

Pushing Back the Boundaries: A Systematic Approach for Cultivating Diversity in the Audiences We Serve

A Diversity Initiatives Plan for:

**Office of Public Outreach
Space Telescope Science Institute
Baltimore, Maryland**

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Office of Public Outreach

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“The cultivation of diversity is both a management philosophy and core value for all NASA education efforts.”

NASA Education Strategy Coordination Framework: A Portfolio Approach

For a decade and a half of operation, the Hubble Space Telescope (HST) has been pushing back the boundaries of the universe in unparalleled ways. The concomitant mission of the Office of Public Outreach (OPO) at the Space Telescope Science Institute has been to “share scientific knowledge of the universe in ways that inspire, excite, challenge, and educate,” returning to the public the fruits of their investment in space science as represented by the images, data and scientific understanding produced by the HST and other NASA missions that provide context for interpreting Hubble results. This effort is national in scope, in keeping with the founding mandate of OPO to be “a national center for space astronomy education.” It is also broad in its reach, by design and practice, as articulated in OPO’s current strategic plan: “we will expand the cross section of the American public we reach.”

An essential element of this goal is to ensure that our audience is also diverse, reflecting both the various communities that make up the United States and the desired future demographic of the NASA workforce in which “the knowledge, expertise, and unique background and life experiences—including ethnic, gender, racial, religious, and cultural identity—of each individual strengthen the Agency.” (From the *NASA Education Strategic Coordination Framework: A Portfolio Approach*.) As a result, OPO’s efforts are mindful of the need, as stated by a NASA senior-level committee reviewing the Agency’s education program, that “education activities should ensure that participants reflect the targeted population.”

Students at Barrett Elementary School, Fairfax, Virginia, access an Amazing Space “online exploration” activity.



Consequently, the Office has undertaken a variety of initiatives, involving surveys, interviews, needs assessments, focus group sessions and workshop inputs to address how OPO's programs can most effectively reach and serve minorities, the underserved, and the underrepresented among our target audiences. These efforts have included, for example:

- Interviewing a sample of education and science institutions using Hubble educational materials to learn how the materials are disseminated and modified for use with underrepresented groups.
- Identifying minority colleges and universities for the *Amazing Space* Impact Study and interviewing these institutions to learn how and why *Amazing Space* materials are being used in teacher training.
- Using regional and national education workshops, such as those developed for Louisiana State University, the Louisiana Art and Science Center in Baton Rouge, and the Norfolk State NASA pre-service teacher conference in Alexandria, Virginia, to create focus groups whose input has helped us to collect data on the needs of teachers, students and the public and how Hubble science and educational materials can be best used to inspire and teach underserved groups.



Participants test OPO materials at a pre-service teacher conference in Alexandria, Virginia.

- Actively participating in the NASA Explorer Institute focus group on engaging underserved and underrepresented youth to build on the lessons learned from OPO participation in the national outreach program associated with the 2004 NOVA *Origins* series.

- Placing materials such as *ViewSpace* at institutions with high minority youth populations and low socio-economic status (such as the International Museum of Art and Science in McAllen, Texas) and to study the impact of these efforts, as part of a collaboration with the Pacific Science Center.
- Recruiting schools with high minority populations to test educational units and seek insight into the needs of minority teachers and students and to determine the most effective ways to meet those needs; such school initiatives have included the Crossroads School in Baltimore, Maryland, and the Sundown Middle School in Sundown, Texas.

Students at Crossroads Middle School in Baltimore participate in the "Solar System Expedition" learning project.



- Participating in the Council of Exceptional Children in Baltimore and the Exceptional Needs Workshop in Huntsville, Alabama to learn how to make educational materials and activities more user-friendly for special needs populations.

Collaborations and pilot programs have been particularly effective in yielding “ground truth” that informs and guides our efforts to effectively implement strategies to reach and serve diverse audiences in a variety of OPO programs.

The data, information and experiences collected through these initiatives have served as a basis for developing a systematic approach to serving the underserved. This approach includes establishing our primary methodologies, or approaches, for use with our primary audiences; articulating a series of objectives to implement these approaches in multiple OPO programs, and to temper these efforts with considerations derived from our studies.

