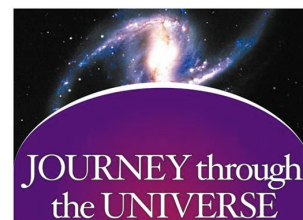


A Journey through the Universe for Baltimore City

An Executive Summary of the Program Proposed by the
National Center for Earth and Space Science Education

and the

Baltimore City Public School System



Program Concept:

The National Center for Earth and Space Science Education (NCESSE; <http://ncesse.usra.edu>), operated by the Universities Space Research Association (USRA; <http://www.usra.edu>), and the Baltimore City Public School System (BCPSS) propose community-wide *Journey through the Universe* programming for academic years 2007-08, 2008-09, and 2009-10, which will serve all BCPSS 5th grade students, their teachers, and their families.

Journey through the Universe is a national science education initiative of the NCESSE that engages *entire* communities—students, teachers, families, and the public—using education programs in space exploration and the space sciences to inspire and captivate. The initiative embraces the notion that—*it takes a community to educate a child*

Journey through the Universe programming is tailored to a community's strategic needs in science, technology, engineering, and mathematics (STEM) education, and is a framework for partnership between school districts, museums and science centers, colleges and universities, civic and business organizations, and the public. The cornerstone philosophy for all programming is—*inspire... then educate*.

What the human race knows about our world and the greater universe is used to inspire *the next generation* of scientists and engineers through interactions with *the current generation*; give teachers the tools to conduct powerful lessons in the classroom relevant to the science curriculum; and provide venues for family learning where parents and their children learn together.

Proposed Program for Baltimore:

Journey through the Universe in Baltimore includes: 1) professional development for all 350 5th grade teachers of science on lessons to be implemented as the 5th grade science curriculum; 2) impactful presentations to all 7,000 5th graders—one to two classrooms at a time—by scientists and engineers from a dozen research organizations locally and nationally—researchers who are chosen because they are gifted at

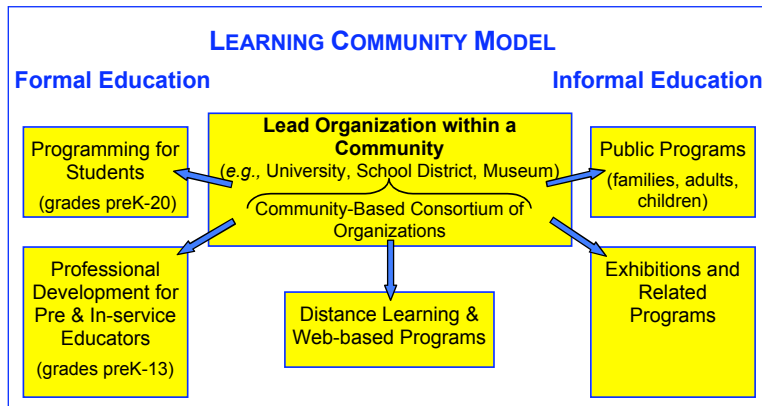


Figure 1: The Learning Community Model embraced by the *Journey through the Universe* national initiative is a coherent framework for program delivery across an entire community.

communicating their passion about their work to audiences of all ages; and 3) family programs at the Maryland Science Center that are designed as extensions of the 5th grade curriculum, and promote educational conversations between adult and child that continue long after the experience.

The proposed programming is: systemic, addressing the entire 5th grade; strategic, addressing the BCPSS's desire to reintroduce science into the 5th grade classroom in advance of full inclusion of science testing in the Maryland School Assessment Test (MSA) during the 2007-08 academic year; and sustainable beyond the 3-year proposed performance period given: the introduction and implementation of new curriculum, establishment of a 5th grade science leadership team of master science educators, a transition after year 3 to professional development conducted by the leadership team, and science education resources provided by NCSSE beyond the proposed performance period, at no cost, including new lessons and access to content and pedagogy experts.

