	0 (0.00%)	6 (12.00%)	14 (28.00 %)	30 (60.00%)	4.48

I would like the ASRC to do more trips online.	1 (2.50 %)	1 (2.50%)	12 (30.00%)	11 (27.50 %)	15 (37.50%)	3.95

When asked what their favorite part of the trip was, students were overwhelmingly positive. Most responses mentioned seeing the labs were their favorite part of the trip. However, other responses included “learning about neuroscience”, “looking at the cool science games”, “all of it but mostly learning about chemical science”. When asked what they would like to see or do more, students mentioned watching more of the lab activities and speaking to the scientists about their jobs and what they are working on. Other frequently cited comments were “learning more about neuroscience.”

Students were asked what they would tell a teacher who asked why you should bring students to the ASRC. Again, their responses were highly positive. Many responses centered around how powerful and compelling the trip was. For example, one student wrote that “*I would tell a teacher to bring their students to ASRC to learn more about interdisciplinary science principles/topics*” and another stated that *“I would tell teachers interested in bringing to students to the ASRC to prepare their students for a breathtaking experience right here in NYC! The labs at the center feature some amazing research that will help us learn more about so many things in our world related to the environment, our brains, and more!”* Other students responded that the interactive feature of the ASRC was a key strength; “*I would tell ‘them to go because it’s very cool and awesome to see science in real life”.* Another wrote that *“for those who love science just as much as me you’ll get a hands-on experience in the wonderful place learning about earth science, computer science etc…”* Student responses highlighted another theme of the trips showing students career possibilities. For example, a student wrote that “*I would tell them that students should come here because it gives kids an idea of what they could do in the future”.* Another wrote that *“I think they should because they can figure out what they want to be when they grow up and have an idea on it”.*

Table 9 below, reports the frequencies of sorted open-ended responses to “I wondered about…” during the field trip. As you can see, students reported wondering about various science topics the most and also reported thinking about being science interest in general. The visit also sparked thoughts about the ASRC technology and equipment.

Table 9. Response categories to: *I wondered about…*

Category	Frequency
Various specific science topics	8

Interested in general science	6
Technology/equipment	5
Opportunities at the ASRC	2

Table 10 displays the frequencies of sorted responses to reasons why or why not a teacher should bring students to the ASRC. Responses were highly enthusiastic, with students reporting that the visit was recommended for learning and secondly, for overall fun and a positive experience. Significantly, students also mentioned the power of the ASRC field trip to inspire students to become scientists and think about science as a possible career path.

Table 10. Response categories to: *Why a teacher should bring students to the ASRC*:

Category	Frequency
Recommended for learning	13
Positive experiences/fun	11
Inspiring future scientists	8
To learn about interdisciplinary science	2

Summary of Field Trip Survey Responses

The responses indicate that students thought the visits, speakers and presentations were engaging and interesting. Of significant interest, is that some responses revealed that students viewed the field trips as an opportunity and a springboard to learn more and to possibly explore careers in science. These positive reviews suggest the ASRC IS HUB is able to translate complex science into smaller, more easily digestible chunks for students, who do not have an advanced science background. In other words, the project is modeling one of its mission goals which is communicating advanced science to the public in an engaging, informative way. In addition, the visitor population demographic information suggests that the field trips are meeting another critical benchmark which is serving students who are underrepresented in STEM.

Community Sensor Lab (CSL)

The CSL collaborates with local high schools and communities to create curriculum and environmental sensors aimed at environmental justice. Environmental sensors are a series of sensors that monitor the environment and identify the quality of the environment. Examples of environmental sensors are soil sensors, temperature and humidity sensors, gas sensors, rainfall sensors, light sensors, wind speed and direction sensors. A key component of the CSL are the CUNY undergraduate students who serve as interns during the summer and learn about

working with local communities, data literacy, building low-cost environmental sensors. This experience provides an opportunity for students develop STEM related skills and understand how science research is related to the public interest. The following section describes CSL intern responses to the summer 2021 and summer 2022 surveys.

Table 11. CSL intern demographics based on survey data.

