STUDENT VOICES

STORIES FROM THE NATIONAL STEM CONSORTIUM

A community college program that made a difference in the lives of its students.
In 2011 the National STEM Consortium (NSC), a collaborative of ten leading community colleges in nine states, received a U.S. Department of Labor TRADE ADJUSTMENT ASSISTANCE COMMUNITY COLLEGE CAREER TRAINING grant to develop nationally portable, certificate-level college programs in Science, Technology, Engineering and Math (STEM) and to build a national model of multi-college cooperation in the design and delivery of high quality, labor market-driven occupational certificate programs.

Ten colleges from across the United States participated in this project: Anne Arundel Community College in Maryland, Clover Park Technical College and South Seattle College in Washington, the College of Lake County in Illinois, Cuyahoga Community College in Ohio, Florida State College at Jacksonville, Ivy Tech Community College in Indiana, Macomb Community College in Michigan, Northwest Arkansas Community College, and Roane State Community College in Tennessee.

The project’s results are impressive. The ten colleges achieved the goals of the grant through an exceptional collaborative effort. Multi-college teams together with industry experts created new technical curricula in five high-wage, high-skill STEM fields: Composites Technology, Cyber Technology, Electric Vehicle Technology, Environmental Technology, and Mechatronics. All of the curricula developed under this project are free and open educational resources available on two online repositories: Carnegie Mellon University’s Open Learning Initiative (www.oli.cmu.edu) and California State University’s MERLOT/Skills Commons (www.skillscommons.org).

Simply developing new content was not enough. The consortium was committed to developing a model to increase student success. The resulting NSC “completion model” combines high-quality curriculum with embedded, contextualized remediation, industry-recognized credentials, and evidence-based strategies - cohort enrollment, block scheduling, whole program design, employer linkages, and the concierge-style assistance of a student navigator. The model works: the 1400 students enrolled in NSC programs during the grant period achieved a 69% on-time completion rate (over three times the typical completion rate for certificates or degrees in public community colleges) - AND they’re getting good jobs! Partner colleges report that over 80% of NSC program completers are working in their chosen industries earning family-sustaining wages.

The program has opened doors for participants in many ways, literally and figuratively. Two Anne Arundel Community College students, Ginny Quillen and Gary Pollard, were invited to the TAACCCT Round 4 Grant Announcement at the White House in September 2014 and had the privilege of introducing Vice President Joe Biden.

NSC has a lot to celebrate: a productive multi-college partnership, nationally-portable curricula, and an effective completion model. But the most inspiring cause for celebration? The students, who began their NSC journeys at different academic, professional, and personal stages of their lives. In this booklet, nineteen NSC students tell their stories.

SUSAN GALLAGHER
Project Director, National STEM Consortium
ABOUT THE NATIONAL STEM CONSORTIUM

Jesse Andrews
Hometown: Wartburg, Tennessee
Roane State Community College
Certificate: Mechatronics
Current Employer: Oak Ridge National Laboratory
Position: Research and Development Lab Technician

The long hours and tedious work associated with fast food jobs and factory work were not something Jesse Andrews had envisioned for his life, so enrolling in the STEM program at Roane State Community College was an important, life-changing first step.

“I had been a factory worker for most of my life and my family was growing so I decided I wanted a career, not just a job,” he said. “Roane State and its mechatronics program enabled me to achieve that goal.”

Jesse had entered the workforce straight out of high school, but soon learned that the work environment he encountered was not going to get him what he wanted in life.

“I tried to go back to school before, while working 60-plus hours a week and trying to take care of my family, but that proved to be very difficult,” he said. “The mechatronics program made it easier for me to balance work, home and school.”

Not only were the classes useful, the projects proved Jesse had discovered the right field: “A co-worker and I were given the opportunity to operate a remote underwater robot that was thousands of miles away in a lagoon off Key Largo, Florida from our location in Clinton, Tennessee.”

After completing his course work, the school helped Jesse set up interviews, ultimately leading him to the job he holds today at the U.S. Department of Energy’s Oak Ridge National Laboratory which, thanks to a more reasonable work schedule, allows him to spend more time with his family.

“The program helped me achieve the goal of a career not a job,” Jesse says. Oak Ridge is the largest U.S. Department of Energy science and energy laboratory, and Jesse’s department specializes in batteries with the goal of creating increasingly affordable, safer batteries with longer life and higher performance.

“I would like to continue my employment at ORNL until retirement,” Jesse says of his long-term goals. “And I would also like to be in a financial position to send my two children to college.”

The Academic Model
The STEM Bridge
The Technical Curricula
Student Success Strategies
The STEM Bridge
Partner Colleges

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STEM PROGRAM LEADS TO A CAREER, NOT A ‘JOB’
Matthew Zipper
Hometown: Crofton, Maryland
Anne Arundel Community College
Certificate: Cyber Technology
Current Employer: NASA Goddard
Position: IT Project Support Specialist III

MATTHEW ZIPPER thought that he would spend his entire career on the greens, but changes in the economy drove him towards his new passion - information technology. Matthew began his career in golf course management, but soon afterwards the industry faltered. As the economy struggled to recover from the recession, golf courses began to close. Matthew noticed that opportunities in this field were shrinking at a time when he was ready to grow, so he began to reevaluate his career path.

While he researched further educational opportunities, Matthew used his business savvy to secure a short-term contract with a technology solutions company that worked with NASA. Quickly, Matthew discovered his passion for information technology. When the contract ended, he knew the pursuit of further IT training would help him secure another position at NASA. Matthew was between jobs and not sure where to go next, when he discovered the NSC Cyber Technology program. He felt that this would be a great way to jumpstart his new career.

During the course of the year-long program, he was offered a position at NASA again. Matthew accepted the position, and managed to juggle his academic work and new employment. “When I started the STEM program I really didn’t know how challenging it was going to be,” Matthew said. As the year progressed, his supervisor noticed that he was able to participate and contribute at meetings from a technical standpoint. As a result, he was assigned more projects and technical responsibilities, including creating test plans, serving as a local system administrator for an assistive technology lab and participating in more high-level meetings. The hands-on experience and skills gained in the Cyber Technology program clearly played an important role in his growing technical expertise and professional abilities.

