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SPACE EXPLORATION THROUGH EDUCATION

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INTRODUCTION

During Buzz Aldrin's remarks at the twentieth anniversary of the Apollo 11 liftoff last July, he indicated that this country was not yet ready to commit to a manned mission to Mars. I contend that to put off this commitment or any commitment only lessens the chances of ever doing it.

The United States space program, like the rest of the american industrial complex is at a very critical point. Long range decisions must be made for it to remain in a competitive position worldwide. It must be remembered that "not to decide is to decide". During the past thirty years the United States space industry has achieved a level of success which made it the envy of the world. Will the next thirty years be a continuation of that tradition or will we be forced out of the industry by better prepared competition? A comprehensive plan, developed and executed with an unwaiving dedication will maintain our position. The roles both education and industry play in this plan is the key to its success and must be fully developed.

A HISTORICAL PROSPECTIVE

Achievements of the past were obtained through the efforts of a highly motivated and trained work force. Future goals are no less complex and will require a labor pool with similar capabilities. Current planners want a space station this decade, Moon bases in the next and a manned mission to Mars before 2020. These goals are all obtainable but we must begin the preparations now. The three essential elements necessary for these programs to progress already exist and if properly utilized will make success the logical conclusion. First, it is within NASA's basic charter to maintain the United States in a position of pre-eminence in space exploration and to promote the social and economic benefits of space. Second, President Bush is strongly on record as the "Education President" and would support any effort to improve our education system and achieve our national goals. Third, adequate budget already exists, the american taxpayer is spending more on education than any other budget item, over 300 billion dollars annually.

Proper planning around these three elements and the aggressive implementation of that plan is where success will be found. It is not just the specific project plan which must be developed but an all encompassing approach which details the specific national conditions which would allow these enormous exploration projects. Planning must include the social and economic conditions which would permit a democratic society to pursue major space projects and how these conditions can be foster and achieved. Successful space stations, Moon bases and manned Mars missions will take an unparalleled national commitment to excellence at all levels and in all industries.

From this excellence the explores will developed the answers to the unanswered questions. Our recent history gives us some insight about the desired conditions and how to achieve them. Does anybody really believe that when John Kennedy committed this country to go to the Moon, that the capability to achieve that goal didn't already exist? This was a very well schooled young politician who was well aware of the pitfalls of proposing a grand folly. Admittedly many difficult problems still needed solutions but the capability and national resolve to overcome all obstacles was ready for success.

A look back at this nation in the early 1960's reveals a success oriented work force, ready to solve any problem and an industrial capability second to none. The economy was up and down but the industrial capability was healthy and robust. This nation was ready to tackle the impossible. Workers were technically educated and motivated to accept only total success at any expense. They were ready to take up the challenge thrown down by the President. The competitive challenge to beat the Soviet Union to the Moon was something the nation could outwardly support but the inner challenge to be the best was what sustained the effort. In 1969, when Apollo 11 touched down on the Moon every American felt the pride associated with a job well done. It is interesting to also note that 1969 was the last year this country had a budget surplus. On the way to the Moon mankind's capabilities to expect and prepare for the unknown was put to the test. As in any attempt to advance beyond existing knowledge failures were expected and some occurred but ultimate success was achieved because lessons were learned and forward movement was maintained. Along the road to the Moon other industries were created and stimulated and the country got much more than a few hundred pounds of Moon rocks and some bragging rights.

Today the legacy of that great adventure is still with us in the many industries inspired by that program or by parallel programs. The Moon program is still paying healthy dividends. In addition to the many spinoff products used in our everyday lives, we have satellites giving us global communications, resource identification and weather prediction. Imagine the losses hurricane Hugo could have caused without early warning weather satellites. These satellites in low earth orbit and geo-synchronous orbit are part of a mature industry with new generations making incremental advances to our capabilities. As near earth space is developed over the next decade with free flyers and the space station Freedom, new industries will grow out of the unique characteristics of that environment. This is a logical sequence of events in any mature product development. This sequence however will not support a major exploration project whose only rational at present is the expansion of human presence.

THE CONTRIBUTION OF EDUCATION

A long range plan to once again leap to a new quantum level in space exploration must be built around strong economic conditions and a large motivated surplus work force. These

conditions will develop as a result of a comprehensive program of education and motivation. Successful campaigns to construct Moon bases and to send manned expeditions to Mars will happen only if this country is prepared to support exploration as an expression of its high level needs. Space exploration is the early stage of a potential growth industry and demands a large up front commitment of resources. For this type of exploration the critical resource to be developed is educated and motivated minds. Minds to attack the problems with new ideas and the energy to implement them. A failures can only exist as a lesson in how not to do things and be reward as another piece of information gained. New ideas and concepts flow from active minds which are properly prepared and encouraged to perform. The work force necessary for these exploration projects must be in addition to the talent needed to keep this country running at peak efficiency. Skilled workers take years of education to develop, an engineer graduating in 2005 is now in first grade. The question at hand is how do we turn on the minds of our youth and develop the necessary work force. Thinking freely about the actual conditions and finding solutions to fit them is not easily taught but is essential to our nation's success. Without an abundant supply of active minds our industry is not ready to leap to the next level of exploration. A commitment to develop those minds however, is within our grasps and needs to be made now.

