



STEM Initiatives in Community Colleges

A Program Review

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Introduction. In order to meet future workforce demands, all students must have a solid foundation in science, technology, engineering, and mathematics (STEM). These needs have sparked a renewed emphasis in strengthening STEM competencies among students at all levels of education.

The National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF) signed a Memorandum of Understanding in February 2007 to coordinate efforts for expanding opportunities to promote science, technology, engineering, and mathematics education. In June 2007, hearings on STEM education were conducted by a subcommittee of the United States House of Representatives' Committee on Science and Technology.

One of the 2006-2007 initiatives of the National Governors Association (NGA) is to assist states to improve K-12 STEM education and training for all students. In its study, *Building a Science, Technology, Engineering and Math Agenda*, the NGA identifies three obstacles to having a world class STEM education system:

1. too many high school graduates inadequately prepared for postsecondary education and work,
2. misalignment of STEM coursework between K-12, postsecondary skills, and work expectations, and
3. an under-qualified STEM teaching workforce.

Recently, the National Science Foundation's National Science Board published a draft version of "A National Action Plan for Addressing the Critical Needs of the U. S. Science, Technology, Engineering, and Mathematics Education System." This proposed Action Plan calls for a "coherent, coordinated system of STEM education provided by well-prepared and highly effective STEM teachers."

Results on the National Assessment of Educational Progress (NAEP), often called the "nation's report card", demonstrate persistent mathematics and science achievement gaps between students relative to race/ethnicity, gender, and socioeconomic status. Projected demographic shifts will magnify this problem in the United States if STEM achievement gaps are not eliminated.

Florida's community colleges are uniquely situated to offer educational solutions by providing STEM-related programs to middle and high school students as well as delivering postsecondary instruction emphasizing STEM coursework. Community colleges offer elective courses in each STEM discipline and provide enrichment opportunities to middle and high school students. These enrichment opportunities provide students in traditional high school programs with added instructional content and encouragement in STEM areas. Community colleges offer Associate in Science programs that prepare students for entry into select STEM careers. In addition, community colleges provide opportunities for students to complete the first two years of instruction before transferring to baccalaureate programs in public or private universities. Science and mathematics instruction is an integral part of the first two years of instruction.

Some community colleges provide opportunities for students to attain baccalaureate degrees in STEM-related fields through the community college baccalaureate programs and concurrent-use/joint-use partnerships between community colleges and universities. To better prepare Florida's teachers and improve K-12 achievement in science and mathematics, Florida's Community College System operates Educator Preparation Institutes (EPIs) that train baccalaureate degree holders for teaching careers.

As part of Florida's application for an NGA STEM Center grant, the Division of Community Colleges surveyed the twenty-eight public institutions to collect up-to-date information on any tracks or programs offered by community colleges that promote or provide opportunities to students in STEM areas.

Survey Findings. The survey was distributed in April 2007. Community Colleges were asked to provide information for 2005-06 about pre-collegiate, collegiate, and teacher preparation programs that have a STEM component. While all 28 colleges responded to the survey, the information submitted by the colleges provides examples rather than an exhaustive list of all STEM-related programs and activities. Information presented here is taken from the survey responses and is supplemented with information collected by the Florida Department of Education. See Appendix A for detailed information on the STEM initiatives reported by each college.

Pre-Collegiate Programs

Academic Instruction. Community colleges offer a broad range of programs that provide direct academic instruction to high school students. In addition, college faculty and staff have volunteered to serve on local Assistance Plus Teams, which serve as specialists to assist low performing elementary and secondary public schools.

At this time, nine community colleges operate separate high schools. Six of the high schools (Florida Community College at Jacksonville, Indian River, Lake-Sumter, Okaloosa-Walton, Polk, and St. Petersburg) are charter schools and one (Daytona Beach) is a charter technical center. Of the seven charter schools, two (Daytona Beach and Indian River) have a technology focus. Two additional colleges (Brevard and Broward) operate separate high schools that are not charter schools. In addition, Central Florida, Miami Dade, Okaloosa-Walton, and Pensacola have dual enrollment academies that are separate entities operated through an agreement with the local school district. They have a separate administration and award both high school and college credit for successful course completion.

Several Florida districts also operate small, personalized learning communities called career academies. Central Florida, Miami Dade, Okaloosa-Walton, and Pensacola are partnering with local career academies to identify appropriate dual enrollment options to align with the academy's career theme.

All 28 community colleges offer dual enrollment courses for eligible high school students. A student earns high school credit and college credit for the dual enrollment course. The student headcount in dual enrollment in 2005-06 exceeded 32,000. Courses in STEM areas are available to all students eligible for dual enrollment.