He now works as an IT contractor supporting the Information Technology & Communications Directorate (ITCD) at NASA Goddard and most recently has focused on converting an outdated end-of-life, end-of-service telephone PBX system to a centrally managed Voice Over Internet Protocol (VoIP) solution. When the project is completed, the team will have replaced nearly 8,500 phones. He’s also been involved with providing support for Solarwinds testing, acting as a lead customer service representative for the new phones, and leading a small team for customer outreach.

Ultimately, Matthew sees himself gaining increased government clearance and managing high level network projects within the next 10 years. Sometimes you have to take a risk to gain a reward. “If you are up for a challenge that has life-changing potential, don’t hesitate to learn more and see how you can exceed expectations about yourself,” Matthew says. “IT is an ever-evolving field, especially in the field of Security, so why wait any longer if this is something that interests you?”

FROM THE TEE TO IT.

Arvin Samali
Hometown: Tehran, Iran
Florida State College at Jacksonville
Certificate: Mechatronics
Current Employer: Johnson & Johnson Vision Care, Inc.
Position: Technician

A native of Iran, ARVIN SAMALI was a jewelry maker before he immigrated to the U.S. five years ago. He was studying in the English for Speakers of Other Languages (ESOL) program at Florida State College at Jacksonville while working in his family’s restaurant, but also heard about the mechatronics program and decided to enroll.

Validating it as an attractive option, the U.S. Department of Labor identifies mechatronics as a new and emerging, “green occupation” growth area. The mechatronics field supports a diversity of occupations and positions that are suitable for community college technical certificate holders, such as those prepared by NSC programs.

Mechatronics technicians typically work with design, development, and engineering staff to install, maintain, modify, and repair mechatronic systems, equipment, and component parts. Common tasks include testing the performance of electro-mechanical assemblies, automated manufacturing equipment, or packaging machinery; using precision measuring instruments used in the mechatronics program.

While taking the mechatronics classes, Arvin continued with his jewelry making, using a small CNC milling machine similar to the instruments used in the mechatronics program. Arvin said the program covered a range of technical skills he had always been interested in, including mechanical devices and systems, hydraulics, pneumatics, electronics, PLC, instrumentation, CNC, job safety, manufacturing, robotics, motors and controls, and lean manufacturing. Upon completing the program, Arvin connected with Kelly Services and was able to find a position as an instrumentation technician at Johnson & Johnson Vision Care, Inc., the largest manufacturer of Acuvue brand contact lenses.

The company has a stringent application and review process, so Arvin’s acceptance is even more impressive as an ESOL student. “I could not have taken this job without my education at Florida State College at Jacksonville,” Arvin said. “I had to pass a professional technical test to take this job, and my education really benefited me.”

NEW FOCUS ON MECHATRONICS IS A GOLDEN OPPORTUNITY
OUT OF A RUT AND ONTO A PROMISING FUTURE

He came across the STEM certificate program at Macomb Community College and immediately recognized its potential as a ticket to a better future: "I saw it as a golden opportunity to get me out of the rut that I was in. It seemed to almost be tailored to my interests: electric/hybrid vehicles, electronics, batteries, all of these things are of great interest to me." Timothy now works for the energy storage and battery development company Energy Power Systems in metro Detroit. "I have the great pleasure to say that over a year into it, I still very much enjoy my work," he said. "The electronics aspect steered me into an electronics engineering degree program and at work I’ve been tasked with everything from potting electronics in epoxy for study under a scanning electron microscope, to setting up data acquisition equipment, to preparing reports and presentations, to conducting studies on acid flow rates."

Timothy points to three aspects of the STEM program that made it so successful, beginning with the program navigator, Stacey Ahwari, who helped the students in many ways, from registering for classes to completion of various forms to ensuring the students were getting what they needed from instructors. "Without her remarkable diligence, I strongly suspect we wouldn’t have been nearly as successful in completing the requirements of the program," he said. "Also, being a part of a cohort was exceptionally helpful," Timothy said. "Since everyone was experiencing the same instruction, the same class, the same work, we could all play on each other’s strengths and weaknesses." Finally, he said, the block scheduling was helpful in that it enabled the cohort to get through the courses quicker, which ultimately allowed them to proceed with their careers that much sooner.

The program of incredible benefit to my life," Timothy said. "It completely changed where I was headed, from being stuck in a jobless rut and living in my parents’ house, to having my own home, a good and enjoyable career, and a future." Timothy’s long-term career goals are to obtain a degree in electronics engineering, and possibly a master’s. "The benefits cannot be measured in dollars, as the experience, the education, and the opportunity have been incomparably rewarding," he said. ■

MAKING A DIFFERENCE FOR THE ENVIRONMENT

A passion for improving the environment led Bailey Hammond to the environmental technology certificate program at Florida State College at Jacksonville and today she works with the City of Jacksonville helping to protect wildlife.

"In learning about the National STEM Consortium Certificate program, I was drawn to the fact that while I was earning my degree in environment science, I would also be earning certifications that involve water quality, hazardous material handling, and safety that are recognized on a national level," Bailey said.

Duties with her current position with the City include animal surveys, data entry, technical writing, ArcGIS, educating, disposal and bird stewarding.

"Career-wise in ten years, I see myself involved in a position of knowledge and respect in a well-established organization," she said. "I see myself in a position where I am making a difference for the environment and where I can help future students that are pursuing environmental science careers gain the experience they need to excel."

Bailey said the biggest obstacle she faced while attending FSCJ was completing the required math courses, taking many of the required courses more than once to continue on to other classes. While that process slowed her down, the FSCJ professors and resources available at the campus helped her to not only pass the courses but to later use the material successfully in her new position.

"For me, I enjoyed having professors teach multiple courses along with having the same classmates in the cohort throughout the program," Bailey said. "I feel that you have good support from your peers as well as a better understanding from your professors. When you are in a comfortable environment, you are able to express your ideas and ask questions more freely and that will help you learn easier. ■
SYRIA NATIVE FINDS OPPORTUNITY IN U.S. WITH ELECTRIC VEHICLE TECHNOLOGY

With prior experience in the industry, LAMA KADOURA recognized the value of a deeper certification in the specialized field of electric vehicle technology and the hands-on experience it provided.

New to the U.S., she faced a number of obstacles, including the language barriers and the conversion of SI units to the American standard measuring system. The STEM program was a needed next step in her career journey.

“STEM opened more doors for me and helped me find better opportunities, besides gaining a very good experience in the automotive industry, where women are very rare,” Lama says.

