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**Paper Session II-D - Project Vision (Very Intensive Scientific Intercurricular Onsite Education): A Partnership Among NASA/John F. Kennedy Space Center, Florida International University, Universidad del Turabo, Dade County Public Schools, and the Caguas/Gurabo Public Schools.**

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Presenter Information
Project VISION
(Very Intensive Scientific Intercurricular Onsite Education):
A Partnership Among NASA/John F. Kennedy
Space Center, Florida International University,
Universidad del Turabo, Dade County Public
Schools, and the Caguas/Gurabo Public Schools.

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Abstract

Project VISION is a joint effort among NASA/John F. Kennedy Space Center, Florida
International University, Universidad del Turabo, Dade County Public Schools and the Caguas/
Gurabo Public Schools. The project’s main mission is to institutionalize change among the 7th
grade science and mathematics teachers at participating public middle schools. A further
aspect of the mission is to enhance the science and math education of the public middle school
students during the phase of institutionalization. Project VISION will not need to generate any
new educational materials to fulfill its mission. Rather than generating new materials, Project
VISION will use the vast quantities of high quality learning modules, lessons, hands-on experi-
ments and other educational materials available at NASA and other scientific depositories. The
project will identify, adopt and then adapt these learning modules or learning materials to best
meet the needs and capabilities of the target student and teacher populations. A further goal of
this project lies within the realm of NASA’s Mission - to specifically focus our activities on middle
schools that serve socially and economically disadvantaged students. Additionally, the project
will invite members of the private and public sectors to serve as lecturers, mentors and role
models. The project will perform program evaluations to measure the levels of success and
accomplishments of each of the proposed activities.

Introduction

The nation is experiencing severe changes in its national economy as a result of the
world’s continuing transformation into a global market. Greater numbers of scientists, math-
ematicians, and engineers will be required if our nation is to remain competitive in an increas-
ingly technology-driven world economy. In recent educational surveys, our nation has been shown as trailing behind most of the industrialized nations in the quality of science and math education provided at the elementary, middle and senior high school levels. Comparison of test scores with those of other nations proves that our students’ foundation in science and mathematics is greatly inferior. Without a quality science and mathematics background, our nation’s students start their academic careers at a disadvantage when compared to the students from other industrialized nations. This disparity will eventually lead to a national shortage of highly qualified scientists, engineers, and mathematicians.

Another fact about our nation is that it has one of the best, if not the best higher educational system in the world. The large numbers of students from foreign countries who flock to enroll in our nation’s institutions of higher learning attest to this fact. Our higher education system is an asset that we must harness for the benefit of those students still in the beginning stages of their academic careers.

In addition to the institutions of higher learning, our nation has another valuable asset that can be utilized to assist the public schools, the National Aeronautics and Space Administration (NASA). NASA, as mandated by Congress and directed in its strategic mission, has developed a wealth of up-to-date educational information and materials available for the public’s use. Project VISION plans to maximize the use of this information and materials by identifying, adopting, and then adapting them to the middle school curriculum.

Project VISION strives to develop a methodology by which the resources of NASA and our higher education system can be tapped in order to assist the nation’s public schools in developing brighter, more resourceful scientists, mathematicians, and engineers. Project VISION will develop a systemic approach to solidifying an alliance among NASA, two institutions of higher learning, and two local public school systems. The methods and successes, as well as failures, developed by this project will serve as a critical guide to expanding these activities nation-wide. The extent of our educational crisis is such that a model should be developed that could be replicated at every public school system in order to achieve the significant results needed to overcome this crisis.

Both Florida International University and the Universidad del Turabo have “adopted” middle schools to participate in this project. The project will focus specifically on 7th grade science and math teachers, as well as all 7th grade students, during the project’s first year of operation. During the second year, this project will be expanded to include the 8th grade students, who also participated in the project’s first year.