Some school districts and community colleges have designated select programs for high school students that include transfer provisions that feed into a certificate or associate degree. For example, Florida Keys offers dual enrollment opportunities in a Marine Propulsion program allowing high school students to take 18 college credits during one year of high school. A student may then continue at the college to complete a certificate in Marine Propulsion or an Associate in Science (A. S.) degree in Marine Engineering. Using a different approach, Brevard Community College offers an intensive three-week course in environmental science and statistics that provides students with college credit for Statistical Methods I (STA 2023) and Introduction to Environmental Science (EVR 1001).

SUCCEED, Florida! Career Paths Grants, funded by the Florida legislature for 2006-07, included at least two technology academies operated by community colleges. The Information Technologies Pathways Academy at Florida Community College at Jacksonville provides coursework leading to industry certification in various information technology areas. The Indian River Community College academy provides an information technology concentration at its campus high school which enables students to

earn 36 credit hours toward an A.S. degree in Computer Information Technology and earn industry certification.

Secondary students enrolled in collegiate high schools, career academies, or dual enrollment courses may participate in the college's STEM-focused student clubs.

Activities That Promote STEM Programs. To date, 23 colleges (82%) reported some type of targeted program or workshop in STEM subjects for secondary students. Examples include science lecture/seminar series, math learning centers, Saturday enrichment classes, Code Breaking (a course including math and science for incoming dual enrolled students), Earth Day celebrations, Girls Excited About Mathematics (GEMs), Educational Talent Search (ETS), Sizzling Science, Mad Science, Girls Get IT, and work at Indian River Community College on the Everglades Restoration Project.

According to Florida Department of Education's Office of Equity and Access, 25 community colleges have a College Reach-Out Program (CROP) serving low-income and educationally disadvantaged students in grades 6-12. Miami Dade, Polk and Valencia have Upward Bound programs serving low income/first generation high school students. The CROP and Upward Bound programs provide tutoring services to high school students in academic subjects, including STEM subjects.

Fourteen community colleges (Brevard, Central Florida, Chipola, Daytona Beach, Florida Community College at Jacksonville, Indian River, Lake City, Lake-Sumter, Manatee, North Florida, Palm Beach, Polk, St. Petersburg, and Santa Fe) provide or partner with a school district to provide summer camp activities, including Kids College, that include STEM topics. Examples of camp opportunities provided for secondary students include an Aviation Camp using flight simulations, robotics camps, Computer Assisted Design instruction, technology camp focusing on graphic design including Powerpoint, and Crime Scene Investigation (CSI) camps.

Ten community colleges (Chipola, Daytona Beach, Hillsborough, Lake-Sumter, Manatee, North Florida, Okaloosa-Walton, St. Petersburg, Santa Fe, and Seminole) sponsor or host academic competitions in STEM areas. The most frequently reported competitions were Math or Science Brain Bowls, Math Olympics, Math Counts, and Physics Olympics. Seven colleges report that they host, judge, or organize a science or technology fair.

Collegiate Programs

All community colleges have STEM courses as part of their curriculum and offer STEM-related degree and certificate programs such as Information Technology and Network Systems Development. General education requirements for the Associate in Arts degree include six hours of mathematics at the College Algebra level or higher, three hours of biological science, and three hours of physical science. In addition, some colleges require computer literacy or computer applications coursework.

Daytona Beach has an Advanced Technology College. This new facility includes Internet and network connections, science labs, a multi-purpose room, a media center and open computer labs. This facility provides a setting for the regional science fair, specialized technological training, and the summer high school Robocamp program.

Brevard Community College has an articulated four-year engineering program that caters to place-bound students. The first two years of instruction are provided on the community college campus. Year three is provided at the Brevard County campus of the University of Central Florida. Students participate in classes at the main branch of the University of Central Florida during the fourth year of the program.

Teacher Preparation Programs

Three community colleges (Chipola, Miami Dade, and St. Petersburg) currently offer their own baccalaureate degree programs in education in STEM subjects. Three additional community colleges (Edison, Indian River, and Okaloosa-Walton) have been approved by the State Board of Education to offer such baccalaureate programs in the near future. In 2005-06, over 600 baccalaureate degrees were awarded by community colleges in STEM areas. Sixteen colleges offer baccalaureate degree programs through university concurrent-use partnership programs in STEM areas. Twenty-three offer concurrent-use baccalaureate programs in education. In 2005-06, a total of 8,055 students were enrolled in concurrent-use partnership programs in STEM areas; a total of 4,652 were enrolled in concurrent-use partnership programs in education. The Department of Education no longer collects the number of completers in concurrent-use partnership programs.

Legislation passed in 2004 allows the Florida Community College System to develop a program to train college graduates for careers in education through the Educator Preparation Institutes (EPIs). Currently, 27 community colleges have implemented EPIs that offer alternative certification for teachers. Appendix B includes the total number of students and the number of STEM students reported by each college in the STEM Survey.