Lama said she learned about data acquisition and vehicle circuitry which today helps her in designing and testing PCB circuitry. She credits the instructors at Macomb Community College for preparing her for the next step in her career. “They were very knowledgeable and they went above and beyond the subject to help us get better understanding.”

Macomb’s program navigator gave Lama encouragement and support, the cohort enrollment was simple and easy, and a benefit of the block scheduling was that it provided study time between classes.

Upon receiving the certificate, Lama said the adjunct internship coordinator at Macomb helped her find a position at UCI-FRAM AutoBrands, one of North America’s largest and most diversified companies servicing the vehicle replacement parts and car care market. The company develops a broad range of automotive products under well-known industry brands such as Autolite spark plugs and wire sets, FRAM filters, and Prestone antifreeze and car care products. At UCI-FRAM, Lama is an electrical engineer, working in designing, testing and validating vehicle PCB boards. She expects to further develop her expertise in this area and hopes to create more complicated - and economical - boards.

“If you have the chance to go in the NSC program, don’t waste it,” Lama says. “Try to work hard, to gain as much experience as you can, and finally you will find yourself in a great career you will never expect.”

DISCOVERING THE RECIPE FOR SUCCESS

KEVIN KUBIT had explored it all: from sales, to fishing guide, to chef, to real estate appraiser - but eventually came to the realization that none of those areas was a match. Until he found the STEM program at Anne Arundel Community College and re-ignited his passion for engineering.

“When I read about the mechatronics program in the AACC course book I absolutely knew it was the perfect fit for me,” Kevin said. “With a great interest in engineering, I was incredibly grateful to see something that was right up my alley.”

Kevin had started in an engineering program at the University of Maryland, but the loss of a close friend made it difficult to focus on his studies and he went on to try other career paths.

“It took me a while to be able to be passionate about anything,” Kevin said. “I had tried going to AACC after leaving the University of Maryland after a few months but I just wasn’t ready to be a good student.”

Kevin says it took effort to refocus on his education, although the grieving process strengthened his ability to deal with difficult issues.

“The training I received through the National STEM Consortium allowed me a foot in the door into the industry I wanted to get into,” he said. “Right after leaving school, I immediately got hired by a Fortune 500 company as a technician making very good pay.”

After working there for eight months he was able to use that experience as a steppingstone to where he wanted to be as an engineer, using his creativity and designing things people use every day.

“I now work at a smaller company as a lead design engineer, which I absolutely love,” he said. “Being the go-to guy at work for CAD modeling is a pretty great feeling, and the experience I’ve gained working here has been absolutely tremendous. I always knew I’d be able to take off running given the chance, and I’ve certainly been able to accomplish that with the experience needed on my resume to get the job.”

Next up for Kevin is serious consideration of continuing his studies and completing his bachelor’s degree while helping Harbor Designs and Manufacturing grow while growing himself, perhaps as an engineering manager or project manager for the firm’s design projects.

Kevin said his program navigator was “amazing,” and the people he completed the program with continue to stay in touch. He left the program with multiple job interviews.

“I owe my current job and all the experience I’ve gotten since then to the wonderful teachers and staff at AACC who helped develop the courses, tutorials, and material that allowed me to be knowledgeable enough to jump into fields that take many years of experience if they are even able to get it where they work.”
Life in America has changed a lot for Rathish Kumar Pandian since his childhood in India.

In school, he was made to sit in the back of the classroom on the floor while boys in the upper caste sat at desks in the front. He rode his bike to school and each day the upper caste boys would let the air out of his tires. After a while, Rathish asked the other boys why they were doing this. The response: “Because we can.”

One day, Rathish ended up pushing one of the boys, an action that was enough to have him expelled from the entire school system. His mother pleaded to have his son back in school and earn an education, but none of the schools would accept him.

So Rathish left India as a teenager after securing a job on a cruise ship. He was able to travel to the southern United States and securing a job on a cruise ship. He was able to travel to the southern United States and find work at a small composites company in the Puget Sound area, but soon found out there were limited opportunities for advancement there. The larger companies would not consider Rathish until he met additional educational requirements so as he contemplated the next step in his journey, Rathish decided to get his commercial driver’s license.

While driving a semi across the country, Rathish said he experienced prejudices that reminded him of growing up in India and the same long hours that led him to composites. He decided that he needed to overcome his employment barriers and continue with his education. Today, Rathish continues to take classes at South Seattle College, while working at Exotic Metals and earning money through his own chauffeur business.

With his hard work ethic, he will likely succeed. Once he completes his goal, Rathish said he experiences prejudices that reminded him of growing up in India and the same long hours that led him to composites.

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The National STEM Consortium program is just what VIRGINIA “GINNY” QUILLEN needed as she navigated through a difficult life. Today she is a successful network operations specialist at Rockwell Collins/ARINC.

“I wanted to learn more about technology when I first went to college, but my previous employer would only pay for business degrees,” Ginny recalls. “Being unemployed and with a mortgage and bills that hadn’t disappeared, the program was extremely attractive. Assistance was available for tuition, books, and certification exams. All I had to do was commit fully to learning a new profession, so this seemed like a no-brainer to me.”

Before entering the certificate program at Anne Arundel Community College, she had been pursuing a degree in Human Resources at the University of Maryland University College when she was let go from a position at the University of Maryland University College. Ginny points to the cohort enrollment system as being a key driver in her - and his fellow classmates’ - success.

“When Derek Blanding started the program at Florida State College at Jacksonville he was surviving on unemployment benefits, paying child support and doing what he could to provide for his family. His previous college training left him with outdated skills, and he knew from experience that construction work and selling gym memberships wouldn’t be enough.

“I always wanted to get into networking with Cisco devices, along with gaining strong knowledge in network security, and I can say I would not be where I am now without the awesome vision, compassion and help from those who created this program,” Derek said.

Today his work involves monitoring, configuring and solving daily networking problems for a supermarket chain as a network technician. In essence, he provides technical solutions to business problems.

Looking back, Derek credits the program’s cohort system as being a key driver in his - and his fellow classmates’ - success. “One of the most important things I can tell you about my cohort’s success is that from day one we all decided to work together in order to succeed,” he said. “We became a team and encouraged each other. We became a sounding board for each other, and shared our knowledge to help those who were having difficulties at various times along the way. Those who deviated and decided to do it on their own did not make it.”