At this stage of our long range space exploration plan the emphasis needs to be placed on developing technical capabilities and promoting our vision of the future missions. Through education a society invests in the future. Education must make the future believable and supply the students with the needed tools. The success or failure of education is based on the abilities of its educators to present an attractive future and motivate the students to believe in it. Our national capabilities in mathematics, physics, chemistry, biology, sociology, and psychology are essential to the success of our space exploration projects. All people need to understand these basic subjects so informed decisions can be made and our overall industrial base can improve. Ignorance in a society is dangerous because the right to make an informed decision is abdicated in favor of acceptance of self proclaiming authorities. A society that can only identify problems but is not willing or capable of solving them will not advance technically. Regardless of what profession a person may enter, the laws of nature still apply and knowledge of them will make the future more understandable.

It is in the nature of people to take pride in understanding and working within the complexities of the world around them. Everyday life presents a continuous array of problems which must be solved. A literate person is able to identify what is not proper or needs a solution and to implement corrective measures. This skill must be the goal of our education system. To solve a problem, it must first be accurately identified and with the tools obtained through the education process a solution can be implemented. Problems without solutions do not exist. The ability to solve problems is very important to a person's feeling of self worth and must be encouraged at all ages. Pride,

motivation and ego when properly molded will create an effective worker when coupled with basic skills.

A student can not be considered educated without a solid background in both humanities and science. One without the other will not produce a well educated person or a balanced and prosperous society. Perhaps this is the reason for our high failure rates in our education system. A failure rate of 30 percent is published for functionally illiteracy but based on the amount of training industry must provide new employees, the percentage maybe much higher. Currently less then twenty percent of our high school graduates have taken a course in basic physics. In any advancing technological society this is critical deficiency. Beginning with the first day of the first grade the principles of physics should be woven into the educational process. It is the link between the abstract concepts in education and the reality of the industrial world. Young minds are best prepared to learn an equal balance of humanities and the laws of nature. A broad brush coverage of physics, chemistry and the other sciences geared to the learning skills of the various grade levels is essential for all levels. People are motivated to excel by different stimuli but if the stimuli is not presented or the skills needed to understand the stimuli were taught earlier but not learned, frustration and failure will result. If understanding science makes science fiction readable and enjoyable then the student learns both science and how to read. Each student observes the world in a different manner but within each vision the basic laws can be applied. Students arriving at the end of their high school education should have a knowledge of how the world works and possess the basic skills to deal with it. Upon entry to industry or college they should have basic skills in physics, chemistry, mathematics and communications and the motivation to aggressively pursue whatever goals appeal to them. This capability can be achieved if we start teaching our youth all the basic skills and motivating them to strive for success at the risk of momentary failures.

RECOMMENDATIONS

To achieve these desired goals american industry and in our case, the space industry, must get involved in the education process. The five point plan I am presenting here will once again connect industry and education and reduce the cost industry is now incurring on post employment education. First, industry must identify the basic skills needed to successfully participate in their market place. Second, industry must go to the schools and together with the educators, develop academic paths which will supply the needed skills in their work force. This process is now being worked within the Institute for Space Technology at Brevard Community College and should be expanded into high school and grade school programs. Third, assistance must be given to the teaching profession in developing programs and class work which will technically motivate each grade level to acquire the necessary skills. Most students need real world examples of how algebra and geometry are used before they will apply themselves in learning them. Fourth, educators should be brought into the

factories and industrial complexes for temporary work assignments to obtain first hand exposure to what is needed. Fifth, industry must send specialist to the schools to work within the classroom system on a regular basis. This would present a clear signal to the students that industry really does need their help in the future and the material they're learning is important. To assist our space industry in maintaining its pre-eminence in space exploration, incentives to participate in the development of it future work force would certainly be appropriate. Once the national work force is motivated with skill individuals and industry is supplied with a surplus of technically motivated workers, serious space exploration can begin again.

CONCLUSION

New space industries must be built on a strong economic base which is not subject to continuous budget pressures. The work force at all levels must be well versed in the basic science skills and the general public must understand the significance of the projects. This process will take a few years to achieve the surplus work force needed for grand exploration but will pay immediate dividends with increased productivity each year after its implementation.

BIBLIOGRAPHY

1. "The Will to Take Leadership", Lee Iacocca, Washington, D.C., March 22, 1989

2. "Schools Get a Disturbing Report Card", Lance Oliver, Orlando Sentinel, December 1989

3. "Irrational Fright Against Nuclear Power in Space", Dr Lynn Weaver, Florida Institute of Technology, Melbourne, Fl, December 1989

4. "Project Focus - Teaching Science", Denis Paiste, New Hampshire Sunday News, January 14, 1990

5. " When You Know Your ABC's", William F. Buckley Jr, January 1990

6. The World Almanac and Book of Facts 1970, editor Luman H. Long, Newspaper Enterprise Assoc., NY, NY