In 2004, the Legislature also approved the expansion of teacher preparation programs through the *SUCCEED, Florida! Crucial Professionals Program*. Five million dollars was appropriated specifically for teacher preparation “capacity expansion” programs and bonus points were provided in the Request for Proposals for programs that focused on critical teacher shortage areas including secondary math and science. Nineteen community colleges were awarded approximately \$3.3 million in *SUCCEED, Florida!* funding in 2005-06. Most of these funded programs focused on recruiting students with baccalaureate degrees related to critical teacher shortage areas into Educator Preparation Institutes. The *SUCCEED, Florida!* program has continued in subsequent years with an ongoing emphasis on expanding the capacity of teacher preparation programs in critical shortage areas. For 2007-08, the allocation was nearly \$7 million.

Conclusion. Florida’s community colleges are responding to the emphasis on strengthening STEM opportunities in education through a variety of methods. By offering educational opportunities to both high school students and those enrolled in traditional college classes, Florida’s community colleges encourage interest in STEM areas at multiple points in time. However, there is no coordinated statewide plan to close the gaps between high school exit competencies, entrance competencies that enhance success in postsecondary education, and the competencies required to meet the needs of the 21st century workforce.

For more information about this STEM summary, please contact Dr. Pat Windham at (850) 245-9482 or Pat.Windham@fldoe.org.

Appendix A

STEM Initiatives Reported by Each Community College

Brevard	<ul style="list-style-type: none"> • Kids Career Camps: partnership with Brevard Public Schools; students entering 7th, 8th, or 9th grade chose a technical area, learned new skills and gained more information about related career. Sessions included Web Design, Fashion Production, Culinary Arts, Architecture/Drafting/Design, Digital Camera, Construction of Submersible Robotic Vehicles, Digital Art/Design, and Crafts & Activities for Future Teachers. Students received 20 hours of contact time in one subject. • College Explorer: partnership with Brevard Public Schools; middle school students attended a one-day activity at Brevard Community College that included exploration of various academic and technical subjects. Each subject area was presented for approximately 30 minutes; subjects included chemistry (60 students), biology (180 students), computer science (120 students), office technology (120), automotive (60 students), television production (60 students). • Construction, Design and Technology Fair: partnership with Brevard Public Schools; High school students enrolled in construction, drafting and design related programs were invited to attend a one-day workshop to find out about technical programs available at the community college level. Each subject area was presented for approximately 30 minutes. Subjects included drafting (90 students), electronics (60 students), computers and technology trends in homebuilding (60 students) and graphic design (90 students). Students also heard about careers in the construction field, and met with construction related businesses. • Topics in Environmental Chemistry and Statistics: Dual Enrollment program that brings highly motivated high school students to BCC to take a three-week dedicated program of study in environmental science and statistics. Students who successfully completed the program were awarded credit for EVR 1001 Introduction to Environmental Science and STA 2023 Statistics.
Broward	<ul style="list-style-type: none"> • Girls Excited about Mathematics (GEMs): program set up in the summer of 2006 with the support of Staff and Program Development funds and with the administrative support of Broward's North campus Mathematics Department • College Academy: collegiate high school located on Central Campus
Central Florida	<ul style="list-style-type: none"> • Sunshine Scholars Math and Science Summer Camp: one week summer camp for rising 9th and 10th graders • Pre-Collegiate Scholars: high school students attend training workshops of math, science, education, and technology for one semester
Chipola	<ul style="list-style-type: none"> • Mathematics Olympiad: conducted annually to serve approximately 200 students in grades 9-12 from 17 local schools. Students are tested individually in Calculus and Trigonometry. Both individual tests and collaborative group problems are given in the areas of Algebra I, Algebra II, and Geometry. • Science Seminar Series: sponsored by the Mathematics and Science Department. Outstanding scientists and mathematicians are invited to speak to student groups on timely science and mathematics topics. These speakers are often associated with institutions of higher learning and provide information about opportunities for postsecondary programs as well as subject specific information. Local high school students and teachers are invited to participate in these seminars. In 2005–2006 approximately 135 students (primarily juniors and seniors) attended at least one of the seminars. • Kids College: uses Chipola facilities; Chipola provides a director for the Kids College but the parents of the students pay the full cost of instruction. During the 2005–2006 year, approximately 75 students age five through twelve participated in three different levels of computer literacy classes.
Daytona Beach	<ul style="list-style-type: none"> • Robocamp Program: offered at the Advanced Technology College campus of DBCC, serves approximately 100 seventh through ninth grade students per year. The program's STEM focus is technology, design, and computer science/simulation through the design, development, and use of tabletop full featured robots. • Advanced Technology College: serves as the host to the regional science fair conducted by Volusia county schools. In addition this facility is used extensively by both Volusia and Flagler county schools for technology related field trips. • Physics Olympics: hosted by DBCC; this event is open to all high schools in Volusia and Flagler counties. The 2007 Physics Olympics saw 75 students competing. • College Experience Day Program: provides local high school students with a college level academic experience. DBCC professors offer academic activities providing students with an opportunity to experience a day as a college student and participate in college curriculum. This program was started fall 2006. The classes that students have been able to participate in are: science labs, dissecting mice and cats, global warming, marine biology, and sequencing DNA proteins; chemistry lab where students synthesized polymers; classes in robotics, drafting & design, auto collision, and digital media; mathematics classes to learn hurricane tracking and creating algebraic graphs; and computer classes.
Edison	<ul style="list-style-type: none"> • Edison College avails all sciences, technological, mathematics, and engineering programs to dual enrollment and early college students.