“Being in the cohort made us like family,” he said. Derek says some of the most important skills he learned were all of the Cisco modules, CCNA 1-4, the Security + training, A+ training, and the IT career builders training.

His long-term career goals include obtaining his CCNP, CEH and Unix certifications, along with moving as high up as he can in cyber security, helping to protect the U.S.

“I believe and know that if you are willing to make a serious sacrifice for one year, you can do it.” Derek says. “Are you willing to lock up your video games, put TV watching to a minimum, and inform your friends and family that you need their help in this sacrifice?”

Derek offers this advice: “If you are willing to dream about a much better day in the future. If you are willing to try, and when that is not enough, try some more, and again, and again, and again. You will make it. I repeat, you WILL make it!”

Virginia Quillen
Hometown: Pasadena, Maryland
Anne Arundel Community College
Certificate: Cyber Technology
Current Employer: Rockwell Collins / ARINC
Position: Network Operations Specialist, Incident Manager

Derek Blanding
Hometown: New York, New York
Florida State College at Jacksonville
Certificate: Cyber Technology
Current Employer: Southeastern Grocers
Position: Network Technician
Randy Rohrig's passion for automobiles was the perfect match for the STEM program at Macomb Community College and today he's well on his way toward his career goal of working for a major automobile manufacturer.

"My dad is a mechanic and I’ve been around cars, car shows and garages the majority of my life," Randy said. "This program seemed to encompass both interests quite nicely, and meanwhile offer new opportunities in terms of my future, so I decided to give it a shot.

Rather than going straight to college full-time, Randy took classes while working in a range of settings, including a mechanic's assistant for a private fleet of vehicles, and a snow removal business where he learned to endure long shifts in frigid conditions while learning the inner workings of small engines.

"I decided it would be better to slowly progress in my school career, and be able to maintain financial and academic stability, rather than put myself in debt and most likely compromise my grades by going to school and working full-time," he said.

At Jacobs Technology, Randy's job includes instrumenting production and prototype vehicles, running noise tests in an anechoic room, acquiring data via a series of programs, and then processing the data and formatting it to an Excel spreadsheet. His duties also include changing parts and performing vehicle audits to production cars in order to ensure that everything at the assembly plants is going according to plan.

"If it weren’t for Macomb's job search assistance, I wouldn’t be where I am today," said Randy. "The people conducting this assistance were a huge help and I can honestly say I couldn't have done it without them. The first job fair that was held is where I met my current supervisor at Jacobs and he sent me an official job offer less than two weeks later.

Randy has nothing but praise for the structure and value of the block scheduling as well as the program navigator who served as their academic guide: "Stacey was a huge help with keeping everyone motivated and she genuinely cared about students concerns and questions." As for the value of the cohort, having the same people throughout the entire program was essential, according to Randy. "I would have to say this had the biggest impact on the successful completion of the course, since we were all in it together. We developed a team and nobody was going to be left behind.”

"If you have the opportunity to get involved in one of these programs, do your future self a favor and take action," Randy says. "It isn’t easy, and it isn’t always fun, but college usually isn’t. What I can say is that it is 100 percent worth your time and it really flies by. At the end there is a very powerful feeling of success and achievement.”

Randy Rohrig
Hometown: Clinton Township, Michigan
Macomb Community College
Certificate: Electric Vehicle Development
Current Employer: Jacobs Technology
Position: Test Technician

Amanda O'Bannon
Hometown: Mineral Wells, Texas
Florida State College at Jacksonville
Certificate: Mechatronics
Current Employer: Fleet Readiness Center Southeast, NAS Jacksonville
Position: Electronics Worker

Amanda O'Bannon served eight years as an electronics technician in the U.S. Navy and later landed a position as a Navy civilian at the Naval Air Station in Jacksonville, Florida.

With her experience in the Navy, she already held significant knowledge in the STEM field, but needed additional knowledge to pursue the career she wanted.

"I had been working at Saft Batteries in Jacksonville and became really interested in becoming a technician. However, in this field I needed more experience with hydraulics/pneumatics, PLCs and mechanics so I enrolled in the STEM program at FSC,” she said.

"Even though I knew a great deal about basic and advanced electronic theory, I still lacked experience and training on the mechanical aspect associated with the electronics," Amanda recalled.

Through the STEM and mechatronics courses she learned practical, valuable tools for her job, such as mechanics and robotic controls.

"The STEM program has given me the confidence and experience I needed to pursue the jobs I really want, and helped me learn more about mechanical, electrical and hydraulic/pneumatic power," she said.

Amanda now performs depot-level repair and rebuilds radars for naval aviation from the ground up. Her ultimate goal: to become the supervisor of the radar work center at the Fleet Readiness Center Southeast and train new employees on radar troubleshooting and safety practices.

Looking back, working with a robot in the robotics class helped Amanda understand the inner workings of the robots she uses today, and the mechanical classes refined her mechanical skills for when she has to repair gear trains for radar equipment.

A VETERAN’S ADVICE:
NEVER STOP LEARNING

As for the structure of the STEM program, Amanda points to Sarah Wilson, a hydraulics professor who she said helped her get a grasp on hydraulic and pneumatic theory and understand fluid power, while keeping the class motivated and interested.

Amanda said enrollment into the program as well as enrolling into new classes was easy and seamless, especially with the guidance of Darrell High, the program navigator, and others who were “easy to talk to and very helpful during the program.”

The cohort enrollment allowed for students in the same educational path to attend the same classes, making it easy to create study groups and learn from one another’s experiences when all were attending the same classes, according to Amanda.

“The block scheduling helped me to make the most out of my education time while not interfering with my work schedule,” she said.

“Even when I needed certain classes in the same block, the professors and counselors were very helpful to help me find a way to complete all of my classes.”

FIRST JOB FAIR LEADS TO OFFER LETTER TWO WEEKS LATER
MIKE SWANSON understands the value of education, so when he learned about the STEM program at Macomb Community College and its electric vehicle development certificate, he knew its long-term value would be worth the classroom and lab time.

As part of the electric vehicle development program, Mike had an internship at GM Powertrain in the engine development labs as a technician and was hired in a permanent position. “GM Powertrain is a magnificent facility,” he said. “A lot of neat things take place in this lab and they treated me very well there. I started as a validation technician, then shortly after I became a team leader for the first shift,” he said. “I did that for about a year, and then interviewed for a lab engineer position and got it!”

Soon after that he was approached by General Dynamics Land Systems Defense & Space Division for a position as a subsystem test engineer.

