



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Prepared for the Florida Department of Education



Our Team

Gary Chartrand
Chairman of the Board of Directors
NEFL Regional STEM2 Hub

Kathleen Schofield
Executive Director
NEFL Regional STEM2 Hub

Frank Robinson
Program Director
After School and Summer Programs

Nancy Watson
Program Director
K12 In-School Programs



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

The Northeast Florida Regional STEM2 Hub Board of **Directors** and Staff, community partners including the **Boys and Girls Club** of Northeast Florida, the **Police Athletic League**, **Communities in Schools**, the **Girl Scouts of Gateway Council**, The **Museum of Science and History**, and the **students, parents, teachers, and leaders** in the seven school districts that we serve are thankful to our state leaders for granting us the funds to carry out the work in this project.



We are pleased to present our mid-year progress.

The **Northeast Florida Regional STEM2 Hub** was chartered in 2015 by the Jacksonville business community. The leaders noticed that there was a disconnect between the skills that students would need to be ready for the careers of the 21st century, and the experiences that students were receiving through their formal education.

The mission of the STEM2 Hub is to “**convene, inspire, and invest in the STEM2 field by providing the essential missing elements to accelerate the growth of STEM2 education and careers.**” By the end of the program period, all school districts in the Northeast Florida region shall have the opportunity to offer **expanded and more equitable access** to 21st Century Skills Development Programs with a focus on robotics, coding, and high-quality instruction in mathematics, problem-based learning, and career exploration, with pilot programs in emerging technologies.

The purpose of this project is to increase the availability of educational programs that will build interest as well as the **needed prerequisite skills for high-demand STEM-related careers** throughout the Northeast Florida region. To be workforce-ready for these careers, students must have skills that include computer science and coding, as well as demonstrate competency in mathematics. Through this program, students will have the opportunity to participate in competitive robotics and mathematics programs, as well as receive an introduction to coding concepts beginning at the elementary school level. Program implementation shall be modeled after successful local and national programs, and shall include competitive elements, as appropriate. Robotics, math, and coding programs shall be developed to include an aligned progression to allow for the development of skills over time, assure alignment to state standards and



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

curriculum for ease of integration into the school day, and shall provide guidelines for districts to implement professional development for those leading the programs and

implement the curricula. Community engagement, through community partnerships and industry mentorships, will be developed to assure the building of relationships which focus on awareness of post-secondary career pathways.

Projects Launched

STEM Summer Camps

Multiple STEM summer camps went on around the region with a focus on students in the urban core in Duval County Schools. Camps were attended by students being served through the Communities in Jacksonville Programs and the Boys and Girls Clubs of Northeast Florida, which extends the impact into St. Johns County. Students participated in an exciting week of STEM-focused summer learning experience on topics including robotics, coding, health science, and web design.

The camps reached **OVER 200 students** from 11 CIS and Boys and Girls Clubs locations across Jacksonville with an elementary and middle school curriculum incorporating science, technology, engineering, math and medicine. The curriculum encourages problem-solving through play-based learning opportunities in a classroom setting.

The camps ran all summer, Monday through Thursday, and were repeated for a new group of students each week. The schedule ran as follows:

Monday - ROBOTICS: Students learned how to use software to program FIRST LEGO League robots and studied robotic movement and other programming options.

Tuesday - CODING: Students learned how to write programs to order the robots to run specific courses. Instructor, Janine Aleong noted that, once the students became acclimated to the software, options, and programming procedures, it was literally ‘off to the races. They were really excited about making things move, problem solving and competing against each other.’



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Wednesday - MEDICINE: Students were immersed in health science topics, including how to measure heart rate, respiration, pulse, and temperature.



Thursday - WEB DESIGN: Students learned about web design topics, including design theory elements such as color and content, building a small website using templates, and how to customize content.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

At the end of camp each week, students were administered items from the PEAR Institute retrospective survey to measure interest levels for participation in school-based activities.