FCCJ	<ul style="list-style-type: none"> • Aviation Math and Science Summer Camps: two- or four- week camps utilize aviation as a conduit for practical application of the principles of math and science theories involved in flight. Activities include: classroom instruction, research, project design/construction, plus field trips to airports, IMAX theaters, museums and the Kennedy Space Center. Flight simulators and actual training flights are used to demonstrate theories, principles and laws of mathematics and science. • Crime Scene Investigation (CSI) Summer Camp: using the latest data security and biotechnology information and equipment, along with other tools of forensic science, campers become "Youth Crime Scene Investigators." CSI campers will examine a "crime scene," collect evidence, perform analysis, use forensic techniques, extract DNA, identify fibers, explore field of data security. • M.A.R.S. for Robotics Summer Academy (Mastering Arithmetic and Reading Systems for Robotics): students explore the field of robotics while building their very own robot. • CAD Camp: 16-hour camp introduces student to the most popular CAD programs used in the industry today. • ChemCamp: Making Molecules: ChemCamp demonstrates real-world applications of science, mathematics and technology and shows the relevance of academic work to the real world. Participants will visit five different Jacksonville chemical plants. • District Science Fair • It Does Compute—Helping Early College High School Students in Math
Florida Keys	<ul style="list-style-type: none"> • Marine Propulsion Dual Enrollment program: started in 2005-06 for local high school students; students can take 18 college credits (towards a 33 credit certificate) during one year in high school. After high school graduation, student continues at the college to complete the certificate or work towards an AS degree in Marine Engineering.
Gulf Coast	<ul style="list-style-type: none"> • Sizzling Science: program for area K-12 students; science and technology faculty set up interactive science displays on campus; some displays were geared towards high school students but most were geared to any K-12 student. Five biologists, two chemists, one physicist, one engineer, and one instructional technologist participated. Five Gulf Coast Community College students also participated. The science clubs at two local high schools participated as helpers.
Hillsborough	<ul style="list-style-type: none"> • Educational Talent Search Program (ETS): promotes postsecondary education as a feasible and viable option for first generation, low income and economically disadvantaged students in middle and high schools. The program provides first time exposure to college environments through educational tours to a variety of postsecondary institutions. Public school students in this program also visit NASA, Epcot Science Center at Disney World, Museum of Science and Industry, and other places of scientific and educational interests. • FLATE: The National Science Foundation awarded HCC funds to operate the Florida Advanced Technological Education Center (FLATE), a Regional Center for Manufacturing Education that serves the entire state of Florida. Its mission is to increase the capacity of manufacturing and related high technology technicians in the workforce using three venues: outreach/ recruitment; curriculum development and reform; and professional development for k12 and CC faculty. FLATE has several program activities focused on STEM enrichment such as: <ul style="list-style-type: none"> ○ "Made in Florida" industry tours provide tours of manufacturing facilities and a related lesson on Manufacturing in Florida and technical careers. ○ Summer Robotics Camps – during the past three summers, HCC co-sponsored week-long camps for middle school students. ○ Presentations to student groups about technical careers and manufacturing in Florida. ○ Professional development for teachers in the science and technology areas, both on a "request" basis and on Professional Development days.
Indian River	<ul style="list-style-type: none"> • Developed joint high school and college facility, Clark Advanced Learning Center (CALC), in partnership with the Martin County School District (MCSD). • Project CAPSTONE (National Science Foundation/ATE Everglades Restoration Project): seeks to create and implement an interdisciplinary, project-based model to prepare high school students for scientific and technical careers. The goal of Project CAPSTONE is to increase student success in math, science, and technology studies through the implementation of an annual comprehensive, interdisciplinary school-wide project at the CALC. Over the course of three years, approximately 200 high school sophomores, juniors, and seniors are directly served by the project. Activities include the development of integrated math, science and technology curricula; the creation of industry relevant technical experiences guided by career pathways; enhancement of high school programs that articulate to associates degrees; and provision of professional development experiences for CALC teachers. Through partnering with the South Florida Water Management District and other government/industry organizations, the project develops a school-wide learning project focused on local environmental restoration efforts. Career pathways are supported through e-mentoring as well as student internships with industry professionals. • Techno Camp Summer Program: a technology summer camp is hosted at the CALC campus. Students who attend are engaged in a week of activities that includes designing a logo for their own t-shirt using Adobe Photoshop, creating a music compilation CD and cover with Adobe Illustrator, creating a web page with embedded flash animation, exploring environmental pollutants and their effects on the global environment, taking a field trip for career exploration, and loads of other fun activities. Also, each student who attends the camp has the potential to earn 3 college credit hours towards an Associate Degree.