“Knowledge that rounded out his experience and education in engineering. The block scheduling helped him manage his course load, while working with a cohort made the experience even better.

“What drew me to the program was its focus on electric vehicle development,” Mike said. “Electric vehicles are the future and this is new technology, the future essentially. Being from Michigan, we are home of the Big Three and that means lots of jobs.”

“My advice is that this program is a great way to jumpstart a new career field,” he said. “Absolutely do not stop here, though. Keep pursuing a two-year degree and eventually a four-year. Also do research and get advice on putting together a flawless resume that stands out from everyone else’s.

“Learn how to interview well, market yourself everywhere on websites like LinkedIn, monster.com and careerbuilder.com, and always attend career fairs and networking events,” he said.

Mike says he is satisfied with his career at General Dynamics and aiming for a management path at this stage, remaining at General Dynamics and working in plant maintenance and in the health care sector. With the electric vehicle development program, “I have always been interested in how I could help turn our society green; this was the way I could do it.”

Jonathan Lyndell Burt
Hometown: Detroit, Michigan
Macomb Community College
Certificate: Electric Vehicle Development
Current Employer: Quanta Staffing Solutions (FANUC America)
Position: Robotic/Automation Corporate Trainer

The demands of the electric vehicle development program at Macomb Community College meant its participants had to treat it like a full-time position — forty hours of classes per week, plus time for homework, not to mention the time needed for part-time employment and family commitments.

“The block schedule, career assistance, the same faces for one year, and STEM courses were equally important on our journey,” said JONATHAN BURT. “I believe the most important factor at that time was having a group of people that could relate to each other with a common goal — getting back into the workforce. We pushed each other possibly like no one else could because we started and wanted to finish together.”

In the end, the challenges were worth the effort as Jonathan landed a position as a corporate trainer with the robotics and factory automation company FANUC America Corporation where his immediate goal is to have a lasting and upwardly mobile career there and to become one of the best instructors FANUC has to offer.

“There are other departments that I would like to be a part of as well, but I really enjoy training adult learners,” he said. “If not at FANUC, I would like to become a dean of students or run the technical department at a community college.”

Prior to entering the electric vehicle development program, Jonathan had worked in plant maintenance and in the health care sector. With the electric vehicle development program, “I have always been interested in how I could help turn our society green; this was the way I could do it.”

Jonathan said he met a good group of people in his cohort and some have turned into lasting friendships, while the instructors were “down to earth, had workforce experience, were helpful and challenged us, too.”

“I can remember days where the class as a whole was ready to give up and one of us said, ‘Pull up your boot straps and stop feeling sorry for yourselves.’”

“At times, we shared our lunches with each other and also if someone was in need, we pitched in to give someone gas money to make it to school for the day/week,” Jonathan recalls. “Our cohort bonded really well and because of it, we pushed each other to various forms of success. Out of twenty-five people initially in our group, I believe nineteen graduated and most of us were employed after the year went by. But, all of us were employable!”

“This program was well worth all of my blood, sweat and tears,” Jonathan says. “It is special to me because my seven year old son and I would sit at the dining room table and do our homework together; now he wants to go to college too.”

MIKE SWANSON
Hometown: Macomb Township, Michigan
Macomb Community College
Certificate: Electric Vehicle Development
Current Employer: General Dynamics
Position: Test Engineer

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LANDING A RESEARCH POSITION AT THE HEART OF THE AUTOMOTIVE INDUSTRY

The promising future of electric vehicle technology seemed like the ideal career path for Luke Deptula, so he enrolled in the STEM program at Macomb Community College to take advantage of its many opportunities. Luke had worked with plug-in hybrids and taken classes in an automotive associates program prior to enrolling in the electric vehicle program at Macomb where he knew he was in the right spot to expand on his interest in developing more efficient transportation.

“I struggled to find a program that taught skills relevant to new technologies and an area of growth in the automotive industry before finding this program at Macomb,” he said. With the certificate in hand, Luke found a position at the heart of the automotive industry, working for the Ann Arbor based Center for Automotive Research (CAR) as an assistant researcher. The nonprofit organization is the ideal fit for someone with Luke’s background and interests, as it focuses on the research of significant issues that relate to the future direction of the global automotive industry.

To fulfill its mission as an impartial voice of the industry, CAR maintains strong relationships with industry, government agencies, universities, research institutes, labor organizations, media, and other major participants in the international automotive community.

Luke said his position at CAR includes conducting research, investigating manufacturing facilities, looking into new and upcoming technologies, writing research papers, and giving presentations; all relevant to the future of the automotive industry. “Thanks to the STEM program, I am on my way to becoming a fuels efficiency research specialist,” he said. “In ten years I see myself in a key role in research and development of transportation systems.”

Luke said his coursework covering electrical training, motor training and the hands-on vehicle training really helped prepare him for the position at CAR and he feels he knew more than those who took university level classes in electric transportation technology bachelor programs.

“I think we all worked better as a cohort when it came to learning, especially when compared to standard classes where students don’t share schedules,” he said. “Our group benefited by having the same schedule; keeping everyone together with the block scheduling created a learning environment where everyone was involved and contributed.”

“The NSC program gave me an opportunity to be a part of a new field that is developing with great opportunities,” Luke said. “I can’t stress it enough that these are new growing fields that students can have a future in a field where there is not a lot of competition for jobs, yet.”

LEARNING AMERICAN CUSTOMS AND THE IMPORTANCE OF IT’S ‘SOFT SKILLS’

Working as an administrative assistant was fine for Larri Rodriguez Reyes, but he felt he wasn’t going anywhere with the position or the organization. It was time for a change.

“I was looking to go back to the IT field to which I dedicated the earlier part of my professional career, but since I’d been in the States for just a short time and with no tangible experience in the field, I knew I needed to go back to school to validate my skills and to acquire new ones,” Larri said. “Most importantly, I needed to learn America’s customs when working as an IT professional,” he said.

Larri credits his instructors and the computer labs at Florida State College at Jacksonville where he was able to practice what he had learned in the classrooms on the actual equipment in the labs. Thanks to this, he has real-world experience configuring Cisco routers and switches and with setting up network cabling.

“I think the most important thing I learned from this program was to discover my soft skills and how to focus them while looking and applying for jobs,” he said. “The instruction also enabled me to discover the links between working for nonprofits, customer service and IT support, which I used to land the job I have today.”

