DOCUMENT RESUME

ED 416 097 SE 061 153

AUTHOR	Barry, Dana M.
TITLE	Science Teachers Benefit from Clarkson University's "Adopt a School" Project.
PUB DATE	1997-00-00
NOTE	12p.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Career Exploration; Educational Resources; Elementary Secondary Education; *Engineering Education; *Hands on Science; Higher Education; *Partnerships in Education; *Science Teachers; *Scientific Literacy; Space Sciences; *Student Attitudes; Thinking Skills
IDENTIFIERS	Clarkson University NY

ABSTRACT

Clarkson University's Space Grant Program provides an opportunity for students to consider engineering as a career option and aims to increase science literacy, promote critical thinking skills, and positive science attitudes. These goals are met through an adopt-a-school project which is described in detail to provide a model program for science teachers to present to nearby colleges with whom they would like to collaborate. A discussion of the origins of the project, the speakers, tours, demonstrations and workshops, grants, Web links, handouts, certificates of participation, and the perceived benefits of the project are included. (DDR)

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Science Teachers Benefit from Clarkson University's "Adopt a School" Project

by Dr. Dana M. Barry

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Science Teachers Benefit From Clarkson University's "Adopt a School" Project

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Clarkson University's Space Grant Program initiated an "Adopt a School" project to assist and enhance education in science and space-related fields at local schools. Major goals of the project are to increase interest in space-related topics and to encourage qualified students to pursue science and space-related technical studies. A unique goal is the introduction of the field of engineering, an area not generally included in the school curriculum, to science teachers and their students. This exposure provides an opportunity for students to consider engineering as a career option. The project also aims to increase science literacy and to promote critical thinking skills and positive science attitudes. Every year Clarkson's Space Grant Program adopts a school in its area for a year. This union provides collaborative experiences, hands-on learning activities and other useful and exciting interactions between Clarkson University and the adopted school.

Clarkson's very successful "Adopt a School" project is described in detail to provide a model program for science teachers to present to nearby colleges that they would like to collaborate and interact with. The model program may be used in its present form or modified to meet the needs of science teachers and the universities collaborating with them. The author of this article is willing to assist in this endeavor.

Setup of Clarkson's "Adopt a School" Project

To start, an adopt a school program containing benefits for adopted schools was prepared by Clarkson's Space Grant Program Administrator in collaboration with Clarkson faculty and area

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high school science teachers. The implemented program includes speakers, tours, demonstrations, workshops, grants, web links, handouts, resources, certificates and press releases. Becoming an adopted school is competitive. Interested schools must send a letter of request for participation in the program to Clarkson's Space Grant Program Director Dr. Daniel T. Valentine. Once adopted, schools begin the program by interacting with Clarkson's Space Grant Program Administrator Dr. Dana M. Barry who serves as the university representative / liaison between Clarkson and the adopted school. The liaison sets up an initial meeting with the school's science faculty and principal to present and describe the program as well as to distribute educational resources and other useful materials and to start the collaborative relationship

Program Components

Speakers

Clarkson's representative checked with university professors, staff and students to generate a list of confirmed speakers and topics available to adopted schools. Speakers include engineers, scientists and technologists who share their expertise, excitement, research and career experiences. Presentation topics include the Mechanical Behavior of Soil, Space Shuttle Experiments on Bubbles and Drops, Microgravity and Fluid Mechanics, the Chemistry of Artificial Blood, Making Money with Powder, Virtual Reality, Particle Deposition in the Lung, Earthquakes, Vibration Control of Aerospace Structures, Steel Bridges, Concrete Canoes, the Center for Advanced Materials Processing (CAMP), Clarkson's Space Grant Program, Clarkson's Solar Race Car and more. In addition adopted schools receive prior notification of presentations already taking place on campus.

Tours

The university representative prepared a list of confirmed tours with guides for interesting

equipment, labs, research centers and more. This list includes a planetarium, microscopes (SEM, STM, & TEM), earthquake monitoring equipment, a centrifuge for welding, a centrifuge for crystal growth, the Center for Advanced Materials Processing (CAMP) and others.