Lake City	<ul style="list-style-type: none"> • Columbia County Science Fair: participants were in grades 1-12 in Columbia County; with 270 projects: 113 from elementary and 157 middle and high. Fifty judges from the scientific community participated. • Suwannee Regional Science Fair: college hosts the week-long affair, provides judges, college employee time in staff and instructors. Schools cover award costs. There were 143 projects with participation from Columbia, Union, and Suwannee counties. • Earth Day Celebration: participating students from LCCC and Fort White High School present posters to educate the public about geological and biological environmental processes. It will be the opportunity for everyone to learn more about global warming, ozone depletion, acid rain, volcanoes, earthquakes, tsunamis, sinkholes, landslides, hurricanes and more of these natural processes that show how deadly but also how fragile our planet is.
Lake-Sumter	<ul style="list-style-type: none"> • Mathlympics: the mathematics faculty coordinate and host Mathlympics each year for local high school teams. Eighteen teams of 4 members each competed, accompanied by 14 high school math teachers. Teams were from Lake and Sumter school districts and private schools. • Hi Q Tournament: the college Brain Bowl team, advisors, and other staff and college students organize and run a regional Hi Q Tournament for varsity and junior varsity teams from the high schools of the two districts. Over 100 students participated this year in the event, which is an intense academic challenge in many areas, including STEM areas. • Kids' College: summer event on two campuses that serves hundreds of elementary and middle school students every year. Courses in their curriculum highlight various areas of STEM disciplines, especially in the sciences and computers. • District Science Fairs: the chair of the Science Department and other faculty served as judges in local school science fairs at the middle school level. • Middle School Tours: groups from local area middle schools have toured our campus this semester to expose students to possible career choices and opportunities. These students always spend extra time exploring computer labs and science labs. • New Science Building: with the scheduled opening of the new science building in August 2007, we planned a series of events for local school groups to expose middle and high school students to the sciences with seminars and guest speakers, and to introduce these students to the new facility and the opportunities for study here at our college. Possibilities for topics include: Birds of Prey, Genetic Plant Engineering, Rattlesnake Lecture, Endangered Gopher Tortoises, Organic Gardening, Meteorology, Hydroponics, Marine Science, and Invasive Exotic Plant Species.
Manatee	<ul style="list-style-type: none"> • Governor's Summer Program, CSI Program: high school students • Math Aces Competition: high school students • Math Counts: middle school students • District Science Fair (Sarasota/Manatee): middle and high school students
Miami Dade	<ul style="list-style-type: none"> • South Florida Regional Science and Engineering Fair: faculty members judge projects and scientific projects created by regional high school students. • Some physics and chemistry workshops are continually offered. The dual enrollees use the Science Resource center and The Math Lab. • The Math Learning Center: a supportive partnership between the School of Community Education at North Campus and Miami Dade County Public Schools which provides enrichment material related to the mathematics the students are studying in school. The Center allows K-12 students to meet with Miami Dade County Public School math teachers from the feeder pattern schools in small classes (class size = 10) for academic enrichment in mathematics. These classes meet throughout the year on Saturday. • SAT preparatory classes: offered to high school students through the School of Community Education at North Campus. • Grant Programs: NSF grants to provide scholarships and support services to STEM majors; Title V grant that provided supplemental instruction and cooperative learning for STEM majors; and a Department of Labor grant for Biotechnology programs. • Summer Program: for college-bound high school students; Hialeah Campus provided academic labor force; program conducted motivational activities by engaging students in writing-reading activities about technology and art and science appreciation, as well as mathematics, Microsoft Visio software usage and computer science; Hialeah Campus provided support for field trips and excursions to Science Museum and local technical cargo areas at the Miami International Airport.
North Florida	<ul style="list-style-type: none"> • Kids In College Summer Camps: Rocketry 101 (19 students); Rocketry 201 (13 students); Earth Essentials (15 students); Science Supreme (23 students); Weather Watchers (25 students); Mastering Math (21 students); Dig This: Archaeology (24 students); Let's Get Physical: Physics (18 students); Total STEM-related enrollments = 158 students • Brain Bowl: annual high school competition is held at NFCC • Dual Enrollment: have Articulation Agreements with all high schools in the college service area • Annual Ecology Day: area elementary schools in the college service district • Chemistry presentations: at area secondary schools • Annual Faculty-to-Faculty Summits (Math and Science): area high school science and math instructors meet at NFCC with college instructors to discuss teaching methods and issues such as curriculum alignment.