Key Program Elements:

Curriculum: A customized *Compendium of Lessons* in the Earth and space sciences, and developed by NCSSE, that specifically addresses the 4th and 5th grade Astronomy segment of Maryland's Voluntary State Curriculum (VSC), with emphasis on the portions relevant to the 5th grade MSA. Topics include observed distinctions between planets and stars, the Sun as a star, observed patterns and changes in the sky, Earth as part of the Solar System, and Earth as a life-bearing planet. BCPSS will implement the *Compendium of Lessons* as the 5th grade science curriculum.

Professional Development (PD): for all 350 5th grade teachers of science on the *Compendium of Lessons*: PD in October 2007 on lessons addressing astronomy, and PD in January 2008 on lessons addressing astrobiology (Earth as a life-bearing planet). As part of PD, teachers will be given activity plans and resources for grade-level-wide and school-wide activities and projects.

There will be separate professional development for 20 BCPSS 5th grade master science teachers to establish this group as a 5th grade science teacher leadership team. This team will provide district-wide support for 5th grade teachers throughout the year over the 3-year proposed performance period, and take on PD training for the 5th grade teaching staff by the end of the performance period. This leadership team, with committed program support from BCPSS's office of the Chief Academic Officer, will ensure program sustainability.

Assessment: BCPSS implementation of the *Compendium of Lessons* as the 5th grade science curriculum, allowing BCPSS's Division of Research, Evaluation, Assessment, and Accountability (DREAA) to assess: 1) the level of implementation by teachers in the classroom across the 5th grade teaching staff, and 2) program impact on students through benchmark testing (grade-level wide) and through scores in science on the standardized state test (MSA).

Social Event for Teachers: a family science evening at the Maryland Science Center for 5th grade teachers and their families, in order to: develop a sense of community spirit and buy-in for the *Journey* program, generate excitement about the subject matter, and provide a venue for teachers to have a wonderful educational experience with *their own* families and see first-hand the program impact on *their* children.

5th Grade-wide and School-wide Activities: teacher-led activities at schools: multidisciplinary projects across the 5th grade, lessons conducted from the *Compendium* in 5th grade classrooms; and school-wide celebrations (a school-wide enrichment model)—all in advance of *Journey through the Universe Week* (see below).

Journey through the Universe Week: a week-long celebration of learning in November, where scientists and engineers will visit 5th grade classrooms, and family nights for 5th grade students and their families will be held at the Maryland Science Center.

- Authentic Experiences with Researchers for Students: 200 Classroom Presentations by over 20 scientists and engineers from a dozen research organizations locally and nationally—called the Visiting Researchers—to all 5th grade classrooms (assumes 100 presentations to double classes). Classroom

Presentations are designed to provide students a window on research in terms of process, content, and human experience; and an understanding of the pathway to a research career. More specifically, these presentations are designed to provide a window on the nature of science and the lives of modern-day explorers, with special emphasis on not just *what* is known about our world and the universe but *how* it has come to be known. This approach reveals the very personal means by which researchers ask questions of the world, empower themselves to create a pathway to an answer, and hopefully bear witness to something new to the human race.

- ***Inclusion:*** *Journey* is for **all** 5th graders. The program includes 25 Classroom Presentations to special education classes by an NCESSE Educator.
- ***Family Learning:*** 2 Family Science Nights at the Maryland Science Center, to be advertised at the schools as a field trip designed for **family** learning. (More than 80% of parents have never been on a school field trip designed for families, as opposed to a school field trip where adults chaperone a group of students.)

Current Science in the Classroom: all 5th grade teachers will have access to *Teachable Moments in the News*, an online resource which equips teachers to use breaking news stories in Solar System science and exploration to create teachable moments in the classroom. News stories are provided with downloadable lessons that are relevant to both the news story and Maryland's Voluntary State Curriculum. Professional development will be provided via web-cast and audio dial-in. (This resource will also be provided on an ongoing basis at no cost to BCPSS after the end of the performance period.)

Teachers' Ongoing Access to Experts: *Ask a Space Scientist* and *Ask a Space Science Educator* programs will provide BCPSS 5th grade teachers access to scientists, engineers, and educators from NCESSE and around the nation, to address teachers' questions concerning content and pedagogical approaches in the classroom. *Teachers' Thursdays* held at the Maryland Science Center as part of their normal programming will be augmented to include content relevant to the BCPSS 5th grade science curriculum, including *Teachable Moments in the News* briefings, and presentations by guest scientists and engineers. (These resources will also be provided on an ongoing basis at no cost to BCPSS after the end of the performance period.)