Demonstrations / Workshops

Clarkson's representative prepared a list of presentations and presenters for demonstrations, hands-on science workshops and science magic shows which can be presented at the university or at the adopted school. The hands-on science workshops include exciting and stimulating activities and demonstrations in all areas of science (biology, physics, chemistry, earth science and space science) for grades K-12. The science magic show which is of interest to students of all ages exemplifies the mysteries of science through unique chemical reactions, color changes, sound effects and more.

Grants

The Clarkson Space Grant Program offers grants of up to $100.00 to an adopted school if funds are available. To apply for a grant, a proposal must be submitted to the university representative. Proposals should include a description of how the grant money will be used and an indication of the number of people it will benefit. Grant money may be awarded to the adopted school or science and space-related materials needed by the school may be purchased by the university and then awarded to the school.

Web Links

Adopted schools having home pages on the web can be linked to the Clarkson Space Grant Program's web site (http://www.clarkson.edu/~space/) as well as to other useful locations. Also the Space Grant Program includes at its web site a brief description of an adopted school's science and space-related activities resulting from the program.

Handouts

The university liaison presents a handout containing the "Adopt a School" program (lists of speakers, tours, etc.) to the adopted school's principal and science faculty at their first meeting. Also lists of free publications from organizations such as the National Aeronautics and Space Administration (NASA) and other useful materials are given to the school at this time. NASA handouts include *NASA CORE* (Central Operation of Resources for Educators) and NASA's *Liftoff to Learning* (an educational videotape series). Other free NASA publications available to teachers are *Looking at Earth Through Space, Rockets, Seeing in a New Light, Teachers and Students Investigating Plants in Space, Our Mission to Planet Earth, Atmospheric Detectives, Living in Space, The Living Ocean, Exploring the Moon, Space Mathematics, Space Based Astronomy, Suited for Spacewalking* and more.

Educational Resource

The NASA Education Division has created the NASA Teacher Resource Center (TRC) network. TRCs contain a wealth of information for educators. They contain publications, reference books, slide sets, audio cassettes, videotapes, telelecture programs, computer programs, lesson plans, and teacher guides with activities. The TRC for Northern New York is the NASA Goodard Space Flight Center in Greenbelt, MD 20771-001. In addition NASA provides educators with electronic resources. Some useful locations on the internet are the NASA Space Link (http://spacelink.msfc.nasa.gov) and the NASA Home Page (http://www.nasa.gov/).

Certificate of Participation

The adopted school is presented a Certificate of Participation. The university liaison presents the certificate to the school principal in the presence of the school's science faculty at their first meeting.

Press Releases

The university communications office does press releases on the adopt a school program activities. This promotes good public relations and makes known the university's interactions with area schools as well as their efforts to enhance science and space-related education.

Program Benefits

The program benefits the adopted school in numerous ways. In addition to receiving educational materials and resources such as speakers and tour guides, the schools are introduced to the university setting (faculty, students, labs etc,). Relationships and lines of communication develop between college faculty and high school science teachers and opportunities are provided to share ideas and interact collaboratively. Clarkson University's eager and enthusiastic engineers and scientists, who are involved in leading edge research, willingly share their expertise, excitement and the challenges of their work with science teachers and their students. Science teachers select appropriate speakers, presenters and so on, to complement and enhance the material being taught in their classes as well as to provide and expose their students to examples of applied science and world known experts in the field.

The linking of the university with area schools introduces as well as promotes engineering, an important component of science and math that is missing from most school curriculums. The field of engineering is of great importance and has diverse applications from bridge construction and the design of earthquake proof buildings, to genetics and drug delivery devices. Clarkson has competitive engineering design teams which provide opportunities for students to work on hands-on projects such as the construction and testing of steel bridges, concrete canoes, solar race cars and more. These exciting projects could lead to new spin-off activities and clubs for collaborating schools. In addition, exposing students to the university setting may increase college attendance

and ease the transition from high school to college.

Benefits to the university include community service and outreach, positive public relations and student growth. In addition, linking schools to the university may possibly payoff with increased enrollment of high school graduates at the university.