Major Goals and Objectives

The following are the major goals and objectives of Project VISION:

1. Develop a model of collaboration between the NASA-John F. Kennedy Space Center, public school systems, industry representatives, science and math public middle school teachers, public middle school students, two institutions of higher learning, and faculty and students from science, mathematics, education, and engineering disciplines.

2. Enhance the public middle school science and mathematics curriculum through the use of NASA electronic resources and educational materials, as well as other sources.

3. Empower the public school teachers by enhancing their understanding of mathematics and science principles and by enhancing their science and math curriculum through the use of state-of-the-art materials integrated within their teaching methodology.

4. Establish greater participation in existing academic competitions (i.e. Science Fairs, SECME District Olympiad, etc.)
Increase the average scores in science and math subjects, as well as in the regular classes, and increase the overall average scores in the standardized tests.

Increased parental involvement in the educational process of their middle school children in order to foster a greater sense of motivation and responsibility within the children.

Expose the middle school students to examples of real industry professionals/mentors so as that they can see, first-hand, the rewards and challenges of a professional career in science and engineering.

**Organization and Personnel**

Project VISION is staffed and organized to meet the differing demands resulting from program activities that are conducted in two distinct geographical regions – Miami, Florida and Gurabo, Puerto Rico. (see the Project VISION Organizational Chart below) There are two Program Directors; Dr. Gustavo Roig, Associate Dean of the College of Engineering at Florida International University, and Principal Investigator, and Dr. Federico Norwood, Dean of the College of Engineering at *the Universidad del Turabo*, and Co-Principal Investigator. The two Program Directors oversee the daily operations of Project VISION. There are two other Co-Principal Investigators involved with the project: Dr. M. A. Ebadian, Director of the Hemispheric Center for Environmental Technology at Florida International University, and Dr. Irma Becerra-Fernandez, Assistant Professor in the Department of Industrial and Systems Engineering at Florida International University. Drs. Ebadian and Becerra-Fernandez serve as the liaisons between the Industrial Mentors and the project's staff. They assist in coordinating the activities of the Industry Mentors with respect to the project's overall goals.

During the first year, the project has enlisted the assistance of approximately 25 representatives from industry and government to serve as Industry Mentors. These Industry Mentors are volunteers who provide their valuable time to this project out of a real concern for the educational well being of the public middle school students, as well as a deep concern for the future of our nation.

The project has also enlisted the assistance of university faculty in the fields of science, math, engineering, education and English, from both Florida International University and the *Universidad del Turabo*. These faculty are the team leaders who coordinate the university student assistants in the identification, adoption, adaption, pilot testing, and fine tuning of the learning modules. The university student assistants are those who are majoring in the fields of Science, Math, Engineering, Education, or English. They work for the university faculty in the capacity mentioned above, and also assist the public school teachers in their understanding and usage of the learning modules.

A total of four public middle schools have been selected to participate in the project's first year: Homestead Middle School in Dade County, Florida, with approximately 1,800 students; Escuela Rafael Quiñones Vidal, Escuela Antonio S. Pedeira, and Escuela John F. Kennedy, Caguas/Gurabo, Puerto Rico, for a combined three-school total of 1,100 students. Educators who teach 7th grade math and science classes have been selected from these schools to participate in Project VISION. These teachers will form part of the teams that will develop the learning modules for the target student audience. Their efforts will include assisting in the pilot testing of the learning modules, as well as being involved in presenting learning modules on their initiative once these modules have been adapted to the 7th grade curriculum.

The project also has the cooperation and assistance of the public middle school administrators in both Dade County, Florida and in Caguas/Gurabo, Puerto Rico. Each of the participating public middle schools has also assigned one of its administrators to serve as a liaison between the public school teachers, students and administrators, and the project's staff.
Another important and integral partner in this project is the NASA/John F. Kennedy Space Center, located in the state of Florida. Through the assistance and strong collaboration of the NASA liaison personnel – the University Program Coordinator and the Technical Monitor - NASA/KSC will be providing the project with personnel who will serve as speakers, educational materials, access to repositories of scientific information, teleconferencing and other resources.