	Summer 2021	Fall 2020 / Spring 2021	Summer 2022	Fall 22 / Spring 2023	Total
	4	4	4	7	18
Race/Ethnicity					
Asian	0	1	3	3	5
American Indian or Alaskan Native	0	0	0	0	0
Black or African American	2	1	1	1	5
Latino/Hispanic	1	0	0	1	2
White	2	1	0	0	3
Multiracial	0	0	0	1	1
Other	0	1	0	1	2
Gender					
Female	2	2	1	4	9
Male	1	2	3	3	9
Age					
Under 18	0	0	0	0	0
18-22	2	3	2	3	10
23-27	1		1	2	4
28-32	1	1	1	1	4
Over 32	0	0	0	1	1
I prefer not to say	0	0	0	0	0

Summer 2021 CSL Interns

Participants were asked to provide feedback on their summer experiences, virtual learning, in-lab learning, and the importance of the CSL. Most participants enjoyed the rooftop

view of the ASRC building and being together with everyone in the lab, while others loved the experience of working at Red Hook Farm and teaching students about air quality and sensor building. One intern noted that "*the biggest highlight was seeing the potential of the sensor projects in the neighborhood, and in that farm specifically, being nestled between all of this construction and traffic activity that opened so many doors to so many questions about air quality, the potential of green urban spaces to offset emissions, and the health/quality of life impacts on residents. Another highlight was the trajectory of student learning unfolding before us as the students became more comfortable with a lot of the concepts and continuously volunteered their own concerns/opinions about their own livelihoods surrounding their neighborhood and impacts."*

When asked what was special about the CSL, interns reported that the hands-on work was meaningful especially in comparison to in-class academics and exams. *"It gives college students a chance to get hands on experience with technical work, rather than the exams and quizzes I am used to."* The feedback revealed that the CSL provided an opportunity to work in a collaborative way with communities. **One intern reported that "*unlike other scientific models or projects, it doesn't just approach people with tools and inaccessible scientific repositories of knowledge and say, 'here's what we have and we're going to do XYZ' but the lab actually asks, 'what is it that this community needs from us and how can we provide it'. It's a model for how every science program or project should operate.***

Several respondents found virtual learning helpful, especially when work was to be completed online. However, they also recognized that in-person learning is more effective for hands-on skill building lessons like soldering. The importance of the CSL was highlighted, with respondents appreciating the opportunity to gain hands-on technical work experience, the supportive community, and the focus on bridging the gap between scientific and non-scientific worlds. Participants reported that they learned and improved technical skills like coding, soldering, and troubleshooting, as well as personal skills such as teaching, presentation, and environmental science knowledge.

Summer 2022 CSL Interns

Summer 2022 participants reported that building a sensor and working as a team brought the most joy during the summer. When asked what was special or important about the CSL internship, respondents noted the environmental justice aspect of the program. One intern wrote that *"building technology for environmental justice"* was important. Another respondent noted that *"the Community Sensor Lab is particularly important as it forces people to confront*

the fact that global warming is slowly affecting our daily lives, propelling them to make movements to prevent it from spreading further."

Virtual learning was not preferred, but it was helpful for explanations about coding. In-person lab learning was beneficial due to the hands-on experience and relevant examples. The CSL was appreciated for its focus on environmental justice and providing technology education. One intern noted that she learned *"how to build sensor and micro-controllers."* Suggestions for improvement include longer internships with more in-depth projects and introduction videos to assist interns in understanding the lab's operations.

Summary CSL findings. Findings indicate that the CSL internship is powerful for the participants in two ways. First, the interns are learning how to build environmental sensors from a hands-on perspective. That experience is giving them technological and lab skills. Secondly, the interns are working with communities as partners and understanding what it is like to work alongside communities who need the data from these sensors. Both learning outcomes would likely not occur in traditional academic settings but are unique to a hands-on, applied internship. Not surprisingly, the interns reported that virtual learning had its limitations and was most appropriate for certain types of skill building like coding. Students were overall highly positive about the experience and even requested more time in the internship/lab to work on projects.

Science Communications Academy

The science communications academy aims to coach faculty and graduate students in how to communicate complex science to different types of audiences and advocate effectively for the use, design and engagement of STEM for the public good. Two ways in which the science communications academy works toward these training and education goals are the development of a series of webinars and a paid fellowship where graduate students learn and practice techniques for communicating science. The following section focuses on feedback about the Communicating Your Science (CYS) series of webinars and the experiences of the Science Communications Fellows.

Communicating Your Science (CYS) Series

The CYS series of workshops and webinars are aimed at enhancing the science communication skills of CUNY STEM faculty, postdocs, and students. Presentations are geared toward developing science communication skills in a variety of formats such as verbal, written, video and social media.

