

Project VISION

(Very Intensive Scientific Intercurricular Onsite Education):
Teacher Training

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Abstract

Project VISION is a joint effort among NASA/John F. Kennedy Space Center, Florida International University, Universidad del Turabo, Bethune-Cookman College, Florida Memorial College, Miami-Dade County Public Schools, the Caguas/Gurabo Public Schools and Volusia County Public Schools District. The project's main mission is to enhance the science and mathematics curriculum for elementary and middle schools. A further aspect of the mission is to enhance the science and math education of the public elementary and middle school students during the training phase. Project VISION will not need to generate any new educational materials to fulfill its mission. Rather than generating new materials, Project VISION is using the vast quantities of high quality learning modules, lessons, hands-on experiments and other educational materials available at NASA and other scientific depositories. The project identifies, adopts and then adapts 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 realms of NASA's Mission – to specifically focus our activities on middle schools that serve socially and economically disadvantaged students. Additionally, the project invites members of the private and public sectors to serve as lecturers, mentors and role models.

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, mathematicians, and engineers will be required if our nation is to remain competitive in an increasingly 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 elementary and middle school curriculum (NASA Spacelink website address is <http://spacelink.nasa.gov>)

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 developed a systemic approach to solidifying an alliance among NASA, four institutions of higher learning, and three 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.

Training Methodology

Project VISION has developed a training system for the science and math teachers of the elementary and middle schools consistent with the use of learning modules with their hands-on and minds-on activities. The learning modules to be used will be selected based on the level of the target audience, elementary or middle school, and on the given subject area, math or science. They were also selected in deference to the preference of the participating teachers and school administrators. The Project VISION Training Methodology consists of three components: *Learning Modules, Personnel, and Training Options*.

Learning Modules:

A basic premise of Project VISION is that there already exist sufficient educational materials (learning Modules) to compliment almost every subject, for every level of study from Kindergarten through 12th grade. These learning modules can be accessed through the Internet at the data repositories of the federal, state, and local governments, at public and private libraries and at public and private universities. Therefore, it is not that there is a lack of learning modules that prevents local public school systems and teachers from incorporating them, with their hands-on activities or experiments, into the regular academic curriculum. Instead, it is a combination of not knowing where they can be found; how to access them; where they fit into the competency based curriculum (CBC) or equivalent national education standards; and, 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.

Personnel:

In order to perform the actual teacher training, the following personnel are involved at on stage or another.

Public School Teacher: This is the individual who is undergoing the training. For the purposes of this program, this teacher should instruct math and/or science classes at the participating public school.

Lead Teacher/Teacher Trainer: This is the individual who will perform the actual training and evaluation. The Teacher Trainer will present the learning module alone, or in conjunction with the public school teacher, depending upon the training option selected.

Training Assistant: This is the individual who assists the Teacher Trainer to obtain the necessary materials and supplies, present the learning module, coordinate the hands-on activities, and serves as a general assistant during the entire process. The Training Assistant allows the Teacher Trainer to be able to conduct observation and evaluation and not be caught up procuring and distributing supplies, and other time consuming tasks.

Training Options:

Project VISION provides two (2) distinct training options or methods. The first option provides a more simplistic approach to teacher training. In this method, the project staff presents the learning module, while the public school

teacher observes. The expectation is that the public school teacher, given copies of all the materials and information used, will be able to present this same learning modules on her/his own throughout the her/his teaching career. In the second option, a more didactic approach is taken. In this option, the public school teacher gradually increases her participation in presenting a learning module until she/he presents one completely on his/her own.

Option 1: Project VISION staff provides 3 to 5 learning modules chosen by the target teacher from a list of recommended learning modules. The staff then prepares and presents these learning modules within an actual classroom setting. The target public school teacher serves as an observer or trainee in order to learn how to do the module. The teacher also assists the staff members in maintaining classroom discipline. After observing each learning module presentation, the target teacher should be able to understand the theory and application of the learning module, and should be able to present these learning modules on his/her own.

Option 2: The Project VISION staff conducts a more in depth training on the identification preparation and presentation of learning modules in a classroom setting. This option provides for a ten-step training process as follows:

Step 1: Consultation and Coordination

Step 2: Learning Module 1 – Pre-presentation Classroom Preparation

Step 3: Learning Module 1 – Presentation (Initial Learning Module)

Step 4: Learning Module 2 – Pre-presentation Classroom Preparation

Step 5: Learning Module 2 – Presentation (Pre-Solo Learning Module)

Step 6: Learning Module 3 – Pre-presentation Classroom Preparation

Step 7: Learning Module 3 – Presentation (Semi-Solo Learning Module)

Step 8: Learning Module 4 – Pre-presentation Classroom Preparation

Step 9: Learning Module 4 – Presentation (Solo Learning Modules)

Step 10: Evaluation and Feedback

Step 1: Consultation and Coordination

During this step in the training system, the Teacher Trainer and the participating public school teacher meet to discuss delivery schedules choose three learning modules (Initial, Pre-Solo, and Semi-Solo) and coordinate other matters.