Adopted Schools

Below is a brief description of some activities taking place at our adopted schools. For more information on our "Adopt a School" Project refer to the web site http://www.clarkson.edu/~space/outreach.html and for general information on our Space Grant Program please refer to the web site http://www.clarkson.edu/~space/

Canton High School (the 1997 Adopted School)

Canton High School in Canton, New York was the first school to be adopted by the Clarkson Space Grant Program. In addition to presenting educational resource materials and a Certificate of Participation, the Space Grant Program gave the school software on *Exploring the Planets* and a *Biological Periodic Chart* which benefit over 400 students and faculty each year. Also Canton Central School was provided with excellent speakers and tours.

Professor Richard Partch of Clarkson's Chemistry Department spoke to over 100 students and faculty at Canton Central on March 12, 1997. His well received two-part presentation on artificial blood included fluorocarbon derivatives and hemoglobin mimics. Students were very excited about this topic and many exercised critical thinking and science process skills in coming up with unique and in depth questions.

On April 23, 1997 Professor Dayakar Penumadu of Clarkson's Civil and Environmental Engineering Department gave a wonderful presentation on concrete canoes to more than 75 students and faculty at Canton Central. He was assisted by students Jeffrey Spence and Douglas

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Mandeville who are on Clarkson's competitive concrete canoe team called Fly by Knight. The presentation started with a description of the components of civil and environmental engineering and the work of engineers in those fields. It discussed concrete canoe design, construction and competition. Concrete samples and canoe sections were passed around and examined by the audience. Participants also saw a video of the Clarkson canoe team in a race with other college entries. At the end of the talk, a contest was held and Canton's student winners were awarded T-shirts.

On April 24 and May 1, 1997 Canton Central's Earth Science teacher Doug Dominy and his 60 plus students toured SUNY Potsdam's planetarium. The tours, given by Dr. Jim Carl a Professor of Geology at Potsdam College, included constellation displays and stories to go with them.

On October 21, 1997 Clarkson University's Solar Car Team and team adviser Dr. Eric Thacher gave a fantastic presentation and demonstration of their car Solar Knight, to over 100 students and faculty at Canton Central. Participants received information on solar energy and the solar car and saw solar panels and other components of the car. The talk was well received and provided an opportunity for the audience to ask questions as well as experience the thrill of seeing Solar Knight whiz around the school's outdoor track.

Potsdam High School (the 1997-1998 Adopted School)

Potsdam High School in Potsdam, New York was designated the Space Grant's 1997-1998 "Adopted School." The school was presented educational resources and a Certificate of Participation, and has benefits similar to those of Canton Central School. In addition the Clarkson Space Grant Program has provided Potsdam High School the opportunity to participate in MOONLINK, an educational outreach program with NASA's Lunar Prospector Mission and

Space Explorers, Inc. The Lunar Prospector is a spacecraft launched in the fall of 1997 to conduct a one-year mapping mission of the moon. The MOONLINK program allows students to link to the Lunar Prospector via the internet. It provides an exciting, hands-on experience for students in which they examine the potential assets of the lunar environment. The Lunar Prospector Mission, managed and controlled from the NASA Ames Research Center, includes the following three phases: Lunar Prospector science curriculum based on national science content standards, student internet mission involving live interaction with a MOONLINK mission controller, and a continuing internet mission which allows students to collaborate and work with other schools around the world.

Become an Adopted School

To possibly start up an "Adopt a School" program in your area do the following. Contact the Science or Engineering Department in a nearby college. Mention and discuss Clarkson University's "Adopt a School " Project with them. Ask them if they have any interest in doing a similar type of project with your school. If so, they can contact the author of this article for assistance in setting up the program. If necessary, the author of this article would gladly contact the college of interest on your behalf.

References:

http://www.clarkson.edu/~space/outreach.html

Barry, Dana. "Colleges Adopt Schools to Enhance Science Education," (Letter to the Editor) *Journal of College Science Teaching*, **27**, 87 (1997).

Photo Caption: High School Chemistry Teacher Jim Barry displays a model section of a concrete canoe, designed by Clarkson's competitive team. From left: Clarkson Professor Dayakar Penumadu, Douglas Mandeville, James Barry and Jeffrey Spence.

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