The following is a list of webinars by date with a brief description:

- September 18, 2020 - Meet the Librarian: An Introduction to The Graduate Center Library's Science Resources - Learn about the science resources available at The Graduate Center Library.
- October 16, 2020 - Meet the Editor: Open Access Journals - Gain insights on publishing in open access journals from experienced editors.
- November 20, 2020 - Best-Practices for Youth Science Engagement - Discover effective strategies for engaging youth in science-related activities.
- January 22, 2021 - Meet the Reporter: Shaping STEM Research for General Media - Learn how to communicate STEM research to the general media effectively.
- February 19, 2021 - Science Op-Ed Writing Bootcamp - Acquire skills for writing science op-eds and making your research accessible to wider audiences.
- March 19, 2021 - Tools of Engagement Workshop: Simple Steps to Becoming a Science Thought Leader - Learn how to become a thought leader in science communication through effective engagement strategies.
- April 30, 2021 - Improving DEI in STEM - Explore ways to promote diversity, equity, and inclusion in STEM fields.
- June 18, 2021 - Promoting Science Accessibility: A Symposium! By early-career GC STEM students! - Join a symposium by early-career GC STEM students on promoting science accessibility.
- September 10, 2021 - How to Become an Aspen Institute Science Mentor - Discover how to become a science mentor with the Aspen Institute.
- September 24, 2021 - Meet the Librarian: An Introduction to The Graduate Center Library's Science Resources - Learn about the science resources available at The Graduate Center Library.
- October 29, 2021 - Science Careers Beyond the Lab: A Conversation With AAAS CEO Sudip Parikh - Join a conversation with AAAS CEO Sudip Parikh on science careers beyond the lab.
- December 3, 2021 - Sharing Your Research Through Images & Graphics - Learn how to effectively share your research through images and graphics.
- January 28, 2022 - Easy Science Videos With Lumen5 & iPhones - Discover how to create easy science videos using Lumen5 and iPhones.
- February 25, 2022 - CUNY STEM Opportunities for Mastering Science Outreach - Explore opportunities for mastering science outreach at CUNY.

- March 25, 2022 - Meet the Editor: CUNY Faculty STEM Journal Editors - Learn from CUNY faculty STEM journal editors about the publishing process.
- April 29, 2022 - Meet the Reporter: Shaping STEM Research for the General Media - Learn how to shape STEM research for general media coverage.
- June 10, 2022 - CUNY Student SciComs Symposium: Communicating Your Science Competition - Participate in a symposium on communicating your science through competitions.
- September 30, 2022 - Meet the Librarian: An Introduction to The Graduate Center Library's Science Resources - Learn about the science resources available at The Graduate Center Library.
- November 4, 2022 - CUNY AcademicWorks: A Tool for Sharing Your Open-Access Research With the General Public - Discover how to use CUNY AcademicWorks to share your open-access research with the public.
- December 2, 2022 - Applied Science: A Conversation about STEM Higher Education & Science Communication With Malcolm Gladwell - Join a conversation with Malcolm Gladwell about STEM higher education and science communication.
- January 27, 2023 - Visualizing Science Workshop: How to Turn Research Into Compelling Media - Learn how to create compelling media from your research through visualization techniques.

Table 12 below, describes the demographics of participants who responded to the feedback surveys of the last four monthly webinars (September 2022, November 2022, December 2022 and January 2023.

Table 12. Demographics of survey respondents (n=16)

	Septembe r	**November**	**December**	**January**	**Total**
Age					
18-24	0	0	1	0	1 6.25%
25-34	1	0	3	1	5 31.25%
35-44	0	2	1	0	3 20.00%
45-54	0	0	3	1	4 25.00%

55-64	0	1	0	0	1 6.25%
65+	0	0	1	1	2 12.50%
Total for age	**1 6.25%**	**3 20.00%**	**9 56.35%**	**3 18.75%**	**16**
Race/Ethnicity					
Asian	1	1	2	0	4 26.67%
American Indian or' Alaskan Native	0	0	0	0	0 0.00%
Black or African American	0	0	1	1	2 13.33%
White	0	1	4	1	6 40.00%
Other	0	1	1	1	3 20.00%
Total for Race/ethnicity	**1 6.67%**	**3 20.00%**	**8 53.33%**	**3 20.00%**	**15**
Gender					
Female	0	2	4	3	9 60.00%
Male	1	1	4	0	6 40.00%
Total for gender	**1 6.67%**	**3 20.00%**	**8 53.33%**	**3 20.00%**	**15**

Table 13 describes how the participants learned about the webinars. It is important to note that these numbers reflect only the participants that responded to the survey, not necessarily the number who attended the webinar. As indicated below, although the reporting is small, the respondents were mixed across ages and ethnicities and were mostly female. According to Table 13, most learned about the webinars via email.