Finally, the project is staffed by a Program Coordinator, who assists the Program Directors in their daily operations; two Program Specialists who supervise the team efforts in the development of learning modules; and, several clerical assistants who provide administrative support.

The basic premise of Project VISION is that there already exists sufficient educational materials (learning modules) in all the data repositories of the federal, state, and local governments, at public and private libraries, and at public and private universities, to compliment
almost every subject, for every level of study from Kindergarten through 12th grade. Therefore, it is not that there is a lack of learning modules that prevents local public school systems from incorporating these learning modules, with their hands-on activities or experiments, into the regular academic curriculum. Instead, it is a combination of not knowing where these learning modules are to be found, not knowing how to access them, not knowing where they fit into the competency based curriculum (CBC), and not knowing how to adapt these learning modules for use in the classroom. It is precisely at this point where the activities of Project VISION couples existing educational resources with prevailing needs in order to create an enhanced science and mathematics curriculum.

The process begins with the formation of clusters or teams consisting of a university professor, two university students, a public middle school teacher, and a Program Specialist. The university students, under the direction and supervision of the university faculty, seek potential learning modules on the internet or other electronic or printed sources. An excellent location of potential learning modules is the NASA Spacelink website located at: (http://spacelink.nasa.gov/index.html). This site provides thousands of excellent learning modules and also links with hundreds of other sites that also have high quality educational materials.

The university students search for learning modules that are appropriate for the grade level, subject and topics that are part of the competency based curriculum (CBC) of the target student audience. Once a potential learning module is identified, and its appropriateness is determined, then it is adopted for this project. This learning module that is adopted may not contain all the information, exercises, homework, etc., that would make it fit perfectly within the CBC. Therefore, this learning module must undergo a process of adaptation to create a better fit with the CBC. The process is a joint and continuous effort among the members of the cluster. Each member provides his/her assistance and expertise to fully develop the learning module.

Once the learning module has been adapted to meet the requirements of the CBC, it is then ready to be tested. However, before the testing can begin, the cluster meets to coordinate the location, date and time where the learning module will be presented. Once these specifics are established, the public school teacher becomes familiar with the material that will be presented. Before the learning module is presented, the public school teacher presents to the students the theoretical background or material related to the module, and which is provided in the students’ regular science or math textbook. The students are also given reading materials beforehand which compliments the materials and activities that will be presented in the learning module.

During pilot testing, the learning module is presented by the university faculty and/or university student to a classroom of students at the public middle school. In attendance is also the public school teacher, the university student/faculty, and the Program Specialist. While the faculty/student makes the presentation, the other team members assist and observe the flow of the presentation and the hands-on activities. They make notes of any needed changes or corrections that will make the learning module more effective. After the presentation, the cluster members meet to finalize any changes that are deemed necessary. The changes are incorporated into the learning module and it is then finalized. At this point, there is a fully adapted learning module available for use by the public middle school teachers in their science or math classes.

Presenting a learning module that is fully integrated into the CBC to public middle school teachers will not assure that the teachers will use these learning modules in their classes. It is important to provide these teachers with further assistance before expecting them to incorporate these learning modules into their classes. Therefore, in addition to the pilot test presentation, the project would also conduct two further presentations for each public middle school teacher. During the first presentation, the Program Specialist would present the learning module, includ-
ing the hands-on activities, to the students, and the public school teacher would observe and assist. During the second presentation, the public school teacher would make the presentation, and the Program Specialist would observe and assist. After the presentation, the Program Specialist and the public school teacher would discuss their observations in order to fine tune the presentation process. Thereafter, the public school teacher would be fully trained and qualified to make any subsequent presentations of the learning modules without the assistance of the Program Specialist.

