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EXCELLENCE IN EDUCATION THROUGH SPACE EXPLORATION

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The national space policy for the United States establishes a plan for future exploration of the solar system. This plan includes the Space Station Freedom, a journey back to the Moon to stay, and then--a journey into tomorrow--a human mission to Mars.¹ This exploration, the Space Exploration Initiative, plays a vital role in the education of today's young people. Future space exploration can help revitalize our educational system.

In President George Bush's "State of the Union" address on January 31, 1990, he stated:

By the year 2000, every child must start school ready to learn.

The United States must increase the high school graduation rate to no less than 90%.

In critical subjects, at the fourth, eighth, and 12th grades, we must assess our students' performance.

U.S. students must be the first in the world in math and science achievement.

Every American adult must be a skilled, literate worker and citizen.

Every school must offer the kind of disciplined environment that makes it possible for our kids to learn.

And every school must be drug free.

These are monumental goals for educational reform. The student test scores across the country are some of the lowest in all of the industrialized nations. According to a 1988 study by the Educational Testing Service, 58% of American 13-year-olds cannot solve simple scientific problems and 62% spend less than one hour a week on math homework.² The responsibility for educational reform lies with the state governments, not among federal powers. "Along with local governments, states pay 86% of America's education bill."³ Even a doubling in spending in the 1980's did not increase the standardized test scores.⁴ The private industrial sector of the United States must help in this effort to revitalize the American educational system. We must find ways to inspire our young to excel in science, mathematics and general education. Money alone will not solve our dilemma.

The industrial sector of the United States has a vested interest in the education of our children. The National Science Foundation estimates that there will be a shortage of 675,000 scientists and engineers and 20,000 math and science teachers by the year 2000.⁵ Stephen Bechtel Jr., head of Bechtel Corporation, one of the nation's leading engineering

corporations reported in a recent newspaper article that "a shortage of 45,000 college engineering graduates is predicted by 1996, 700,000 by 2010 threatening the international competitiveness of the USA."⁶ We may lose our competitiveness in the high technology areas if the educational system is not stimulated by outside interest and investment.

The aerospace industry is one of the few remaining areas where we are world leaders. However, European, Soviet and Pacific Rim nations are rapidly advancing in the aerospace technologies. The U.S. aerospace industry is also one of the two industries along with agriculture which currently maintains a positive trade balance. The U.S. must make a firm commitment to maintain our aerospace leadership role. Part of this commitment must come in the form of support in the education of our young people.

One avenue through which the aerospace industry in the United States can play a vital role in the revitalization of our educational system is through sharing the excitement of space exploration with the young people of today. Many companies including McDonnell Douglas are involved at a local level with volunteerism in the education area. The majority of these programs are local and dependent on the availability of the volunteers. These programs offer substantial benefit to the local schools. But, they only touch a small number of the leaders of tomorrow. The line between the strategic business objectives of the company and how "community service" programs coexist with those objectives is hard to draw for most aerospace companies. As mentioned earlier, most community service type programs are manned on a volunteer basis. The management of the volunteer community service programs is performed by a few people in the organization. We have to find a more concrete tie between the business objectives and the community service work.

This connection was discovered, in the case of McDonnell Douglas, through examination of the benefits to life on Earth that the Space Exploration Initiative (SEI) will lead to. Not only will exploration improve the U.S. technology base, create new industries via technology advancement, bolster U.S. competitiveness in global markets and assure national security with continued technology development it will also inspire excellence in education. We at McDonnell Douglas want to be a part of the encouragement of a new generation of scientists and engineers through the inspiration of SEI. Space exploration provides the vision and inspiration for future generations of Americans to pursue excellence in education.

McDonnell Douglas was able to participate in the inspiration of young people through sponsoring a portion of a pilot program called "Visions of Exploration: Past, Present, Future" with USA Today and the National Aeronautics and Space Administration (NASA). The Visions program was developed by USA Today in conjunction with an Advisory Team which guided the project. Members of the team included Directors from the National Science Teachers Association, International Reading Association, National Association of Elementary School Principals, National Council for the Social Studies and National Council of Teachers of Mathematics as well as representatives from the National Geographic Society, National Air and Space Museum, 4-H Youth Development, and the Mathematical Sciences Education Board. Representatives from NASA also participated in an advisory role.

The Visions program uses the *USA Today* newspaper and other resources to encourage students to explore the areas of science, math and social studies while learning the practical applications of technology. The program targets children in grades 3 through 8. The primary level is targeted in this program due to studies which indicate that a child's interest in math and science must be captured in a meaningful way by the third grade.

The program provides news to children in the classroom through current editions of *USA Today*. Teachers are provided with weekly lesson plans called "Classline Today." This teaching plan is written specifically for the edition of the paper delivered to the classroom. It aids teachers in pulling interesting articles and themes from the newspaper and provides ideas on how to expand upon those themes. A curriculum guide is also supplied to the teachers. This guide is not time specific (to a particular edition of the newspaper). The guide offers several different theme areas including "Explorers: Past, Present, Future," "Exploring our Home Planet," "Return to Moon and on to Mars," "Exploration of the Solar System," "The Technology of Exploration," and "Exploring Careers." The curriculum guide is intended to illustrate how to incorporate the theme of exploration from the journey of Columbus to a manned Mars expedition utilizing today's news.