Table 13. CYS survey responses on session information

How did you hear about the session? (check all that apply)	September	November	December	January	Total
ASRC website	0	1	1	1	3 15.00%
Email	1	2	5	2	10 50.00%
Social media post	0	0	1	1	2 10.00%
Friend or colleague	1	0	0	1	2

					10.00%
Does not recall	0	0	1	0	1 5.00%
Other	0	0	2	0	2 10.00%

Table 14 below, indicates the ratings of participants to the sessions. As you can see, all sessions were highly rated across all features.

Table 14. Ratings of CYS Sessions (n=13)

Session Features	Date	Level of Quality					Rating Average
		Extremely Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Extremely Satisfied	
Presenter	September	0 0.00%	0 0.00%	0 0.00%	0 0.00%	1 100.00%	5.00
	November	0 0.00%	0 0.00%	0 0.00%	1 33.33%	2 66.66%	4.67
	December	0 0.00%	0 0.00%	0 0.00%	1 11.11%	8 88.88%	4.89
	January	0 0.00%	0 0.00%	0 0.00%	1 3.33%	2 66.66%	4.67
Length	September	0 0.00%	0 0.00%	0 0.00%	1 100.00%	0 0.00%	4.00
	November	1 20.00%	1 20.00%	0 0.00%	1 20.00%	2 40.00%	4.67
	December	0 0.00%	1 10.00%	1 10.00%	3 30.00%	5 50.00%	4.44
	January	0 0.00%	0 0.00%	0 0.00%	1 33.33%	2 66.66%	4.67
Content	September	0 0.00%	1 50.00%	0 0.00%	1 50.00%	0 0.00%	4.00
	November	0 0.00%	0 0.00%	0 0.00%	1 33.33%	2 66.66%	4.67
	December	1 8.33%	2 16.67%	0 0.00%	0 0.00%	9 75.00%	4.17
	January	0 0.00%	0 0.00%	0 0.00%	1 33.33%	2 66.66%	4.67
Question & Answer	September	0 0.00%	0 0.00%	1 100.00%	0 0.00%	0 0.00%	3.00
	November	1 14.29%	3 42.86%	0 0.00%	1 14.29%	2 14.29%	3.00

Session	December	0 0.00%	0 0.00%	0 0.00%	6 66.67%	3 33.33%	4.33
	January	0 0.00%	0 0.00%	1 33.33%	1 33.33%	1 33.33%	4.00
Day & Time	September	-	-	-	-	-	-
	November	-	-	-	-	-	-
	December	0 0.00%	0 0.00%	1 11.11%	4 44.44%	4 44.44%	4.33
	January	0 0.00%	0 0.00%	0 0.00%	1 3.33%	2 66.67%	4.67

Table 15 below indicates how likely it is that a respondent would recommend the session to a friend. On a scale 1 to 10 with 1 being “not at all likely” and 10 being “extremely likely” all responses were 8 or above with the highest possible rating of “10” receiving the most responses (9 out of 16 responses).

Table 15. Frequencies of how Likely Respondent is to Recommend Session to a Friend/colleague (n=16)

	Session			
Rating	**September**	**November**	**December**	**January**
1 (not at all likely)	0 0.00%	0 0.00%	0 0.00%	0 0.00%
2	0 0.00%	0 0.00%	0 0.00%	0 0.00%
3	0 0.00%	0 0.00%	0 0.00%	0 0.00%
4	0 0.00%	0 0.00%	0 0.00%	0 0.00%
5	0 0.00%	0 0.00%	0 0.00%	0 0.00%
6	0 0.00%	0 0.00%	0 0.00%	1 33.33%
7	0 0.00%	0 0.00%	0 0.00%	0 0.00%
8	0 0.00%	1 33.33%	2 22.22%	0 0.00%
9	1 100.00%	0 0.00%	2 22.22%	0 0.00%
10 (extremely likely)	0 0.00%	2 66.67%	5 55.56%	2 66.67%

Science Communication Fellows

The fellowship trains STEM and journalism graduate students to communicate advanced science concepts to the general public, The two cohorts of science communication fellows during 2021 and 2022 responded to surveys about their experience in the fellowship. Five fellows responded to the survey about their background and experience in the program. Most were in the age group 26-30 with one younger than 26. The ethnicity of the respondents was mixed and three indicated they were U.S. students and two were international students. Three were in biology programs, one in biochemistry and one in physics. Table 16 below, describes the demographics of the fellows in the two cohorts.

Table 16. Science Communication Fellowship Demographics.