- 99 percent of students reported that they enjoyed learning how to create a website
- 94 percent of students reported that they enjoyed building and programming robots
- 90 percent of students said learning about STEM inspired them to work harder in their math and science classes

The program instructor, Aleong, also noted that “many kids demonstrated growth in the area of problem analysis. They were able to create algorithms that moved them closer and closer to a solution for their mission with each iteration.” She added, “another demonstrated growth measure that was prevalent this year was that the students were able to recognize the iteration strategy early in the mission. This shows that they made the connection with the engineering process: Design, build, test, repeat.”

Many students have already expressed their desire to return next year to STEM2 Hub’s summer camps. In response, STEM2 Hub has begun developing a three-year rotating program to allow returning students to experience a continuum of new activities each year. Our goal is to continue growing these students’ interest in STEM careers by exposing them to a wide variety of possibilities in our economy’s fastest growing workforce sectors and igniting interest and building skills to assure that they are future ready.

After School Robotics

Robotic technology is changing the world! Autonomous processes are everywhere. We need to assure all children have access to robotic technologies. There has been exceptional growth across our region in access to robotics in after school programs,

however, all schools still do not have access. With a goal of 100% of all schools in the region having a robotics team, we began work this year to move towards that goal. We chose to begin with the FIRST LEGO League (FLL). FLL is the first competitive level of the FIRST program. Students use the EV2 robot to learn to code and prepare to



Northeast Florida 21st Century Workforce Development Project Midyear Progress & Outcomes July 1 through December 31, 2018

compete. Students develop a research project around a problem in the theme, program their robot to complete missions, and demonstrate their ability to work as a team to

Our approach to implementation of this program was to work with community partners and school districts to fund or reimburse for the establishment of new teams in the districts with the expectation that the districts would provide teacher stipends or staff members to facilitate and mentor the team. The STEM2 Hub provided coaches training all around the region to build team leadership capacity. Approximately 65 new teams were started this season, serving approximately 650 students. Equipment and registration fees were paid, and training was provided. Districts currently funding 100% of their robotics programs were given upgraded equipment, since many teams were working with outdated robots. Ongoing support was provided throughout the season. Dozens of competitions have taken place, and many of our teams moved on to regional and even state competitions.



A total of 65 new robotics teams have been launched in after school programs all around the region impacting over 500 students as a result of this project. We are pleased to report that 100% of Communities in Schools sites, Boys and Girls Clubs, and selected Girl Scout troops and YMCA programs now have robotics programs across our region. We have coordinated with 21st Century Learning Grants across the region, as well, to build capacity for robotics within these programs.

Districts around the region are institutionalizing robotics by assuring that teachers are provided a stipend to coach a robotics team. Clay, Putnam, and St. Johns Counties are



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

amongst those who have funded this stipend for every school. Leadership buy-in and understanding of the critical workforce need for all students to have access to programs such as these is leading to robust participation, and a clear vision for STEM across our region.

FIRST Competitions: Season Kick Off Event

Each year, there is a theme across the competitive robotics programs coordinated by FIRST. This year the theme was space. Frank Robinson, program director for afterschool programs, is a retired engineer from NASA.

Frank worked with Kennedy Space Center on the statewide team that planned a kickoff competition event at the space center. There were 1,000 slots for teams to attend. Frank worked to assure that Northeast Florida was well represented, with approximately 300 students from all areas of our region attending. Thanks to this project, our students are inspired to reach new heights and career aspirations.





**Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018**

<p>Welcome</p>	<p>Welcome to the <i>FIRST</i>® SEASON LAUNCH EVENT at Kennedy Space Center!</p> <p>Join <i>FIRST</i>® LEGO® League Jr., <i>FIRST</i>® LEGO® League, and <i>FIRST</i>® Tech Challenge Teams, with support from <i>FIRST</i>® Robotics Competition, as we celebrate the start of our new mission and make all systems go with <i>FIRST</i>® LAUNCH 2019! Students ages 6 to 18 will kick-start their intergalactic adventure of STEM discovery with reveals of the annual challenge, participation in workshops, learning from field topic experts, and visiting scientific displays and exhibits at the Kennedy Space Center Visitor Complex. All the while supporting each other, sharing experiences, and practicing the <i>FIRST</i>® Core Values. Thank you for all of your hard work getting your team to the event for <i>the hardest fun you'll ever have!</i></p>
<p>When</p>	<p>Saturday, September 8, 2018, 9:00 AM – 6:00 PM</p>
<p>Where</p>	<p>The event will take place at Kennedy Space Center in the Center for Space Education building. To get to the building, use the Main Entrance to the Visitor Complex, and then proceed through the Rocket Garden. Some of our fantastic volunteers and staff will be around along the way to help guide you to the start of your mission!</p> <ul style="list-style-type: none"> • Address: M6-306, 405 State Road, Kennedy Space Center, FL 32899 • Google Maps Location: https://goo.gl/maps/RUKaKpuwxc22 • www.astronautsmemorial.org • Kennedy Space Center travel guide https://www.kennedyspacecenter.com/info/travel-information





**Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018**

Arrival	<ul style="list-style-type: none"> • All attendees MUST have their ticket from Eventbrite or they will be unable to enter the park. • The registration area will open at 8:00 AM and will remain open until 9:30 AM. Proceed to the registration area (see map below) on arrival to exchange your Eventbrite ticket for a park ticket. If you ordered lunch, the individual who placed the order can pick up the vouchers at the registration desk. • Your ticket includes information on restricted items, and other important terms and conditions you must review and agree to prior to admission to the park. • The Kennedy Space Center Visitor Complex gates will open at 9:00 AM. • All activities will begin with Opening Ceremonies at 9:30 AM (see schedules by program below).
Reminders	<ul style="list-style-type: none"> • All students must be supervised or they will be denied admission • Please review the terms, conditions, and policies, printed on your tickets • Parent/Other Guest tickets do not include entry into the Center for Space Education where the <i>FIRST</i> workshops and activities will be taking place. Due to capacity limits, this space is restricted to Coaches and Student Participants. We encourage Parents/Other Guests to join us at the <i>FIRST</i> demonstration area in the Rocket Garden to learn more about the <i>FIRST</i> Programs, Alumni and Scholarships, Game and Season, and more! Parents and Other Guests may enjoy all the Kennedy Space Center Visitor Complex has to offer while the students participate in the event and can meet up with the students during lunch and after the closing of the program. • There is a SpaceX Falcon 9 launch from Kennedy Space Center planned for Saturday night at 11:28 PM—see https://spacecoastlaunches.com/launch-schedule/; the launch will likely attract more people to the Visitor Complex for the day, so prepare for potential delays with entering the attractions. The rocket will launch the Telstar 18 VANTAGE communications satellite for Telesat to provide broadcast, enterprise and government communications services over parts of India, China, Mongolia, Southeast Asia, and the Pacific Ocean region.





Northeast Florida 21st Century Workforce Development Project

Midyear Progress & Outcomes

July 1 through December 31, 2018

Schedules

Each of the three programs, *FIRST*® LEGO® League Jr., *FIRST*® LEGO® League, and *FIRST*® Tech Challenge, will start at the same time, but break for lunch at different times, and end at different times. Here are the schedules as they are currently planned:

	<i>FIRST</i> ® LEGO® League Jr.	<i>FIRST</i> ® LEGO® League	<i>FIRST</i> ® Tech Challenge
8:00 AM	« Registration Open«		
9:00 AM	« Kennedy Space Center Visitor Complex gates Open«		
9:30 AM	« Opening Ceremony«		
10:00 AM	MISSION MOON SM Workshops	INTO ORBIT SM Workshops	ROVER RUCKUS SM Workshops Super Seven Inspire Award Winners
10:30 AM	WeDo and Inspire Set	Project Workshop: Research	Haggarty High School Team Presentation Student Leadership Innovation Council
11:00 AM	Ask the Expert; Interactive Play in the Exploration Station	Online Resources – Seshan Brothers	Break for Lunch (<i>FIRST</i> ® Tech Challenge). Come back at noon for the field Reveal!
12:00 PM	Done for the day (<i>FIRST</i> ® LEGO® League Jr.)! Enjoy the Visitor Complex!	Project Workshop: Presentation	ROVER RUCKUS SM Game Field Reveal
12:30 PM		Break for Lunch (<i>FIRST</i> ® LEGO® League). Come back at 1:30 PM with good questions for the NASA Experts Panel	ROVER RUCKUS SM Game Q&A, and Game Field tour
1:30 PM		NASA Experts Panel and Q&A	Done for the day (<i>FIRST</i> ® Tech Challenge)! Enjoy the Visitor Complex!
2:30 PM		NASA Experts Break-out	
3:00 PM		Done for the day (<i>FIRST</i> ® LEGO® League)! Enjoy the Visitor Complex!	
6:00 PM	« Kennedy Space Center Visitor Complex Closes«		