Opportunities Clearing House: web and listserve-enabled environments that provide *Journey* communities awareness of, and facilitated access to, the diverse educational resources and opportunities available from our national partners, including: NASA and other federal agencies, universities, museums, science centers, and businesses. (This resource will also be provided on an ongoing basis at no cost to BCPSS after the end of the performance period.)

Cost:

	Academic Year 1 (2007-08)	Academic Year 2 (2008-09)	Academic Year 3 (2009-10)
Student and Community Programs	92,031	94,545	97,159
Educator Workshop Programs	101,779	89,403	92,092
TOTAL	193,810	183,948	189,251

**In-Kind Contributions from
Baltimore City Public Schools:**

	Academic Year 1 (2007-08)	Academic Year 2 (2008-09)	Academic Year 3 (2009-10)
Professional Development: stipends and substitutes	122,204	127,092	132,176
DREAA Assessment	90,000	93,600	97,344
TOTAL	212,204	220,692	229,520

Supplemental Program Element—

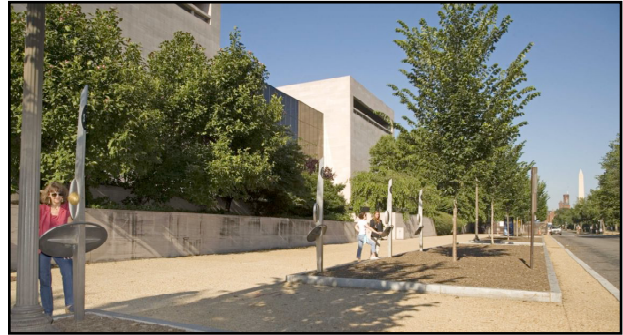
A *Voyage* Scale Model Solar System Exhibition permanently installed in Baltimore's Inner Harbor



FUNDING FOR THIS ELEMENT IS ALSO BEING SOUGHT

The lessons to comprise the *Compendium of Lessons* were created as part of the *Voyage* project, which included the design, fabrication, and permanent installation of a one to 10-billion scale model of the Solar System on the National Mall in Washington, DC (see <http://voyagesolarsystem.org>). Replicas of the exhibition are now available for permanent installation in communities across the nation.

The 13 stanchions of the *Voyage* exhibition on the National Mall are located along the 600 m (2,000 feet) path from the Smithsonian's National Air and Space Museum to the Smithsonian Castle. The exhibition represents a seamless fusion of educational experience and sculpture, and required approval by the U.S. Commission of Fine Arts, and the National Capital Planning Commission.



The Maryland Science Center has expressed strong interest in a *Voyage* exhibition permanently placed in Baltimore's Inner Harbor. NCESSSE is in ongoing discussions with the Office of the Mayor of Baltimore. Given the interest expressed by the Maryland Science Center, the Mayor's Office has requested a concept paper detailing the project and the required funding. Maps are available on request with the proposed location of the exhibition's 13 stanchions in the Inner Harbor.

A *Voyage* exhibition would be a powerful and natural added element to the proposed *Journey through the Universe* program for Baltimore. BCPSS would like to integrate into the 5th grade curriculum: tours of a *Voyage* exhibition in the Inner Harbor, followed by tours of galleries at the Maryland Science Center, for all 7,000 5th graders.

Given that the *Compendium of Lessons* to be implemented as the 5th grade curriculum includes astrobiology content (Earth as a life-bearing planet), it is interesting to note that the proposed location of the *Voyage* exhibition in the Inner Harbor extends from the Maryland Science Center to Baltimore's National Aquarium.