Demographic	Category	2020-2021	2021-2022	Total
Age	25 or under	0	1	1 20.00%
	26-30	2	2	4 80.00%
	31 or older	0	0	0 0.00%
Race/Ethnicity	Asian	0	1	1 20.00%
	American Indian or Alaskan Native	0	0	0 0.00%
	Black or African American	0	0	0 0.00%
	White	2	0	2 40.00%
	Other	0	2	2 40.00%
Gender	Female	2	2	2 40.00%
	Male	0	1	3 60.00%
Student Status	U.S.	2	1	3 60.00%
	International	0	2	2 40.00%
Program	Biology	2	1	3 60.00%
	Biochemistry	0	1	1 20.00%
	Physics	0	1	1 20.00%

Table 17 below displays the participant ratings of various key features of the fellowship experience such as an understanding of science communications writing for the public, media engagement and interview skills. Responses were strongly positive with respondents rating all features as either “valuable” or “extremely valuable.”

Table 17. Frequencies on the value of fellowship features (n=5)

Feature	Level of importance				Weighted Average
	Not at all valuable (1)	Somewhat valuable (2)	Valuable (3)	Extremely Valuable (4)	
An understanding of Science Communications	0 0.00%	0 0.00%	1 20.00%	4 80.00%	3.80
Science Writing for the Public	0 0.00%	0 0.00%	2 40.00%	3 60.00%	3.60
Media Engagement & Interview Skills	0 0.00%	0 0.00%	2 40.00%	3 60.00%	3.60
Science Social Media	0 0.00%	0 0.00%	2 40.00%	3 60.00%	3.60
STEM/Community Outreach Events	0 0.00%	0 0.00%	2 40.00%	3 60.00%	3.60

When the fellows were asked how the experience contributed to helping build their science communication skills, they responded with specific and valuable examples. For instance, one states that “*I was able to learn new software for creating engaging visuals, which I continue to use regularly. I was also able to practice my interviewing skills for the first time- both interviewing others and being interviewed. Finally, I was able to learn how to synthesize complicated research succinctly for public consumption.”* Another described how the fellowship had enhanced her knowledge which in turn has given her new experiences to practice and use her skills*. “The science communication fellowship provided me with exposure to information, tools and tangible communication and interview skills. I have been approached by my department to write a science spotlight for an Alumni because of my participation in this fellowship. It is a truly valuable experience.”* Another fellow responded that she had improved in the following critical areas*: “(1)the ability to summarize my own research in a short, concise and easy-to-understand level; (2)ability to read into other relevant research work and write short and public-facing summary about it; (3) media management skill: making videos, posters, fliers, etc…and; (4)social media management skills.”* One fellow directly attributed her ability to land another important fellowship: “*This internship made me more qualified for positions that value science communication skills. I was able to get a research and communication fellowship the year after completing this fellowship, and it's likely that having this on my CV helped*.”

While there were not many suggestions for improvement, one fellow noted that it might be helpful to have experienced fellows speak to the incoming cohort. *"I think it could be useful for old fellows to be invited back to speak to new fellows about the projects that they chose to do. as the fellowship is very flexible - it could help current fellows understand what types of experiences are available to them. It is very important for new fellows to have a solid idea of what they want to get out of the fellowship as soon as possible, so they can maximize the amount of time on what they feel is most important".* Clearly, the fellowship experience is viewed as an experience to be maximized.

Summary of Science Communications Academy

The project has invested a great deal of time and effort in curating and creating the CYS series of webinars. The topics are valuable and useful for STEM students, professionals and journalists who want to develop their skills in communicating science to both knowledgeable and lay audiences. The project was even able to present a talk by well-known writer and journalist, Malcom Gladwell. Although the sample is not large, the responses indicate that the webinars surveyed were highly rated across all areas and viewers learned important tips for their own writing and content creation. This accomplishment is especially remarkable considering the fact these talks are virtual and it can be difficult to engage viewers thru a computer screen, as compared to an in-person talk.

The fellows reported that their experiences were positive with learning how to communicate science. When asked how the fellowship experience contributed to building their science communication skills, fellows provided specific examples such as learning new software for creating engaging visuals, practicing interviewing skills, synthesizing complicated research for public consumption, gaining exposure to information and tools for communication, and improving media and social media management skills. In addition, the project has continued to re-imagine and revise the fellowship to maximize learning outcomes. This year's cohort will be the first cohort that pairs scientists with students. The fellowship was described as a truly valuable experience that enhanced fellows' knowledge and provided them with opportunities to practice and use their skills in real-world settings.

Digital Community

In April 2023, the project team and the evaluator conducted a community advisory focus group. The purpose of this focus group was to explore and understand what participants think is important in creating and building a successful digital community that would connect members of community groups, scientists, CUNY STEM partners, CUNY students, and science journalists.