Additional Program Activities

Project VISION strives to maximize its impact on all the participants of this program. This impact can take many forms; from educational enhancement, to establishing greater familial unity, to exposing participants to situations and experiences that they would not normally encounter in their daily lives, but that have a profound effect on their way of thinking or viewing the world.

One of the project’s first activities was providing computer technology seminars to the participating 7th grade science and math teachers. The teachers were given intensive training in the latest personal computer software that they could use in order to prepare their class lessons, homework assignments, experiments, proposals, presentations, etc. These teachers were also shown how to access the Internet, and were shown several federal scientific and educational depositories that they could access on their own. Emphasis was placed on the use of electronic resources (like Space Link from NASA) to enhance their curriculum. These teachers will also be able to construct projects and develop materials for their use in the classroom environment during the regular academic year.

Another activity that was planned included identifying and selecting representatives from local industry to participate as Industry Mentors. These mentors would be volunteers who would freely give their time and attention to the students of the participating middle schools. They would be enlisted to provide at least two to three 2-hour presentations during the year to a classroom of students. As part of their presentations, the mentors would talk about their life experiences, as well as the challenges and rewards they have experienced as professionals in the fields of science, engineering, mathematics and other related fields. The students would be exposed to role models of successful professionals who were there to prove that hard work and dedication to academics does have its rewards. The mentors would also participate in various academic competitions by serving as judges or referees.

One of the most important activities of this project involves the parents or guardians of the middle school students. Several of the learning modules do and will require parental involvement. The parents/guardians would also be invited to participate in the “NASA Day” activities that would have several academic competitions and displays of experiments created by the students. The parents would attend and view presentations from the students on a topic related to science or mathematics. They would also be able to attend special presentations by guest speakers from NASA. The purpose of involving the parents in this project is to create and reinforce the motivation and enthusiasm needed by the student, at home, to pursue a career in a scientific or engineering field. It is expected that greater parental involvement at an early stage in their academic development will work towards assuring that the students develop the mental concentration and dedication needed to succeed in the math and science classes. These activities would also serve the purpose of creating parental awareness of the child’s activities at school, as well as serve as a bonding experience for the family.

The students involved in this project will also participate in the annual SECME District Olympiad. This Olympiad is a yearly competition whereby middle and high school students participate in contests that stimulate creativity and analytical thinking. Some of the events
include an egg drop competition, the mousetrap contest, the bridge building competition, etc.

Program Evaluation

One of the important objectives of this project is to review its effectiveness in meeting its goals. The project will evaluate its effectiveness through a careful review of the data, materials, and surveys that will be collected throughout the first year. Several of these Metrics were established early in the project’s first year in order to establish a baseline by which to compare any resulting changes. The metrics that were established are listed as follows:

- Average Student GPA in science and math
- Number of students participating in the Science Fair
- Student participation in science/math clubs
- Participation in SECME District Olympiad
- Student Surveys
- Parent/Guardian Surveys
- Public School Teacher Surveys
- Public School Administrator Surveys
- Number of proposals submitted by science/math public school teachers
- Additional demographic and academic indicators

For those metrics that use GPA, participation rates, submission rates, etc., the data will be accumulated over the year during which the project is in effect. Thereafter, this data will be compared to historical data – it is expected that three previous years’ worth of data will be sufficient to establish a baseline – to compare what changes have occurred due to the project’s impact. The metrics that use surveys will also compare using a “before and after” look. In these instances, surveys will be distributed at the beginning of the project’s first year, and then again at the end of the first year. The information that will be sought through these surveys will be mostly subjective, however, it will give an indication of the changes that have occurred in these target groups (students, teachers, parents and administrators) due to the project’s influence through its daily activities. It is expected that the project will produce a positive change in both the quantitative data as well as in the qualitative or subjective data.

References


**Raising the educational Achievement of Secondary School Students.** Internet address: http://inet.ed.gov/pubs/Raising/brochure/brochure.html