PRIMARY METHODOLOGIES

OPO’S efforts will be governed by the application of a series of guidelines whose objectives are:

- **To prioritize.** OPO’s strategic plan, strategic implementation plan, and fiscal year Product and Services Plan will govern the priorities of the news, formal education, informal science education, online services, and Origins Forum (mission E/PO

coordination) functions of the office. Diversity initiatives will operate in concert with these long-term and annual operational priorities and the subsequent work plan. Decisions on what diversity efforts to emphasize will follow from these priorities.

•**To initiate.** In accord with its national scope, the Office will innovate and initiate diversity strategies based on “front end” assessments, and will employ and deploy its national distribution networks to achieve broad reach and impact.

•**To collaborate.** In keeping with the charge to “establish alliances with suitable partners from the education/outreach communities in order to leverage (its) own activities, expand (its) expertise, and extend the reach of OPO’s programs” (as articulated in the instructions to the 2000 OPO External Advisory Committee), the Office will seek opportunities to collaborate with other organizations and events in diversity initiatives to maximize its effect and impact, when these collaborations further the diversity objectives outlined in the OPO plan.

•**To serve a broad spectrum of groups.** Minority, underserved, and underrepresented audiences include a wide range of groups. In keeping with our priorities, OPO will seek to serve this range, including ethnic minorities (African-American, Hispanic, Asian, Native American), girls, special needs groups, the socio-economically challenged, and rural communities.



Orion Nebula image unveiling at the Robert J. Novins Planetarium in Toms River, New Jersey.

•**To seek guidance from the communities we serve.** Recognizing that minority, underserved and underrepresented communities are best able to enlighten E/PO practitioners on effective and sustainable methods for reaching diverse communities, community representatives will be recruited to advise in diversity efforts.

•**To implement systematically.** The Office is situated in a highly diverse community and region that is well-suited for a systematic approach to implementation of diversity efforts. Varied ethnic communities, socio-economic conditions and minority programs provide an excellent proving-ground for piloting initiatives, learning lessons, establishing best practices, refining products to meet diverse needs and then expanding to regional and national distribution and implementation. The Office will take advantage of this landscape by initiating and beta-testing programs and products on a local and regional basis before nationwide release.

•**To rigorously assess.** The Office’s evaluation team will be employed to rigorously develop front-end, formative, and summative evaluation strategies to determine reach,

effectiveness, and outcomes of diversity initiatives as part of the general program and product assessment regimen. These efforts will ensure that our target audiences reflect demographics and serve as effective means of serving these diverse audiences.

•**To share what we learn.** In accord with the national role of the Office, we will share experiences, lessons learned, and best practices with the larger E/PO community through publications, conference presentations and posters, to help improve in practical ways the efforts of the larger community to serve diverse audiences.

PRIMARY TARGET AUDIENCES



School group at the International Museum of Art and Science, McAllen, Texas.

The primary target audiences within which OPO employs its methodologies parallel those served by its functional areas of emphasis:

•**News Media.** OPO will strive to identify and to post items of interest to newspapers and other media serving large minority and underserved audiences.

•**K-12 Formal Education.** OPO will provide materials and experiences for teachers, schools and school districts serving large minority and underserved populations.

•**Higher Education.** OPO's higher education efforts focus primarily on pre-service teacher training in collaboration with colleges of education--which serve both diverse student teacher populations, and future teachers of diverse populations of students. By teaching those who will teach, OPO will have an opportunity to multiply its impact in improving science teaching by and for minority and underserved groups.

•**Informal Science Education Venues.** OPO will offer products and services to museums, planetariums, nature centers and other informal venues serving a diverse

demographic audience of both free-choice learners and formal groups supplementing their classroom experience.

•**Online Outreach.** Internet user demographics, especially those audiences attracted to science-related sites, do not reflect the diversity of the larger population, and the free-choice nature of the medium makes it problematic to use this medium to reach a diverse audience generally. Efforts will be made to make connections or promote awareness to sites identified as having diverse usership.