The focus group lasted approximately an hour and fifteen minutes and it was recorded and transcribed to ensure accuracy. We followed a protocol that consisted of questions developed prior to the focus group, but also kept the process flexible by asking follow-up and clarification questions where necessary. Due to the flexible nature of the focus group all participants did not answer all questions.

The participants were encouraged to be as honest and forthright as possible in their feedback and were assured their names would not appear in any reports. They were told that there are no "right or wrong" answers and we are interested in their thoughts and opinions. Furthermore, we expected them to have different views and that we hoped to hear from everyone. The participants consented to recording and note taking with the understanding that their names and identities would not appear in any reports. Therefore, this report attempts to maintain the anonymity of the participants.

The report describes the participants and summarizes the major take-aways and themes of the interview responses. The following summary is not presented as answers to specific questions but rather as the general themes that emerged from the wide-ranging conversations.

Focus Group Highlights

Participants. Three project staff and the evaluator participated in the virtual focus group. The remaining nine participants represented various groups and constituencies that would be part of the proposed digital community. The participants were the following: a CUNY graduate student in biology, a recent graduate of Community Sensor Lab (CSL) and a member of a community health initiative group, a health and science journalist, a CUNY associate librarian, a member of environmental justice community group, a member of a community advocacy group, and a higher education administrator who also works with community and advocacy groups.

Online usage. The participants reported that they used varied social media platforms such as Facebook, Twitter and Instagram as well as Google Forms and messaging apps, such as WhatsApp and Signal. Some mentioned using the workplace application for teams, Slack.

Engaging users. They discussed the need for meaningful connections between communities and STEM researchers and importance of making research accessible to the

public. Several participants spoke about the importance of framing research in terms of community needs and benefits. They noted that users are more likely to engage and be repeat users of the platform if the information is relevant to their specific community or neighborhood. It was stated that users would be more engaged if content was relevant to their everyday lives. Another participant spoke about the need to understand what the key science issues are in communities and how a digital platform could fill that need, specifically by educating users and connecting journalists, scientists and students to community groups.

Engaging the scientific community. Several participants raised the importance of engaging the scientific community in the platform and how best to accomplish that. One participant noted that it's important that the digital community also help scientists consider how they conduct their research. For example, the digital community should facilitate live interactions, office hours between researchers and communities, events, etc. One person stated that scientists will often default to speaking with a representative of the community group rather than engaging with the community. A key part of that connection is facilitating the process of scientists working in community spaces and being part of a reciprocal communication flow.

Resources. There were several ideas from the focus group about types of information and resources that would be useful. One suggestion was that the platform could connect students and interns with opportunities. One person suggested that opportunities for student to practice science communication skills would be especially valuable. Another participant suggested the platform could connect users with speakers for events and training purposes. One participant noted that it would be useful to know people in communities who would be willing to be interviewed about community and neighborhood issues.

Challenges and recommendations. The group identified challenges such as continued usage, participation of underserved groups and incentivizing scientist and researchers to participate. One participant suggested creating a certification system (similar to WAGE) where researchers and other groups could be certified by the platform as being excellent for community groups to collaborate with. In other words, certified researchers or groups would meet certain requirements for best practices that are uniformly recognized. Another suggestion was to incentivize for example, researchers or other participants to take an active role by offering some type of "research in residence" opportunity at the platform that would not only benefit community stakeholders, students and other participants in the platform but allow the resident scientist to gain valuable work experience.

IS HUB Website Review

Overview. A major aspect of the IS HUB mission is to coordinate, create and support implementation of large array of information and resources for science communication, youth STEM education, community science and interdisciplinary education. The creation, building and maintenance of the IS HUB website is integral to this mission. The website is a critical part of the IS HUB's aims for creating a repository for a wide range of resources that are key for educators, students, community groups/advocates, and journalists.

Websites have become increasingly critical for all types of businesses and organization. They have a variety of functions which include calls to action, sharing information, selling products and services, cultivating branding and growing the business/organization. While there are several factors that are important in determining a website's success, quality content is vital. Users are coming to a website to get specific information that must be useful and updated. This information may be represented in a variety of ways, webinars, podcasts, text, videos, blogs and links. Webinars and podcasts have enjoyed increasing popularity and are featured in many websites.

Therefore, one focus of this evaluation report is to review and analyze the IS HUB website from the standpoint of the user experience and the content that is presented. The analysis is limited to resources that live directly on the IS HUB website—not resources that exist via links to other websites. The following review is a high-level review that first describes the structure of the website, the types of resources available and the website content. Lastly, we score the website according to a rubric that developed by CASE.