With the certification, Larri was hired to handle IT support for a private school, a welcome new challenge and a good fit for his technical and people skills. “Even though it is an entry-level position, I will be in charge of everything IT related,” he said. “I’m working with hardware and software repair and configuration as well as network support. I will also have the chance to work with different system environments since this school has Windows and Mac devices deployed.”
Unemployed and without no viable job prospects on the horizon, JESSICA MAY came across the STEM program at Anne Arundel Community College during a career workshop. At that point it clicked and she knew what her next move would be. “I was hesitant about the concept of this program because it seemed unattainable, but decided to get more information about it and follow up, and I’m very fortunate that I did,” says Jessica, who subsequently earned the certificate in Cyber Technology and is actively pursuing leads for a full-time position in the field.

SEIZING A LIFE-CHANGING CAREER OPPORTUNITY

“I’d attended college years earlier, but never completed my degree program, so this cohort program is exactly the sort of guidance and opportunity I needed,” she said. “I have a lot going on in my personal and home life, so getting into and through this program was more than about merely improving my work experience, it was a legitimate act of survival.”

Jessica says her cohort was a big part in getting through the program as they bonded as a team and looked out for each other. She said the AACC professors kept the courses interesting and educational for hours at a time, which is not always an easy task. “It’s wonderful that the program was able to find professors with work experience because they were most helpful with our in-class materials, but were then able to give us invaluable insight about the real world,” she said.

She said the block scheduling took a bit of getting used to at first, but in the end she felt less exhausted by it compared to the typical two-hour courses: “I especially appreciated that they were night courses; I think that made it clear for the people who feel hopeless, stagnant and aimless out there that if you’re ever met with an opportunity like this, to go for it,” Jessica said. “Don’t second guess yourself, just try. Go for it.”

“For years I was hoping for an opportunity like this, a program that was concentrated, goal oriented and supportive. I really hope this catches on, as being in this program is the most successful and accomplished I’ve felt since graduating from high school over a decade ago,” she said.

“I’m very grateful I ran into the opportunity, it’s crazy how much can change in a year!”

JESSICA MAY
Hometown: Hanover, Maryland
Anne Arundel Community College
Certificate: Cyber Technology
Current Employer: Michaels (currently pursuing Cyber position)
Position: Floor Associate

There’s more to STEM training than the technical aspects and TIMOTHY WOLOZSYN credits his instructors at Cuyahoga Community College for teaching the “people” aspect of a career in IT and the importance of compassion and patience.

“My training was more than adequate for the certifications. I was able to understand everything the teachers told me about the tests and the skills I would need to learn in order to pass them,” Timothy said. “In particular, the subnetting practice I got in this program is the most relevant to my current job, as I use subnetting in order to fix IP range issues with clients.”

But it was the education beyond the textbooks that really equipped Timothy for his current position as a technical support analyst at Ohio Business Machines. He spends his days traveling around Ohio diagnosing general IT issues for customers as well as assisting them with printing issues.

He credits two Cuyahoga Community College instructors for emphasizing that all-important skill of personal interaction.

“Richard Bohn was helpful in that he showed me most of the social nuances of IT beyond just helping users, in that you need to respect the situation of the person you are helping just as much as the actual problem you have to fix,” he said. “He showed me the world beyond the technical in IT, that this job is about helping the users in their everyday lives as much as it is working with the technology we use every day.”

“As for Dan Shell, he taught me that IT isn’t a career for the faint-hearted, that you need to have passion in order to succeed in this job. IT isn’t a job that just anyone should take, it’s a job that requires you to love the technology you work with even when it all doesn’t work like it should. He taught me the meaning of determination and focus, two skills that I use a lot in my job at OBM and for that I am very appreciative.”

He said the program’s block scheduling provided structure to the class, while the cohort arrangement taught him a lot about working with other people, especially, as he says, in the “patience department.”

“Being around other people teaches you about different perspectives, as they can open your mind to possibilities you wouldn’t have considered by yourself,” Timothy said. “In addition, being in a cohort also taught me the importance of being patient when working with other people, as it’s important to listen and take in everything that the person is telling you about their problem.”

Next up for Timothy: “I want to become either a Systems or Network Administrator, where I can create and maintain various types of networks for a business.”
THE NATIONAL STEM CONSORTIUM: A COMPREHENSIVE MODEL TO MAXIMIZE STUDENT SUCCESS

The NSC academic model is built on research-based strategies that, when combined, yielded an average 69% completion rate across its students nationwide.

First, NSC instruction is outcomes-driven, delivering learning outcomes mapped to industry standards. NSC member colleges formed regional advisory boards to respond to industry needs and employer requests.

NSC programs are one-year, 30-semester-credit academic certificates. Certificates are a highly effective tool for workforce development, and are most effective when they are long enough to be rigorous yet short enough to be achievable.

Second, NSC programs use a built-for-completion structure including a program navigator, cohort structure, block scheduling, compressed timeline, enhanced student support services, and employer partnerships. Research has shown that it is the combination of strategies, rather than any single strategy, that boosts student success. Specifically, a growing body of evidence argues for “strategy intervention at a more comprehensive and integrated level that aims at simultaneous change focusing around whole program design and delivery — improving the coherency of instruction and educationally relevant services that students need as they move through their program of study.”

Last, NSC programs embed contextualized refresher instruction in mathematics, communication, and professionalism to eliminate traditional remedial courses and prepare students for success in demanding technical courses.  

The NATIONAL STEM CONSORTIUM’S curriculum development efforts focused on creating new nationally portable, one-year certificate-level college programs in Science, Technology, Engineering and Math (STEM) in career pathways that are in demand by employers and applicable widely to community colleges throughout the United States. The curricula were developed by multi-college teams, ensuring that they met national as well as local demand. In most cases, content is mapped to industry-recognized credentials.

COMPOSITES TECHNOLOGY

Composites are products made with a combination of materials that maintain their individual characteristics when combined. The performance of the combined materials is superior to that of the constituent elements on their own. The origins of composite materials date to ancient times; adobe bricks, created by mixing straw with mud, are an early example. Today, many composites and their component materials are highly engineered to maximize performance, and thus are called advanced composites. Their high strength, light weight, corrosion resistance, durability, and flexibility, among other benefits, render them ideal materials for diverse products ranging from bathtubs, golf clubs, skis, and snowboards to boat hulls, racecar bodies, high-pressure-gas storage tanks, satellites, and spacecraft.