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

Floor Layout	The Center for Space Education is a straightforward building to navigate, but you may need this overview map to find your way: <image003.jpg>
What to Bring	<ul style="list-style-type: none"> • Printed Eventbrite Tickets • Cooler with lunch (unless you pre-ordered) • Cash for lunch (unless you pre-ordered/paid) or souvenirs • Water bottles • Sunscreen • Hat/Sunglasses • Notepad & Pencils • Questions for the experts • You don't need to bring your team robot, table, mat, nor any mission kits • Don't forget that over-the-top Team Spirit and some Team Flare to share with other teams!
What to Wear	<ul style="list-style-type: none"> • Comfortable shoes for walking the Kennedy Space Center Visitor Complex after the workshops • Comfortable slacks/shorts • Team shirts! • Anything FUN for SPACE
Contact Us	<p>Have any questions? Need more detail? Contact Joyce by email: joyce@centralfloridarobotics.org or phone: +1 (833) 353-4778 x702</p> <p>#FIRSTLAUNCH2019 #STEMSquad</p> <p><image004.jpg></p>

Our students participated in workshops, learned new coding skills, and received inspiration to work hard throughout the upcoming competitive season. As of December, many of our teams have won competitions and will be heading to regional championships in the spring.



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



STEM in the Elementary Media Center – Robotics Infusion

Many students have the opportunity to participate in after school and summer robotics programs, but the number of students in robotics clubs represents only a small number of the total population in our schools. Robotics technology is a critical component for the jobs of the future, and we are already seeing robotic technologies infused into multiple sectors including manufacturing, medicine, autonomous vehicles, warehouse applications to name a few. Since all students need to have an understanding of robotics and their impact on the future of work it is important that we build capacity for all students to gain experience in this area. In addition to the workforce applications, there are strong alignments to standards, especially math, science, and computer science encountered through working with a robot.

The goal of the STEM in the Media Center is to assure that all students have access to build a robot and learn to code during the school day. Students benefit from these experiences by strengthening their understanding of many math and physical science standards, as well as develop critical problem solving skills and put the nature of science to work. The media center is an excellent setting to bring in these collaborative technologies. All students have access to the media center on a regular basis through the resource class, in many schools in our region. This approach also has enabled media centers to revision themselves to include 21st century media.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

To accomplish this shift, and begin the journey of providing media specialists with a new set of skills, professional development was provided by LEGO Education. Prior to the professional development, a planning meeting took place at LEGO North America Headquarters. LEGO convened a team and invited the executive director of the STEM2 Hub to visit and meet with the team. During the planning day, a tiered plan was developed to begin with the basics and then provide ongoing training and support to each media specialist. Input from Mitchell Resnick, the director of the Media Lab at MIT, met with the executive director of the STEM2 Hub and shared his ideas for the project, as well as best practices from his experience and viewpoint. The roll-out training was held early in October at the University of North Florida.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Approximately 71 attended the training, representing elementary school media centers from around the region. Teachers and district leaders were in attendance and all participated in the activities. Districts represented included Baker, Clay, Nassau, and Putnam Counties, with representation from Institutes of Higher Education with teacher education programs, including Edward Waters College, the University of North Florida, and Florida State College at Jacksonville.



The purpose of the attendance from IHE's was to gain exposure to the skills being taught to practicing teachers so that preservice teachers could have opportunities bring new ideas into the colleges and enrich the program offerings, better preparing teachers to implement computer standards upon graduation, rather than rely on the districts to train newly hired teacher in these skills. In addition, St. Johns County sent a district STEM leader to attend the training to bring the idea back to the county and discuss the

strategy that St. Johns County wishes to take to engage in implementing STEM through the media center. At the end of the three-day training, STEM equipment, including robots and Makey Makey's were provided to the teachers. This project will reach over 47,000 students.