Structure and description of the website. (https://asrc.gc.cuny.edu/illuminationspace-hub/) The home page of the website briefly describes the overarching program. Below the description of the program are the four clickable images that represent the four pillars of the program; Youth Classroom and field trips, Science Communications Academy, The Community Sensor Lab and The Digital Community. On the left side of the home page are links to the four components described above and additional tabs to "news", "our team" and "get involved".

Types of resources available. There are a variety of extensive resources available on the website. There are videos to showcase IS HUB and also to highlight student experiences. There are slide presentations about how to communicate science to the public, resources for students, teachers and community advocates to download, a calendar to book field trips, links to a variety of science topics and links to program information, including an application.

Content: Youth classroom and field trips. The link to the youth classroom and field trips takes the user to four possible tabs; IS HUB field trip program, virtual classroom resources, NYC STEM database, and the ASRC STEM teacher residency program. Each tab presents clear, organized resources that may be in the form of videos, links to further information. There is an online interactive calendar to book a field trip and there are downloadable pre-trip resources for teachers and students. There is even a link to a self-guided virtual tour. The NYC STEM database part of the website provides links to 24 STEM programs in NYC that students can get involved with. The virtual classroom resources provide links to information and resources for each of five research initiatives occurring at the ASRC. Each research initiative link contains short articles that are written for the public and a short video showcasing a PhD level student or scientist explaining the research. The link to the ASRC STEM teacher residency thoroughly describes the program and includes important dates and link to apply.

Content: Science Communications academy. The tab to the academy takes the user to a page with a description and a choice of three tabs: webinars and workshops, science communication fellowship, and science communication resources. The webinars and workshops tab list previous seminars and upcoming seminars. They are each clickable links with a full description of the event. If the seminar is upcoming, there is a link to register. The science communication fellowship page describes the opportunity and there is application information at the bottom of the page. The science communications resources page provides very complete resources for communicating science. For instance, there are resources for working the media, talking about your work and resources for social media and online networking. These resources include toolkits, articles, helpful sites and worksheets to practice.

Content: Community sensor lab. The CSL page has a description of the program in addition to a brief (about 2 minutes) video overview. The video includes cameos by students and description of the project by the project director. There is a tab to donate and another tab to explore the CSL website. The CSL website has more videos of student participants, photos. In addition, there are tabs on the top of the page that take the user to curriculum materials, a list of project sites with photos videos and links to those sites and information on how to build your own sensors (sign up required for some of the information).

Content: Digital Community. The tab on the home page for the digital community has a stamp that indicates “coming soon.” There are no further links or information at this time.

CASE rubric. The rubric presented below (see table 18) was developed over the past two years by the evaluation team at CASE. Existing rubrics were reviewed and adapted to meet the needs of the evaluation team in assessing the quality of project websites. This work began by reviewing recommendations for the creation of websites and research about website development. A search for "website quality rubrics" identified several tools for assessing websites. These rubrics were reviews and common relevant elements identified. A draft rubric was created, piloted and used to assess other websites in evaluation reports. Therefore, the rubric below represents a general framework with which to assess websites against key criteria.

Table 18. CASE Website Rubric

Dimension	Poor (0)	Basic (1)	Good (2)	Exemplary (3)
Layout and navigability	Layout is disorganized, cluttered or complicated to navigate, no search function	Layout is sometimes unclear, confusing or hard to follow. Materials may be hard to find	Layout is generally clear and materials easy to find	Layout is creative, easy-to-use search function exists visually appealing and materials easy to find
Up to date content	Content is clearly out of date	No evidence website is outdated but also no indication when website was updated	Website appears to be mostly up to date	Website notes when it was updated OR states it is current OR all content appears to be current
Accuracy/Proofed	Has grammatical errors	Site needs more detailed proofreading	No major grammar and typographical errors	No grammar and typographical errors
Engagement	Site is boring and dull, poor use of graphics or color	Minimal use of color or graphics	Adequate use of color or graphics	Exemplary use of color and graphics, design is very engaging
Mobile ready	Site cannot be viewed on a mobile device	Site loads on a mobile device but sometimes hard to read, configured for computer	Site generally viewable on a mobile device	Site has been reconfigured for easy access on a mobile device
Links presented on site are user friendly	Links do not work, have expired or user gets an error message	A few links appear to work	Most links work and load quickly	All links work and load quickly
Information structure	The sequence of information is not logical. Menus to paths and information are not clear and direct	Some of the information is presented in a logical sequence. Some menus to paths are clear and direct	The sequence is logical. Menus to paths and information are clear and direct	Sequence of information is logical and intuitive. Menus to paths are clear and direct. Website is multimedia-rather than just linear