•**Origins Forum Coordination.** The Origins Forum regularly exploits opportunities, through its coordination of a variety of mission E/PO efforts and strategic collaborations, to involve itself in activities serving diverse audiences. These efforts will be emphasized in its work.



Girl Scout trainers learning hands-on activities in Hilo, Hawaii.

OBJECTIVES

By applying its primary methodologies, or approaches, to its primary audiences, and by integrating insights gained from initial efforts and assessments, OPO will advance its plan to effectively reach minorities and underserved groups in multiple OPO programs.

To this end, the office has established an initial set of objectives for development:

- A. Develop collaborations with local inner city schools and selected schools across the country to use and test K-12 formal education materials for *Amazing Space* with classes of minority students. The lessons learned will be modified or adapted with the needs of minority educators and students in mind as these units are made available for national distribution.**
- B. Establish regional partnerships with formal and informal science education institutions to present pre-service and in-service teacher workshops in areas**

- with large underserved populations that underachieve in science education. Experiences and lessons learned will be applied to a broader effort as resources allow.**
- C. Establish partnerships with coordinators of national science education workshops for college-level educators who teach science to pre-service elementary teachers--and for education majors themselves--at historically black colleges and universities, Hispanic serving institutions and tribal colleges. This effort is designed to encourage improvement in science teaching and the use of Hubble data as current science to both inspire and educate.**
- D. Actively participate in national collaborative efforts to present NASA mission content and materials to improve science teaching and understanding and to promote STEM career considerations among underserved and underrepresented groups, including:**
- **Girls via workshops to train Girl Scout trainers from Girl Scouts of the USA councils serving underserved and underrepresented youth.**
 - **Native Americans via workshops and collaborations promoting the integration of Native and Western science.**
 - **Special needs students via workshop presentations for teachers of the handicapped to modify materials for student use, and through special projects (e.g., collaborating on a new multi-wavelength Braille book for the sight-impaired, as a follow-on to the successful *Touch the Universe* Braille book).**
- E. Establish a mechanism for providing ViewSpace installations on loan to informal science venues serving economically-challenged and/or rural areas, and areas serving large minority or underserved populations. This effort is designed to broaden the ViewSpace network and its science delivery capabilities to areas otherwise unable to receive the benefit of publicly-supported science education.**

It is expected that objectives will evolve over time as current initiatives are successfully integrated into OPO's regular operating plan, as circumstances change, and as new initiatives and opportunities are developed. Current efforts will undergo rigorous assessment to keep them targeted and relevant.



Field testing online activities at Youth Benefit Elementary School, Fallston, Maryland.

CONSIDERATIONS

The Office's focus group and assessment data, its pilot projects and experiences, have provided a series of considerations that will be applied to the efforts outlined above, to inform and improve OPO's efforts in working effectively with underserved and underrepresented populations.

Formal Education Community:

- K-12 teachers often state that they are generally unprepared to teach current science topics, and lack the time to search for appropriate materials to use in their classrooms.

Field testing education units with teachers at Villa Julie College, Baltimore, Maryland.



- Teachers need science content that is presented at a level that they are comfortable with as well as a commitment from developers to maintain partnerships established through outreach efforts.
- In serving rural and minority K-12 schools, classroom teachers need to be acknowledged for their expertise in teaching minorities and the underserved, and to be included in the development of programs that target these communities.
- Developers need to be aware of cultural identity and learning differences in underserved and underrepresented communities and include individuals familiar with these populations in creating educational materials.

Higher Education Community:

- Education professors state that they often lack a strong background in science, but are expected to teach space science to pre-service teachers.
- In addition to lacking knowledge of space science, they state that they often lack funding for professional development that would keep them abreast of the most recent science.

- It is important that E/PO professionals partner with these professors in pre-service teacher to complement their lacks as well as provide professional development opportunities—teaching the teachers of future teachers to use good science education methodologies.



Teacher workshop at LSU's Cain Center for STEM Literacy, Opelousas, Louisiana.

- It is also expressed that programs designed to provide current science to the higher education community need to be more than one-time events.
- Higher education staffs want a commitment from developers to maintain the partnerships established through outreach efforts. These findings parallel preliminary trends found in the formal education community.