Okaloosa-Walton	<ul style="list-style-type: none"> • Collegiate High School: provides dual enrollment opportunities in all math, science and computer curriculum; serves 250 students annually, 85% of whom complete an associate degree simultaneously with the high school diploma. • Project Career Connections or Project C²: Okaloosa-Walton College has developed an accelerated science and math academy to engage and excite secondary students in the career fields of math, science and engineering. Project C², uses applied activities, laboratory experiments, real-life research projects, speakers, field experiences, career chats, simulations and other “hands-on, minds-on” approaches in engineering, math, and science as a curriculum enhancement project. • OWC Math Bowl: annual math competition event involving approximately 150 students from 18-20 high schools from Pensacola to Tallahassee. 9th – 12th grade students compete for individual and team awards in algebra, geometry, statistics and calculus. • Mu Alpha Theta Math Competition: annual math competition event that involves approximately 400 students from local middle and high schools; students compete for individual and team awards. • OWC Science Lecture Series: public event for middle and high school students, faculty and staff, as well as to the community. The lecture series focuses on “hot topics” and “hot careers” in the natural sciences. Faculty members and other distinguished experts make an oral presentation followed by audience questions. Five events are held each year with an attendance of 90-120.
Palm Beach	<ul style="list-style-type: none"> • Summer Youth College: open to children age 8 – 14. STEM-related course offerings in 2006: Fun with FCAT Math (18), College Math (19), Microsoft Basics (18), Fun Science (31), Math & Literature (13), Fossil Exploration (30), Solar System (17), Geometry (16), Art Landscape Design (23) Water Everywhere (15), Problem Solving (16), Creature Features (21), Florida Eco Adventures (21), Multimedia Mania (18), Roller Coaster Tycoon (20), Volcanoes (20), Tux Paint Kids (18), Total (334).
Pasco-Hernando	<ul style="list-style-type: none"> • Dual Enrollment: total DE Students served = 247
Pensacola	<ul style="list-style-type: none"> • Code Breaking: course including mathematics and science offered to incoming eleventh and twelfth grade dual enrolled students. • Tech Prep consortium: partnership with Escambia and Santa Rosa Districts. One facet of the program is the 4 + 2 program to encourage appropriate academic preparation including science and math to enter the high technology programs.
Polk	<ul style="list-style-type: none"> • Kids at College: STEM-related classes for secondary students <i>Lakeland Campus:</i> Beginning Rocketry (53), Advanced Rocketry (17), PowerPoint (21), Shocking Science (27), Beginning Video (38), Advanced Video (26) <i>Winter Haven Campus:</i> Beginning Rocketry (56), Advanced Rocketry (33), PowerPoint (80), Shocking Science (27), Beginning Video (42), Advanced Video (33), Simply Scientific (49), • Upward Bound: serves high school students from east Polk County whose families are low-income and who are potential first-generation college students. • Mad Science: six-day program during which professional scientists make scientific principles more accessible to students for whom science is intimidating; a course on “Your Health and You,” offered during the two-week residential component at Florida Southern College; math enrichment courses (algebra, geometry, pre-calculus, and calculus) during Saturday sessions (twice a month during the 2005-2006 academic year) and during the Summer Academy (six-week academic enrichment). • Dual Enrollment: Polk Community College historically has had a very supportive relationship with the Polk County Schools. During the 2005-2006 school year, 1,061 Polk County high school students were dual enrolled at PCC. • Collegiate High School: PCC Collegiate High School offered 196 students the opportunity to work on the A.A./A.S. degree (certificate) while completing their high school studies, as well as in depth instruction for career paths in Information Technology. Collegiate High developed a curriculum enhancement designed to address deficiencies in the three areas assessed on the Common Placement Test (CPT) – reading comprehension, sentence skills, and math concepts and piloted it during 2005-2006 school year. These skill areas are the base of skill sets necessary for successful completion of STEM courses. The pilot included remediation of enrolled CHS students via a prescribed independent study during an assigned class period, a teacher directed class period utilizing technology facilities, and an available online resource provided to students. The pilot also targeted interested CHS applicants who were offered review packets, evening review sessions and a compacted summer academy.
St. Johns River	<ul style="list-style-type: none"> • Representatives from SJRCC routinely speak at the middle and high schools throughout our district, educating these students about college readiness and our various AS programs. • Each campus hosts Open House for local high school students to highlight AA and AS programs. • SJRCC hosts a meeting each fall for the high school and middle school guidance counselors to inform them about our AA and AS programs. • Representatives of SJRCC meet with middle school and high school career education teachers annually to discuss proposed program changes.
St. Petersburg	<ul style="list-style-type: none"> • The Center of Excellence: a community-based program designed to promote academic enrichment and provide tutoring that supports and encourages academic growth. • The Mathematics Brain Bowl: competition composed of middle school and high school age students to increase academic success in mathematics and career exploration in the field. • Summer of Success (SOS): a summer bridge program; provides for recent high school graduates who meet eligibility criteria an opportunity to participate in six-week summer program

