

Blackstone Valley Educational Collaborative
2012 Promising Practices
Exemplar in Curriculum



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Principal: Beverly Bachelder, Douglas Intermediate Elementary School (Grades 6 & 7) Kevin Maines, Douglas High School (Grade 8)	
Subject Area: Science, Tech./Engineering, Math, ELA, Social Studies, and Spanish	
Standards/Strands being addressed: This interdisciplinary, multi-grade unit addresses multiple standards primarily in Science - Life Science (grade 6); Earth Science (grade 7); and Physical Science (grade 8) – with a focus on integrating additional standards/strands in the areas of Technology/Engineering, ELA, Math, Social Studies/History, and Spanish.	
Grade Level: Grades 6-8	
Target Audience: Grades 6, 7, and 8; also involving students in Grades K-3	
Number of days of unit/activity: One week (5 days)	

Project Title: *Space Week: Protecting our Place in Space* (Interdisciplinary unit for Gr. 6-8)

Project/Unit/Program - Focus/Goal: The focus of *Space Week: Protecting our Place in Space*, an interdisciplinary unit for grades 6-8, is to increase student knowledge about the critical importance of space and satellite-based technology, space exploration, and space-related careers, through an integrated curriculum unit. As a result of participating in “Space Week,” students will be inspired by the vision of Dr. Robert H. Goddard (the father of modern rocketry and a native of Worcester, MA) – who believed that outer space profoundly impacts our daily lives! In 1899, when he was 17, Dr. Goddard climbed a tall cherry tree in his family’s yard in Worcester, Massachusetts to prune its dead limbs. He wrote later that as he looked toward the fields to the east, he imagined how wonderful it would be to make a device which had even the possibility of ascending to Mars. In 1926, Dr. Goddard launched the first liquid-fueled rocket and watched it rise 41 feet during a 2.5 second trip. The challenge for the international community today is to build upon Dr. Goddard’s vision while also protecting the integrity of the space environment for future use and exploration.

On Thursday, May 24, 2012, Dr. David Wright, Senior Scientist and Co-Director of the Global Security Program at the Union of Concerned Scientists, will be visiting Douglas Intermediate Elementary School, and will share a special presentation about the issue of space debris with students in gr. 6-8. With the 8th graders, he will also be offering insight into his own education and career path in order to increase student awareness of space-related STEM careers. In response to the week’s activities, including Dr. Wright’s presentation, students will take part in a letter writing campaign to legislators in Washington, D.C., in which they will write persuasive letters (assisted by their ELA teachers), advocating for policies to protect the outer space environment. At the conclusion of “Space Week,” students will have explored where they “fit in” in space, and will also be empowered to advocate for the protection of the space environment.

Essential student outcomes: As a result of participating in “Space Week,” students in Gr. 6-8 will:

- apply and synthesize what they have learned about the importance of space and the space environment, creating a variety of projects to be shared with classmates and younger students;
- gain an appreciation for the benefits of space-based technologies and be able to articulate them;
- learn about the problem of man-made space debris, utilizing a variety of web resources (including the NASA website and such websites as www.protectouterspace.com);

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- advocate for the protection of the space environment by participating in a letter-writing campaign; and
- gain an awareness and understanding of the varied career opportunities in the aerospace industry through active research and communication with space industry professionals.

Materials: Computers with Internet/Skype access, poster/drawing paper, crayons, colored pencils, markers, tape, rulers, meter sticks, calculators, outline maps of the world, world atlases, index cards, PVC pipe, science fiction short stories and lunar myths, and a variety of websites (available upon request).

Description: In **Gr. 6 Science** classes, students will do a research project – based upon experiments conducted on the International Space Station – regarding the challenges of living in space. They will also apply their knowledge of the engineering/design process to design a habitat model for a small mammal or plant on the International Space Station, including drawings with measurements and construction details; a presentation; a sharing of feedback through discussion and evaluation; and finally a re-design of the habitat, based upon this feedback. In **Math**, they will solve “space math” word problems; in **ELA**, they will create a space-related song, story, poem, or skit to share with **Kindergarten students**; and in **Geography**, they will learn how satellite imaging is used to interpret and predict environmental changes, subsequently writing an essay about the impact of deforestation in Rondonia, Brazil. In addition, students will go on a field trip to the EcoTarium in Worcester, MA, where they will take a multi-media journey through the galaxy as they view “Passport to the Universe.”

Students in **Gr. 7 Science** classes will design, launch, and redesign their own paper rockets after participating in a NASA Digital Learning Network program called “Designed for Flight,” communicating via Skype with a NASA engineer at the Dryden Flight Research Center. In **Math**, students will create a scale model of the solar system; in **ELA**, they will write their own science fiction stories and lunar myths; in **History**, they will create a PowerPoint on space-related historical topics, participating in a Digital Learning Network program on “The History of Modern Rocketry”; and in **Spanish**, they will design an illustrated dictionary of Spanish astronomy terms. In addition, students will hear a presentation from a Raytheon engineer regarding satellite communications; assist **Gr. 1 students** in building and launching straw rockets; and go on a field trip to the Christa McAuliffe Center in Framingham, MA, to complete a Challenger Mission simulation experience.

In **Gr. 8**, students will “lift off” their week with a field trip to the Boston Museum of Science, where they will view the exhibit “To the Moon,” and the planetarium show “Explore the Universe.” In **Science**, students will learn about careers in the aerospace industry and discuss an issue at the forefront of space endeavors – the problem of space debris and the need to work to ensure the sustainability of human use of space. Students will be given a general overview of the problem of orbital debris through videos and articles, and will then be divided into teams to research a proposed method for space debris cleanup. Each team will present its proposal to the class who will then collectively decide which idea should be implemented, based upon the strength of the proposal. Students will also be encouraged to propose ideas of their own. In **Math**, students will utilize an NCTM Illuminations unit on “Modeling Orbiting Debris Problems,” as well as “Space Junk – The Problems” from mathcounts.org, to help them better understand the amount of man-made debris currently in orbit, as well as the opportunity to create linear models for space debris accumulation. In **ELA, History, and Science**, students will participate in lessons based on excerpts from the science fiction novel *Have Space Suit – Will Travel*, by R. Heinlein. Students will read about the main character’s walk on the surface of Pluto; investigate and describe examples of Solar System diversity, including hostile conditions on one planet/moon; create an “Extreme Adventure” brochure for a specific planet/moon; design/illustrate a spacesuit with features enabling humans to survive there; and share their brochures/spacesuit designs with **Gr. 2 students**. Eighth graders will assist the 2nd graders in writing opinion pieces about whether or not they would like to visit that planet/moon.

Assessment Design: Students will be assessed in a variety of ways, both informally and formally, with projects being graded according to teacher-created rubrics that will be shared with students prior to starting the projects. Pre- and post-surveys will also be given, and students will be asked to write a written reflection at the conclusion of *Space Week*.