The Visions program was piloted for ten weeks beginning October 1, 1990 and ending December 7, 1990. The pilot schools selected by USA Today were located in school districts surrounding four NASA centers: Los Angeles Unified School District with Jet Propulsion Laboratory (JPL), Houston Independent School District with Johnson Space Center (JSC), Orange County Public Schools in Orlando with Kennedy Space Center (KSC), and Fairview Park and Lorain City School Districts in the Cleveland area with Lewis Research Center. (USA Today gained approval from the school boards to allow the school districts to participate in the program.) The schools chosen represent a cross-section of our nation's schools, with special attention to include minorities. Forty-eight classrooms per district with grade levels 3 through 8 participated in the program. The level of participation in the program translates into approximately 6,000 students involved in the pilot. The McDonnell Douglas Foundation sponsored the pilot program at the JPL, JSC and the KSC proximate school districts. While the American Institute of Aeronautics and Astronautics sponsored the pilot program at the Lewis Research Center proximate school districts.

McDonnell Douglas' participation in the program was recognized through several vehicles. A sticker was affixed to each newspaper which read "Excellence in Education through Space Exploration - McDonnell Douglas." A company message to the teachers was also included in the preface to the curriculum guide (see Exhibit 1). USA Today also held regional training for the teachers involved in the programs at each school district. The pilot program sponsors were identified at this training session. Also, at the JSC, KSC, and JPL introductory meetings representatives from McDonnell Douglas were present to share the company's enthusiasm in participating in the program.

The teachers involved in the program were asked to comment on the usefulness of the curriculum guide, the edition specific lesson plan "Classline Today", the usefulness of the newspaper as a supplementary learning tool, and the effectiveness of the theme of exploration capturing children's interest. The use of the newspaper as a supplementary tool was intended to highlight the science and math in current events. The teacher's curriculum guide was intended to be used as a reference from which teachers could draw on the past, present and future exploration.

The feedback from the children and teachers is currently being gathered and analyzed. At this time, approximately 43% of the teachers have returned their evaluations of the Visions program to USA Today. Preliminary results indicate that the teachers think that the Visions program is an effective supplementary teaching program. An analysis of the feedback received to date indicates that the specific components of the Visions program which are commended are the curriculum guide, the "what if" questions which generated stimulating discussions and problem solving interactions, and the graphs, maps and tables found in *USA Today*. The material brings current events and issues into the classroom. Visions also accomplished one of the major objectives of the program: getting children excited

about exploration and sparking their imagination. One of the teachers commented that "students loved to dream of other places and other lives."

However, some of the pilot teachers reported that the curriculum guide content was overwhelming because of the format and the large volume of material. Third and fourth grade teachers noted that there was not enough information at an appropriate level to pull directly out of the guide for their students. Also, teachers recommended expanding information on science topics and increasing vocabulary words. These recommendations are being addressed by USA Today. In response to the recommendations the following changes have been adopted by USA Today; reading level, vocabulary and activities revised to address both elementary and middle school populations, curriculum guide re-organized for ease of use, a section of "terms" have been added for each theme and extensive information on science has been added as theme and topic introductions.

The majority of the comments received back were positive. A pilot program teacher stated that "if I continued using Visions, I would be able to get the vast majority of my class to enter science fields." Other teachers commented; "highly motivating, both students and parents were very receptive;" "program created an interest in science and reinforced a need to excel in science;" "it truly captured the student's attention." Several Franklin Elementary School fifth grade teachers from the Houston Independent School District related that the children "have been introduced to technology used in the production of *USA Today*, as well as technology in articles included in each issue. The students have been allowed opportunities to explore areas of science, social studies, math and all other areas of the curriculum..." The teacher evaluations turned, in thus, far indicate that the program was a success. The program does encourage students to explore the fields of science, math and social studies using the centerpiece theme of exploration.

The Visions program is merely one example of a supplementary program which uses current events and an exciting theme which can be incorporated into the educational system. McDonnell Douglas is very pleased with the positive response from the teachers and the children. For a small investment in an evolving program, McDonnell Douglas helped to reach nearly 6,000 children. Through this type of donation to an educational program the company can affect a change or a spark of interest in a larger group of children than purely volunteer educational activities can. Although volunteerism is an integral part of stimulating the youth of America, more concerted effort needs to be pursued by corporations. The involvement of McDonnell Douglas in the USA Today Visions program exemplifies a successful vehicle through which to participate in education. McDonnell Douglas is not in the education business, but in the space business. Therefore, we must continue to find ways to be involved in education while letting the experts in education design and develop the programs. The association with USA Today satisfied these requirements. USA Today in conjunction with the Advisory Team developed the Visions program, received permission from the school districts to use the program in the classrooms and USA Today launched the pilot program. The sponsorship of this pilot program by McDonnell Douglas has conveyed a message to the people of the United States that we are aware of the important role which the private sector must play in education of today's young people. McDonnell Douglas hopes to continue participating in educational programs such as Visions to promote excellence in education.

McDonnell Douglas foundation is pleased to sponsor the **Visions of Exploration** project. We believe an educated America can promise our country a future in space.

Our nation is heading toward the 21st century committed to return to the moon and establishing a permanent base there, and preparing to explore Mars. It is clear that this will happen only if we constantly review our resolve for such an enormous undertaking and draw on our greatest resource, our nation's youth, who will lead the way to the stars.

McDonnell Douglas is preparing for this future with total dedication as it participates with NASA in Space Station Freedom, an international effort that will be a "laboratory in space" as well as a gateway for other explorations such as a lunar colony or a Mars mission. The successful team of professionals who helped launch the country's first astronaut continues to lead the way, searching today for the breakthroughs of tomorrow.

As the McDonnell Douglas team fixes its sights on the future, it acknowledges the importance of education and the need for involvement by the aerospace industry. McDonnell Douglas Foundation pledges its support to education and is proud to be a part of the **Visions of Exploration** project.

MCDONNELL DOUGLAS

Exhibit 1
Preface to Curriculum Guide

References

1. President George Bush, "Apollo Eleven Twentieth Anniversary," July 20, 1989.
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