Santa Fe	<ul style="list-style-type: none"> • College for Kids: summer program is for students ages 10-15. Two, 2-week sessions are offered at SFCC's Northwest campus in Alachua County and one 2-week session is offered in Bradford County. Students choose courses from several offerings that include classes such as ABCs of Anthropology, Biology Bliss, Chemistry Craze, Environmental Explorers, Maniacal Math and others. • District Science Fair with School Board of Alachua County: Santa Fe Community College hosted the annual Alachua Regional Science Fair and assisted with judging, along with providing students tours of the college's zoo. • The Engineering Gatortrax Math Excellence Project: Santa Fe Community College collaborates with the University of Florida as well as other organizations in offering students in grades 6-12 with the opportunity to learn mathematics with hands on activities. Students participate in regular classroom instruction, Saturday Engineering programs, mentoring, summer camps and field trips. The Gatortrax program is intended to pave the way to careers in engineering or other fields that involve creative thinking, analytical and problem solving skills.
Seminole	<ul style="list-style-type: none"> • A pilot course offered at one high school to prepare students to pass the math placement test and bypass college prep has been so successful that the district wants to expand it to all high schools. • Offer a series of dual enrollment courses at Lake Brantley High School in Biology and Biotechnology designed to attract high achieving students to dual enrollment/AP course at another high school. • Science Merit Diploma Program is marketed to high school students as a bridge to the State University System for high achieving high school graduates. Students must apply and commit to take a minimum of 8 courses intended for science majors plus Calculus I. Students completing this program with a 3.3 GPA or higher are universally accepted into the University of Florida's upper division science majors. • "Girls Get IT": partner with FCCJ and TCC in this NSF grant designed to attract middle age girls to IT programs. • Physics Olympics: hosted by SCC for all high school juniors each year.
South Florida	<ul style="list-style-type: none"> • Promoting Academic Success Skills (PASS): provided math and reading tutoring to at-risk/low-performing high school students. There was a significant improvement in their FCAT scores.
Tallahassee	<ul style="list-style-type: none"> • GEM (Gadsden Elementary Magnet School) Water Rocket Activity: water rockets provide a wonderful tool for presenting a variety of scientific concepts and skills. Students first must build rockets by taping together four soda bottles for the body and gluing on fins made from cardboard boxes. Students then work together in teams to collect data on effects of water volume and air pressure on the altitude rocket attains. The data is graphed so students use visual representation to decide whether original hypothesis was correct.
Valencia	<ul style="list-style-type: none"> • Dual Enrollment in Electronics Engineering Technology: as a special part of our Dual Enrollment Program and in partnership with the Seminole County School Board, Seminole Community College, and the University of Central Florida, have designed an articulated program that includes students from grades nine through twelve, articulates to the community college program in Electronics Engineering Technology, and continues to the University of Central Florida's B.S. Degree in Electrical Engineering Technology. • Lyman High School in Seminole County offers seven "choice" programs designed around specialized themes to address the individual interests and abilities of students. Students from any school zone in the county may make application to attend the school and enroll in one of its programs. One of the choice options is the Institute for Engineering which has four areas of concentration, including one in Electrical Engineering. The desire was to offer college credit courses, where appropriate, which were a part of the Valencia Electronics Engineering Technology program and which aligned with the desired outcomes of the high school program in Electrical Engineering. Such an option would enhance the opportunity for these talented students to receive more in-depth training in the electrical engineering field and provide them a path for seamless articulation from high school through the university in the Electrical Engineering field. Seven courses plus an internship (24 college credits) were determined by Valencia and the high school to be appropriate offerings for the Electrical Engineering concentration • Upward Bound: eligible low income/first generation students receive approximately 120 hours of instruction, during a six-week period, in the months of June and July, in core subjects including math and science. This program serves students in Jones High School in Orlando. Academic year activities include approximately 233 hours of personalized academic, career and social skills intervention for participants. Summer Component activities include approximately 190 hours of personalized academic instruction in core subjects such as math, science, literature and composition and foreign language. Participants also receive training in public speaking, computer technology and attend college tours. • STEM Related Tech Prep Career Pathways: Tech Prep career pathways have been developed between Orange County Schools, Osceola District Schools and Valencia Community College.