Contact information	Unclear who to contact for more information	Office or contact is listed but no way to contact is identified	A person or office is identified along with phone or email	Specific contact person/group is identified and way to request information is clear
A variety of different types of resources are available	No resources available	Only one type of resource is available (for example, word documents)	Some types of resources are available	Multiple types of resources are available (such as links to other websites, podcasts, webinar recordings, curriculum examples, videos, articles, etc.…)

Note: Scores of: 0-6 poor; 7-12 fair; 13-18 good; 19-24 excellent; 25-27 exemplary

Scoring and summary of IS HUB Website. The IS HUB website received the highest possible score on eight out of nine dimensions. As indicated below in table 19, the total score for the IS HUB website was 26 out of a possible score of 27 according to the CASE Website Rubric, indicating that the website is exemplary with top design, writing and continued oversight and curation. The layout and navigability of the website is visually appealing and easy to use, with materials readily accessible. The content is up to date, with no grammatical or typographical errors. It is written in clear and articulate language. The appeal of the website is high, with creative use of color and graphics that made the design engaging. The website is also mobile-ready, reconfigured for easy access on mobile devices. All links are functional and load quickly. The information structure is logical and intuitive, with clear menus and paths. Contact information is provided and easy to find, and a variety of different types of resources are available, ranging from links to other websites, podcasts, webinar recordings, curriculum examples, videos, articles, and more. The only minor suggestion would be to update the archive of webinar recordings. Overall, the website is rated exemplary. The website offers a clear, informative and engaging overview of the project for visitors.

Table 19. Scores of IS HUB Website

Dimension	Score	Comments
Layout and navigability	3	The layout is straightforward, and materials are simple to find
Up to date content	3	Everything appears to be current including applications and deadlines
Accuracy/proofed	3	Well-written and no errors
Engagement	3	Photos, videos and website design are appropriate and engaging
Mobile ready	3	Loads easily on a cell phone
Links are user friendly	3	The links work correctly and load quickly
Information structure	3	The structure of information is clear, logical and intuitive
Contact information	3	Contact information is provided for program components and easy to locate
A variety of different types of resources are available	2	There are a variety of resources available. While some archived webinar recordings exist, the collection needs to be bought up to date
Total Score	**26**	**Exemplary**

CONCLUSIONS

The following section briefly summarizes the findings from this report and closes with the project's goals for next year to expand the IS HUB model and broaden its impact. The findings suggest that the project has done outstanding work and has successfully implemented and is continuing to broaden the IS HUB family of programs. The project has grown and expanded the program over the past couple of years in significant and far-reaching ways.

The CSL component of the program has grown significantly with respect to participation and partnerships with a variety of community-based organizations (CBOs). The project has continued to leverage those partnerships to create technology and science initiatives. The scope of the CSL program has widened to include workforce development for a wider age range of adults, data literacy and leadership training for youth and adults. The suite of environmental sensors has expanded both in number and in function with sensors that can measure multiple environmental features. IS HUB has continued to make progress with the development of its teacher-in-residency program. The teacher residency program is currently accepting applicants and will train its first cohort in August 2023. The field trip programs (both in-person and virtual) impact students from underserved communities and continue to develop and broaden their impact.

The science communications academy has continued to deepen and grow its paid fellowship for graduate students to learn and practice techniques in communicating science. The program includes coaching on how to effectively use technology-based communications tools such as podcasts and social media. In addition, the feedback from the fellowship supports the notion that the unique pairing of graduate students in STEM and journalism has allowed both to learn how to work together to communicate science to the public. In addition, the science community academy has created a collection of high-quality webinars and workshops that train skills related to science communication and the publication of science research.

Finally, the IS Hub has begun the initial phase of building and creating a digital community to bring together researchers and local communities. The above activities and progress are especially notable given that much of this occurred during a pandemic when there was a disruption in the in-person activities, meetings and events.

Goals for the upcoming year

As the project continues to expand its model for maximum impact and its potential for sustainability and scalability, there are specific goals that the project leadership has targeted for the upcoming year. Goals include:

- Doubling the participation of the in-person field trips from 300 students per year to 600;
- Increasing participation in the virtual field trips and experiences by improving the marketing;
- Building and testing a beta prototype of the digital community;
- Training more community members in the CSL;
- Continuing building out an advisory committee (composed of CUNY community members and local community stakeholders).

To date, the project has been highly effective in creating and implementing action plans to meet benchmarks. It is expected that trajectory will continue in the upcoming year.