Informal Science Education Community:

- When working with underserved and underrepresented populations, it is important to provide a long-term commitment to build trust since these groups sometimes lack trust in traditional mainstream organizations. Oftentimes this lack of trust stems from previous short-term efforts into the community by outside organizations.
- To reach the underserved communities, outside organizations need to convince communities that programming will be developed with community input and that programming will be available and consistent in the long-term.
- To be effective, these long-term commitments need to be built and sustained by the collaborative efforts of the broader community through



ViewSpace installation at the International Museum of Art and Science, McAllen, Texas.

partnerships. Members of these partnerships may include science and technology centers, community-based organizations and individual community leaders.

- Collaborative partnerships provide effective STEM programs that reach underserved and underrepresented youth. NASA needs to be aware, however, that while informal educators create long-term partnerships with organizations, they often have short-term relationships with the specific audience members who attend drop-in or one-time programs.
- Regardless of the scope, all programs should be developed that have the following characteristics: high impact, flexible format, strong science content and processes, role models to provide a first step in making STEM careers a reality, and an evaluation component to ensure accountability, program sustainability and continued funding.
- It is important for the informal science community to document the impact of their programs in ways that assess the effectiveness of efforts targeting underrepresented and underserved communities; E/PO professionals need to encourage the application of useful metrics and outcome measures to provide essential feedback on success.

IMPLEMENTATION

The Office of Public Outreach's implementation strategy for its diversity initiatives has been and will continue to be based on a systematic approach that includes extensive research, the application of criteria for determining the best targets and approaches, and execution of effort based on the methodologies and considerations derived from our assessments of the education landscape.

OPO's strategic plan and strategic implementation plan are the primary tools that will govern, prioritize and guide the continued development and implementation of the Office's diversity initiatives. Goals, objectives, and strategies for diversity efforts will continue to be derived from and operate in concert with these strategic plans.

In the formal education sphere—primarily K-14 and teacher education—specific criteria are applied to determine targets for partnerships, collaborations and educational efforts. Decisions to partner are based on the following considerations:

1. We examine the systemic reform in the state – organizations that are assisting reform and who the key players are.
2. We look at how the local standards were developed and implemented.
3. We determine whether the needs of the institution match the work we are doing.
4. We examine advanced placement statistics for the state or region.
5. We examine performance scores on state-wide tests and evaluations
6. We examine demographics of the area.
7. We examine number of requests for assistance from the region.
8. We examine the US State Department of Education statistics for the latest data regarding such information as teacher-to-student ratio, technology availability, numbers of elementary, middle and high school teachers, numbers of students, and other data.
9. We examine *Market Facts and Segments Analyses* (the Complete K-12 Report) from Education Market Research.
10. We look for programs and partners that do follow-up data collection with their participants and are willing to share their results with us.



Teachers use diffraction grating glasses at an OPO NSTA workshop in Anaheim, California.

With this information in hand, OPO focuses on three areas to assist in the identification of potential partners:

1. NASA Programs.

We examine the types of initiatives NASA has in its portfolio that parallel the HST education goals and objectives. The purpose is to determine which programs

match and would make a strong collaboration. Specifically, we have made connections with the following:

- NASA education support organizations and efforts—in the past, we have collaborated with the Forum/Broker network, for example, working with the Community Based Working Group, the Exceptional Needs Working Group, the Pre-Service Educator Working Group.
- NASA Pre-Service Educator Conference in Alexandria, Virginia.
- NASA Small grants programs—HST CYCLE and IDEAS.

2. Formal Education Needs Assessments and Impact Study.

We use our Needs Assessments and Impact Study to help us identify underrepresented and diverse groups with which to partner--such as schools, school districts, professional organizations, and colleges and universities.

3. Educational Research.

We conduct educational literature reviews and look for current publications that deal with minority and underserved groups.

With these inputs, we identify, contact, and develop working relationships with institutions, organizations, and groups that can best advance our strategies for serving a diverse population. These strategies will allow us to identify partners who can help us to successfully meet our diversity goals—as they have in the past.