**Appendix B
Educator Preparation Institutes (EPIs), 2005-06**

	EPI Enrollment Reported in the Student Data Base	STEM Enrollment Reported in the STEM Survey	Percent of EPI Enrollment in STEM Discipline
Brevard Community College	88	18	20.5%
Broward Community College	27	6	22.2%
Central Florida Community College	Not reported	Not reported	NA
Chipola College	19	Not reported	NA
Daytona Beach Community College	28	36	128.6%
Edison College	38	5	13.2%
Florida Community College at Jacksonville	105	20	19.0%
Florida Keys Community College	No program in 2005-06	No program in 2005-06	NA
Gulf Coast Community College	71	43	60.6%
Hillsborough Community College	28	Not reported	NA
Indian River Community College	143	58	40.6%
Lake City Community College	30	6	20.0%
Lake-Sumter Community College	Not reported	8	NA
Manatee Community College	41	52	126.8%
Miami Dade College	23	Not reported	NA
North Florida Community College	39	0	0.0%
Okaloosa-Walton College	65	5	NA
Palm Beach Community College	52	Not reported	NA
Pasco-Hernando Community College	150	Not reported	NA
Pensacola Junior College	63	Not reported	NA
Polk Community College	43	20	46.5%
St. Johns Community College	13	5	38.5%
St. Petersburg College	85	7	8.2%
Santa Fe Community College	Not reported	11 (passed subject test)	NA
Seminole Community College	No program in 2005-06	No program in 2005-06	NA
South Florida Community College	No program in 2005-06	No program in 2005-06	NA
Tallahassee Community College	No program in 2005-06	No program in 2005-06	NA
Valencia Community College	No program in 2005-06	No program in 2005-06	NA

Appendix C

Survey of STEM Tracks/Programs at Community Colleges as Distributed to Community Colleges on April 9, 2007

The Florida Department of Education is applying to the National Governors Association (NGA) for a grant to engage in K-12 science, technology, engineering, and mathematics (STEM) education redesign. Six states will be awarded grants through this STEM Center Grant Program.

Please complete the survey below by **Friday, April 20, 2007**, so that we may include all that Florida's community colleges are doing with regards to STEM. While we appreciate that many of you have more recent information, to ensure the ability to aggregate all institutions, we request that you submit information only for the 2005-06 year.

Pre-Collegiate Students

For this section, STEM programs reported should be any programs or activities which may be offered or delivered by your institution to middle or high school students. **Do not** include health and/or medical related programs as STEM programs or activities.

1. Describe any programs or activities your institution has for middle or high school students which promote/provide learning opportunities in STEM areas (science, technology, engineering, and mathematics). These programs or activities may be offered/delivered by your own institution (consider tracks or programs associated with dual enrollment and early college high schools) or through a supportive partnership with K-12 schools. Some examples may include, but are not limited to, Kids College type summer programs; summer camps for K-12 students in computer science, math and natural science; CROP activities aimed at STEM areas; Math Bowls or math competitions (such as Mu Alpha Theta); District Science Fairs.

At a minimum, please include the following information in your description:

- a. Name of track/program;
 - b. Affiliation to middle or high school students (dual enrollment, early college high school, summer bridge program, K-12 partnership, etc.)
 - c. Headcount of students served in 2005-06 (if available, please disaggregate by race/ethnicity and gender)
 - d. What was expended on the program and how much came from each source (list specific funding sources such as National Science Foundation where possible)?
 - i. State funds
 - ii. Federal funds
 - iii. Private funds
 - iv. Scholarships
2. Describe any programs or activities you have that are especially effective in helping middle or high school students be better prepared in STEM competencies for college (may include programs for students and/or professional development opportunities for teachers).
 - a. Do you have evidence of their success? If so, please explain.
 3. Do you provide facilities, equipment, or any other tangible items for use by the local middle or high schools specifically to offer STEM programs or activities? If so, please explain.

Collegiate Students

For this section, STEM programs reported should be only those that are recognized programs (i.e. programs reported to the State on the Student Data Base). **Do not** include health and/or medical related programs as STEM programs or activities.

4. Describe any STEM programs your institution has that prepare community college students for further study or careers in STEM disciplines. At a minimum, please include the following information in your description:
 - a. Name of track/program;
 - b. Headcount of students served in 2005-06 (Please disaggregate by race/ethnicity and gender)
 - c. Headcount of students who completed the track/program in 2005-06 (Please disaggregate by race/ethnicity and gender)
 - d. How do you track these students to know they are in a STEM track/program?
 - e. What was expended on the program and how much came from each source (list specific funding sources such as National Science Foundation where possible)?
 - i. State funds
 - ii. Federal funds
 - iii. Private funds
 - iv. Scholarships
5. If you are a baccalaureate-degree granting college with approval for education degrees, please provide the total number of students in any science, math, or technology teacher preparation programs offered by the college in 2005-06 as well as the overall number of students enrolled in education majors.
6. Provide the total number of students in an EPI program offered by the college in 2005-06 and the number of STEM students in those EPI programs in 2005-06.
7. If you have a special 2+2 STEM-related articulation agreement with a university, please attach a copy with your survey response.