Soaring energy costs and environmental concerns are key factors driving demand for the materials, with their lighter weight and better strength-to-weight ratios than metals. The aerospace and aviation industries are among the earliest and highest-profile markets for composite materials. The wind energy industry is using composites to build...
The curriculum instructs in several different, composites with that of CNC machining.

The NSC Composites Technology Certificate prepares students for careers in manufacturing, with an emphasis on composites, polymers, injection molding, machining, and computer numerical control (CNC) machining.

CYBER TECHNOLOGY

Digital technologies are embedded in virtually every industry—from defense, education, and finance to healthcare, manufacturing, and utilities—and the nation’s critical infrastructures are all highly networked. With cyber now ubiquitous in everyday life, there is widespread and growing demand for the cyber professionals who build and operate the nation’s information technology systems and networks, as well as protect against evolving threats to government, society, and the economy. Such perils include cyber attacks, deemed a top national security threat by the U.S. Director of National Security, and network security breaches, potentially costing American businesses hundreds of billions of dollars annually. In fact, a broad consensus exists across government, industry, and academia that the U.S. cyber workforce must expand in both quantity and quality to meet present and future challenges.

OCCUPATIONS

To bolster efforts to increase the size and capability of the U.S. cyber workforce, the National Initiative for Cybersecurity Education (NICE), an inter-agency collaboration led by the National Institute of Standards and Technology (NIST), published the National Cybersecurity Workforce Framework (Framework) in 2012. The Framework defines 32 specialty areas of cybersecurity work, grouped into seven categories. These include Customer Service and Technical Support, with responsibility to monitor the performance of computer systems, diagnose and resolve user problems regarding computer software or hardware operation, install or repair equipment and operating systems, assist users in installing software, train users to work with new computer hardware or software, read technical manuals, and maintain daily records of transactions and activities.


ELECTRIC VEHICLE TECHNOLOGY

Since the first hybrid electric cars were built for the mass market in 1999, more than 3 million electrified vehicles have been sold in the United States. By 2014, manufacturers offered 60 different hybrid electric vehicles, 8 plug-in hybrid electric vehicles, and 9 fully electric vehicles. In addition, there are multiple models of electric scooters, dirt bikes, motorcycles, and all-terrain vehicles (ATVs), and even a Formula E Electric Vehicle Racing Circuit. Rising energy prices, environmental concerns, and fuel economy targets are driving demand for such alternatives to fossil-fuel-based vehicles.

Sales of electrified automobiles are increasing rapidly; in 2013, nearly 600,000 hybrid cars and plug-in electric cars were sold in the United States, up 21 percent from the previous year. A 2009 study by the Center for Entrepreneurship and Technology (CET) at the University of California, Berkeley projected that, by 2030, electrified cars will comprise 64 percent of all light-vehicle sales in the United States and 24 percent of the entire U.S. light-vehicle fleet.

Service and Maintenance: This occupational area employs technicians who assist electrical, electronics, and mechanical engineers in developing solutions to technical problems in the design, development, manufacturing, quality control, and maintenance of electric vehicles.

Service and Maintenance: This occupational area employs automotive service technicians and mechanics who inspect, maintain, diagnose, and repair electrified vehicles using computerized equipment and electronic components as well as traditional hand tools. While automotive service technicians trained in conventional automotive systems can perform much of the routine maintenance work on electrified vehicles, they need special skills and knowledge to work on the high-voltage electrical systems, lithium-ion batteries, electric generators, and drivetrains of these vehicles.
ENVIRONMENTAL TECHNOLOGY
Mounting concerns about climate change and pollution, rising public interest in sustainability, and an expanding regulatory framework are driving the imperative to protect, conserve, and remediate the natural environment, while making communities and workplaces safer and more sustainable. As a consequence, the environmental technology industry in the United States—the world’s largest producer and consumer of environmental technologies—has flourished. Environmental technology encompasses environmental protection and compliance; pollution control, prevention and remediation; waste management; renewable energy; and the design and operation of environmental infrastructure.

OCCUPATIONS
The environmental technology industry supports a diversity of occupations and positions that are suitable for community college technical certificate holders. Categories include air quality, emergency preparedness and response, energy technologies, environmental laboratory services, environmental site management, natural resources management, safety and health, solid and hazardous waste management, and water supply and treatment.

The primary employers of environmental science and protection technicians—a broad category of workers whose chief tasks involve conducting field and laboratory tests to monitor the environment and investigate pollution sources—are state or local government agencies, testing laboratories, or environmental consulting firms. Other employers include insurance providers, chemical and petroleum manufacturers, utilities, the military, nonprofit organizations, and construction, transportation, and waste management companies.

Two occupational areas of focus are HazMat, Safety, and Health Quality. Virtually every locality must be equipped to clean up hazardous materials and address water quality issues. While large metropolitan areas clearly will have greater demand for environmental technicians than smaller communities, the need for professionals to respond to environmental and occupational threats is present across geographic locations.

THE NSC ENVIRONMENTAL TECHNOLOGY CERTIFICATE
The National STEM Consortium Environmental Technology certificate prepares students for industry-standard certification exams. The certificate features two tracks. The HazMat, Safety, and Health track trains students to analyze, handle, store, transport, and dispense hazardous materials in accordance with appropriate regulations and to plan for the protection of workers, communities, and the environment from hazardous material exposure. The Water Quality track trains students to monitor and ensure compliance with environmental health regulations and industry standards, investigate pollution sources, and control processes to transfer or treat water or liquid waste.

MECHATRONICS TECHNOLOGY
Mechatronics is an emerging multidisciplinary field of engineering that integrates mechanical, electrical, computer, and control technologies. A relatively new approach to product design, mechatronics creates automated intelligent equipment and systems that improve the safety, reliability, productivity, versatility, and energy efficiency of manufacturing and other processes. Mechatronics equipment ranges from ATM machines to multi-million-dollar manufacturing cells, and the technology has applications in a wide variety of industries, such as aerospace, defense, environmental technology, and healthcare. Products incorporating mechatronics technology include artificial limbs, computer drives, antilock brakes, endoscope cameras, hybrid cars, pacemakers, photocopiers, and industrial robots. As technologies advance and costs decrease, an increasing array of products and applications likely will embed these advanced industrial systems.