For example, our studies identified the Southeast U.S. as both an area of low science education scores and achievement and a region of high diversity. We subsequently initiated a relationship with the planetarium at the Louisiana Museum of Art and Science in Baton Rouge to develop a teacher workshop to improve teacher preparation and practice in science teaching. We leveraged this relationship to make a connection with the College of Education at Louisiana State University to expand our effort and to increase our reach by collaborating in our efforts with the Pre-Service and In-Service teacher education resources of the university. This program continues to develop and will serve as a model for expanding the effort to other areas of the country as resources allow.

Another example involves the Crossroads School in the inner city of Baltimore, Maryland. In this case, we identified the school, operated by the Living Classrooms Foundation, as a potential partner. We carefully cultivated a relationship with the Foundation and the principal of the school, established a pilot project with several classes to field test a unit on the solar system, and executed the project successfully. This will serve as a model for future initiatives of this sort that can be applied nationally.

In the informal education sphere—specifically involving the initiative to provide ViewSpace displays on loan to informal science venues serving underserved and underrepresented groups—a rigorous set of criteria will likewise be applied to ensure effective placement of these units. This strategy will be designed to achieve our objective to find appropriate venues with whom we can partner to bring ViewSpace and its content to diverse audiences.



The effort will be underpinned by data derived from the U.S. Census Bureau, which publishes a listing of Metropolitan and Micropolitan Statistical Areas (MSAs) that can be sorted by a “Diversity Score” using the most recent census data. The MSA listing incorporates the Office of Budget and Management’s Statistical Policy 15 identifying four racial groups and one ethnicity as derived from self-identification data. This information, combined with the Association of Science and Technology Centers (ASTC) categorization of science museums in the U.S., will allow us to target museums in diverse communities for which a mutual need can be fulfilled.

Native Hawaiian scientist Paul Coleman presents an invited talk about reaching diverse audiences at the Astronomical Society of the Pacific’s Education and Public Outreach Conference in Baltimore, cohosted by STScI.

The criteria will be set as follows (in keeping with the HSTP directive to target modestly-sized facilities, in less-populous areas, less likely to be able to afford a system on their own):

1. We will identify a list of MSAs containing a population of 2.5 million or less.
2. We will rank the MSAs according to their Diversity Scores.
3. We will identify MSA’s having the highest Diversity Scores in which there is no ViewSpace system operating.
4. We will research and identify medium- or smaller-sized Informal Science Education Institutions (ISEIs) likely to have the most significant public impact within the MSA.
5. We will contact the identified ISEIs and offer them the opportunity to receive a ViewSpace system with appropriate conditions for indefinite loan. These conditions will include assessment opportunities to gauge the success and effectiveness of the installations in reaching the desired audiences.

6. The loaners will be monitored on a regular basis, with a periodic renewal clause to ensure that the program continues to meet its objectives.

Implementation of the Office's diversity initiatives will routinely employ the sorts of strategies described above, to ensure the most effective application of our resources to the effort, in accord with our strategic priorities.

IN SUMMARY

Through the series of initiatives, surveys, and pilot efforts that informed the development of this plan, the Office of Public Outreach has laid the groundwork for addressing the needs of underserved and underrepresented populations and for implementing its plan in multiple OPO programs.

Girls Scout trainer workshop participants learn about the H-R Diagram at a training conference in Briarcliff Manor, New York.



OPO is already working to increase its impact in serving minorities and the underserved while using these experiences to provide critical input in determining the most effective avenues, techniques, and products with which to pursue its objectives and to refine its efforts as it learns. The effort will enrich the OPO program at all levels by increasing its flexibility, adaptability, reach and ultimate impact for minorities and the underserved and all of OPO's many constituencies.

The Hubble Space Telescope has, over sixteen years of in-orbit operation, pushed back the boundaries of the universe for all the people of Earth. The Institute's Office of Public Outreach is committed to removing boundaries of access to ensure that all people can experience and participate in this adventure of discovery—an adventure made possible by a remarkable instrument and the people who use it to unveil the cosmos as never before.