Costs:

- *Voyage* exhibition one time cost: \$179,600
- Installation in Inner Harbor: \$15,000-\$20,000
- Busing for 7,000 5th graders: \$50,000/year



*Supplemental Program Element—
Added Programming From NASA Goddard Space Flight Center*

PROVIDED FREE

From Robert Gabrys, Chief of Education, NASA Goddard Space Flight Center



“NASA Goddard Space Flight Center maintains a Memorandum of Agreement (a NASA Space Act Agreement) with USRA’s National Center for Earth and Space Science Education in order to leverage resources of both groups for the benefit of students and teachers. Baltimore City is within the Goddard service region, and we maintain a strong commitment to providing support to Baltimore City Schools through student, teacher, and e-learning technology based programs. Our efforts are in strong alignment with the *Journey through the Universe* Program being considered for Baltimore. In fact, we were part of the initial meeting with Baltimore City School District leadership. At present Goddard Space Flight Center maintains a partnership with Baltimore City that impacts two elementary/middle schools: Rosemont and Southeastern. Should the *Journey* program be funded, I would expect that Goddard’s education office would provide added and coordinated support for the program in Baltimore City with student and teacher programs related to space science throughout the school year on a mutually agreed upon schedule. We have education staff who actually do workshops in schools linked to science and mathematics standards, and would be pleased to leverage our resources in conjunction with Abell Foundation support. All of our services and materials are free of charge.”

As per the NASA Space Act Agreement, NASA views *Journey through the Universe* as a coherent, community-wide programming framework within which NASA can embed its own diverse programs (see Figure 1). Dr. Gabrys is a former Maryland State Assistant Superintendent of Education, and is eager to collaborate extensively on *Journey* in Baltimore.

2007-08 Program Schedule

(Program Schedules for 2008-09 and 2009-10 are conceptually identical, but will be shaped by assessment)

September 19 and 20 2007:	All 350 teachers receive a 2-hour briefing on the city-wide <i>Journey through the Universe</i> program: to reach all teachers, four 2-hour briefings are held at Loyola, one in the morning and one in the afternoon on each of two days
September 28:	family night for teachers and their families at the Maryland Science Center
Week of September 30: for (T,W or Th)	<u>Professional Development for the astronomy lessons:</u> Master Teacher Workshop 25 5 th grade science lead teachers; 3 hours per day for 2 days after school
Week of October 7:	<u>Professional Development for the astronomy lessons:</u> one 6-hour day of professional development for 175 teachers in Cohort 1 one 6-hour day of professional development for 175 teachers in Cohort 2
Mid-Oct to Mid-Nov:	teacher-led activities at schools: school-wide celebrations, grade-level projects, pre- <i>Journey Week</i> astronomy lessons conducted
November 12-15:	<i>Journey through the Universe Week</i> : researchers visit classrooms Monday through Thursday (coincides with American Education Week)
November 16:	half-day for students, with parent visits at schools in afternoon: opportunity to showcase <i>Journey</i> activities at schools
November 16:	family night for 5 th graders and their families at the Maryland Science Center for the classes of Cohort 1 teachers
November 17:	family night for 5 th graders and their families at the Maryland Science Center for the classes of Cohort 2 teachers
Mid-Nov to Early-Dec:	teacher-led activities: post- <i>Journey Week</i> astronomy lessons conducted
November 27-29:	first benchmark test across 5 th grade, includes astronomy content
December 10:	debrief on analysis of first benchmark test data; conducted for all 5 th grade teachers of science. At least 1-hour debrief after school for each of Cohorts 1 and 2; if additional BCPSS funding becomes available for substitutes, 3 hours in the morning for Cohort 1 and 3 hours in the afternoon for Cohort 2
January 8 and 9 2008:	<u>Professional Development for the astrobiology lessons:</u> Master Teacher Workshop for 25 5 th grade science lead teachers; 3 hours per day for 2 days after school
January 10:	<u>Professional Development for the astrobiology lessons:</u> 3-hours in morning for professional development for 175 teachers in Cohort 1 3-hour s in afternoon for professional development for 175 teachers in Cohort 2
January 14-February 8:	teachers conduct astrobiology lessons
February 12-14:	second benchmark test across 5 th grade, includes astrobiology content
February 29:	debrief on second benchmark test, 1-hour for each Cohort.

March/April	Teachers revisit science content in the classroom, as appropriate, based on results from both benchmark tests, and in advance of MSA.
April 16-May 5	Maryland School Assessment (MSA) testing in Science
May	<i>Journey through the Universe</i> Leadership Team Debrief: assessment of program impact during the 2007-08 academic year, and definition of program modifications for 2008-09.