OCCUPATIONS
The mechatronics field supports a diversity of occupations and positions that are suitable for community college technical certificate holders. Mechatronics technicians typically work with design, development, and engineering staff to install, maintain, modify, and repair mechatronics systems, equipment, and component parts. Common tasks include testing the performance of electro-mechanical assemblies, automated manufacturing equipment, or packaging machinery; using precision measuring instruments to verify dimensions of parts; reading and interpreting blueprints; operating, troubleshooting, and repairing automated systems and machinery; and documenting test results.

The ubiquity of modern consumer products embedding mechatronics technology, as well as the range of industries employing mechatronics systems, ensures that industry demand for mechatronics technicians is large and geographically dispersed. Mechatronics-related occupations span a variety of industry sectors, including agriculture, aerospace, biotechnology, construction, defense, distribution, electronics, energy, food processing, logistics, medical, petroleum refining, telecommunications, and transportation. Employers range from manufacturers, processing plants, and engineering firms to laboratories, hospitals, schools, police departments, and industrial bakeries.

THE NSC MECHATRONICS TECHNOLOGY CERTIFICATE
The National STEM Consortium Mechatronics Technology certificate coursework prepares students for industry-standard certification exams, including Level I of the Siemens Mechatronic Systems Certification Program.
NSC programs improve student persistence by using evidence-based strategies to create a built-for-completion program structure that guides students toward graduation and career entry in an accelerated time frame.

**COHORT MODEL**

Students are recruited and enrolled as a cohort, taking all courses together in sequence. The cohort structure offers a community atmosphere and an opportunity for students to build relationships with other students, faculty, and staff. Students hold one another accountable, develop study groups, and support each other. When a college uses a cohort structure, recruiting students committed to completing the full program year is critical for their success.

**BLOCK SCHEDULING AND COMPRESSED SCHEDULE**

NSC has designed a course sequence to enable students to complete all required courses in one year. The one-year timeframe is based on a block-scheduling scheme that provides convenience for students who take all courses at the same time each day, and know their schedule for the duration of the program. This is especially beneficial for students with a job or family care responsibilities.

**PROGRAM NAVIGATOR**

The Navigator’s role is to coordinate local student support services throughout the continuum of a student’s involvement with the college/program, from initial contact as part of the marketing and recruitment process, through program completion and eventual job placement. Given the range of academic and personal challenges confronting many community college students, having a personal advocate can boost students’ level of commitment and chances of success.

Typically, colleges offer students an array of services, distributed over multiple offices and departments, such as health care, counseling, tutoring, and veterans’ support. The Navigator offers each student a single point of contact to whom s/he can turn for anything. The Navigator helps assemble each program cohort by recruiting students and assisting them in the admission, enrollment, and financial aid processes. Once the program begins, the Navigator connects students with academic and any other support services needed to help them complete the program.

**Academic Support Services**

- Working with other student support staff, Navigators can arrange for tutoring assistance with the help of student academic support or teaching and learning centers; obtain accommodation for students with learning or physical disabilities in conjunction with the college’s disability services office; offer academic advising services to students; and develop relationships with program instructors to learn about student progress.

- To catch potential problems early, a Navigator might ask program instructors at the beginning of each course to inform him/her if a student is having any difficulty. Follow-up with instructors throughout the course can reveal whether a student is on track, staying focused, putting forth sufficient effort, and maintaining his/her grades. Regular one-on-one meetings with students can allow the Navigator to ascertain the cause of a student’s struggles and suggest appropriate measures, such as joining a study group, working with a tutor, or simply finding someone who can help him/her figure out when to undertake assignments amid life’s daily demands.

**Financial Assistance**

Navigators and other student support staff can help students obtain financial assistance, including third-party/workforce agency funding, state-level funding, unemployment insurance, and college financial aid.

**Social Services**

Navigators and other student support staff can connect students with the full scope of social services, including housing, food, clothing, transportation, and medical services.

**Career Planning**

Navigators and other student support staff can help students articulate their career goals and provide job preparation assistance that goes beyond traditional career services offerings, such as help identifying prospective employers and resume and interviewing advice. The navigator or other support staff offers more tailored industry-specific assistance, such as instruction in job search protocols and industry conventions; help conducting job search using social media; and, particularly for students enrolled in STEM programs, help translating technical skills from the programs to their resumes.
One of the most innovative educational strategies that the NSC has used to improve the completion and success rates of students is a two-part STEM Bridge program, created by faculty and staff from each of the ten colleges in the consortium, including technical faculty and industry subject matter experts as well as developmental or adult educators. The group identified the essential skills that were needed by professionals in the NSC pathways, and determined that they would need to design two strategies:

The first STEM Bridge strategy embeds competency development into the technical curriculum instead of using a traditional pre-program approach to developmental education. This has been done through the development of an innovative STEM Readiness course which integrates basic skills, workforce skills, computer skills, and job readiness training contextualized within the STEM pathways. The STEM Readiness course is programatically consistent across the five fields and transferable to other colleges; it focuses on the development of critical key skills identified as essential workplace skills by faculty and employers representing all five technical pathways. This course was designed to quickly refresh key skills for students whose college placement test scores (Accuplacer, Compass, etc.) indicated that they were either “college ready” or were in need of only one developmental math course at a particular institution. The STEM Readiness course has been developed in an online format with assistance from Carnegie Mellon University’s Open Learning Initiative (OLI) and the Center for Applied Special Technology (CAST) and focuses on refreshing critical key skills in the following areas:

- Math
- Critical Thinking and Workplace Communication
- Professional Skills

NSC needs assessment of potential students led to the conclusion that many students would require more intensive, up-front development of the basic skills required for access to the technically demanding educational pathways into STEM occupations. These are students whose college placement test scores indicated that they had more than one developmental need in English and/or math. Therefore, the second STEM Bridge strategy is a modularized set of curriculum “bundles” that can be adapted and inserted by colleges wherever needed to provide support for lower level learners who need to build foundational skills in math and workplace communication before entering the credit certificates. The STEM Foundations course has been designed to help students bring their math, reading/writing, computer and critical thinking skills to the level necessary to take full advantage of the technical curriculum in one of the five programs.

The STEM Foundations course has been developed in an online format with assistance from OLI and focuses on developing critical key skills in the following areas:

- Workplace communication
- Math

EMBEDDED, CONTEXTUALIZED DEVELOPMENTAL EDUCATION: THE STEM BRIDGE