Step 2: Learning Module 1 (Initial) – Pre-presentation classroom Preparation

In step 2, the public school teacher presents to the target classroom the theoretical information that correlates with the subject matter of the learning module. This background material is

obtained from the assigned textbook, the learning module, or other sources of information that the teacher would normally use for class lectures.

Step 3: Learning Module 1 (Initial) - Presentation

In this step, the Teacher Trainer and an assistant present the learning module to the target classroom. This presentation includes the hands-on activities that involve all the students in the classroom. The public school teacher serves as an observer during this presentation. However, the responsibility for class discipline remains with the public school teacher. The supplies and materials needed for this activity are obtained and funded by Project VISION.

Step 4: Learning Module 2 (Pre-Solo) - Pre-presentation Classroom Preparation

During this next step, the public school teacher presents to the target classroom the theoretical information that correlates with the subject matter of the second learning module. Again, this background material is obtained from the assigned textbook, the learning module, or any other sources chosen by the teacher.

Step 5: Learning Module 2 (Pre-Solo) - Presentation

In this step, the Teacher Trainer and the public school teacher present the learning module to the target classroom jointly. This presentation should be a team effort involving both individuals (one-third by the public school teacher and two-thirds by the Teacher Trainer). The responsibility for class discipline remains with the public school teacher. The supplies and materials needed for this activity are obtained and funded by Project VISION.

Step 6: Learning Module 3 (Semi-Solo) - Pre-presentation Classroom Preparation

During this next step, the public school teacher presents to the target classroom the theoretical information that correlates with the subject matter of the third and final learning module. Again, this background material is obtained from the assigned textbook, the learning module, or any other sources chosen by the teacher.

Step 7: Learning Module 2 (Semi-Solo) - Presentation

In this step, the Teacher Trainer and the public school teacher present the learning module to the target classroom jointly. This presentation should be a team effort involving both individuals (two-thirds by the public school teacher and one-third by the Teacher Trainer). The responsibility for class discipline remains with the public school teacher. The supplies and materials needed for this activity are obtained and funded by Project VISION.

Step 8: Learning Module 3 (Solo) - Pre-presentation Classroom Preparation

During this next step, the public school teacher presents to the target classroom the theoretical information that correlates with the subject matter of the third and final learning module. Again, this background material is obtained from the assigned textbook, the learning module, or any other sources chosen by the teacher.

Step 9: Learning Module 3 (Solo) - Presentation

In this step, the public school teacher presents the learning module to the target classroom. The Teacher Trainer is present during the presentation, but only serves as an observer and guide. The responsibility for class discipline remains with the public school teacher. The supplies and materials needed for this activity are obtained by the public school teacher and are funded by the school.

Step 10: Evaluation and Feedback

In the last step of the training system, the Teacher Trainer provides the public school teacher with feedback concerning his/her performance during the learning module presentations. The feedback is provided in a fully professional manner, and an evaluation is provided to the teacher that lists the possible strengths and weaknesses observed. If requested, the Teacher Trainer may provide the administration of school with confidential and specific written results based upon observation and evaluation conducted during the training

The public school teacher will be engaged in 3 to 5 learning modules. Each learning module will be divided into two sections: Pre-presentation Classroom Preparation and the Presentation. During each of the Pre-presentation Classroom Preparations, the public school teacher presents the theoretical background on the subject matter to be presented during the learning modules. Thereafter, the learning modules are presented. The public school teacher increasingly conducts more and more of the learning module presentations. Therefore, during the first learning module presentation, she/he is strictly an observer. During the second, she/he conducts one-third of the presentation. During the third, she/he conducts two-thirds. During the fourth, the public school teacher conducts the entire presentation. In this manner, the public school teacher gradually gains the knowledge and experience to conduct learning module presentations on his/her own, without the assistance of the project staff.

In the last step of this training option, the Teacher Trainer provides the public school teacher with feedback concerning his/her performance during the learning module presentations. The feedback is provided in a fully professional manner, and an evaluation is provided to the teacher that lists his/her possible strengths and weaknesses observed.

Conclusion

With the advent of the Internet, the first step in providing instantaneous, low-cost, and standardized educational materials to all parts of the nation has been achieved. Building upon the Internet, many federal and state agencies, as well as public and private institutions have created and compiled outstanding repositories of high quality education materials. These learning modules, with their hands-on and minds-on activities, can be used to enrich local area classroom curriculums. This enriching process may make the difference between producing students with a standard or mediocre understanding of the principles of math and science, or students who have mastered these areas and have the potential, as well as the motivation to become the next generation of scientists, mathematicians, engineers and leaders. Project VISION has developed its own website that contain links to several hundred quality learning modules at <http://www.eng.fiu.edu/vision/>.

References

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