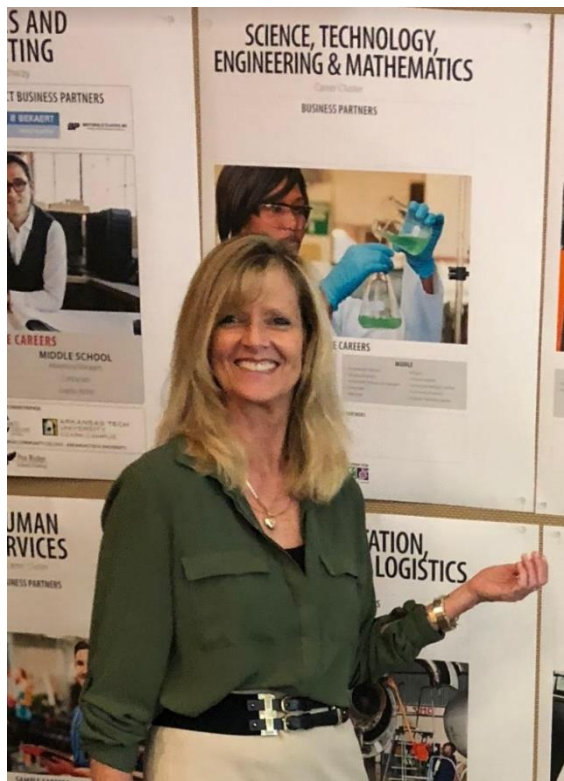
Teacher left the training with equipment to take back to their schools for immediate implementation

In phase two of the project, scheduled for spring, eight to ten schools around the region will be identified to serve as demonstration centers so that capacity for leadership can be





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



build around the region. In the demonstration schools, at least one teacher from each grade level will agree to take advanced STEM training and to integrate a robotics and coding-based lesson into their curriculum a minimum of one time per quarter. These sites will help build local capacity to provide training to other teachers and to give other local teachers the opportunity to visit a demonstration school and observe instruction.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



Administrator Professional Development

All **52 district administrators** and **school principals** have learned to program a robot in Clay County. By gaining hands-on experience with building and programming a robot, the school leaders are now able to better lead instruction in their buildings, understand how math, science, computer science, and critical thinking come together in the context of robotics.

The Florida Times-Union covered the event, reporting on the unprecedented day of training

FLEMING ISLAND — With assorted brightly colored LEGO blocks along with wheels and tiny motors on tables in front of them, Clay County educators Tuesday confronted the question, “how many principals does it take to build a robotic toy car?”

And more importantly, “how will it help their students explore their creativity and critical thinking as well as master the science, technology, engineering and math (STEM) skills necessary for the jobs of the future?”



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

The answer: all 42 Clay school district principals plus Superintendent Addison Davis and senior administrators.



They participated in an unique hands-on professional development training session focused on teaching STEM and STEAM — which is science, technology, engineering, art and math — to students at each grade level from pre-kindergarten through 12th grade. They learned how to incorporate coding and robotics instruction into the school day while meeting state education standards.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

The day-long training was in partnership with Northeast Florida Regional STEM2Hub and LEGO Education. A nonprofit, STEM2Hub offers educational programs and expertise in STEM to Clay and six neighboring counties in the region.

A team from LEGO Education, which provides training to teachers and educational specialists nationwide, led the program that featured the popular toy in lessons including basic coding, robotics and computational thinking.

Clay is among the first county, if not the first in Florida, to train all its school principals how to be actively engaged in creative, collaborative and critical thinking learning processes. It is important to embed those skills in the lessons taught to students in all subjects, Davis noted.

“This is about taking a vision and making it come to fruition,” Davis said of the initiative designed to benefit students.

“We continue to talk about how we build and prepare our students for the future and this is the way we do it. We are trying to create greater excitement for learning. We are trying to expose our students to more of a robotic, advanced technology perspective of learning. And this is the way we are going to prepare our students,” he said.

Robotics currently is a popular and innovative extracurricular activity in the district, and some schools also have a robotics class. But more needs to be done, Davis said.

“What we’re trying to do is teach the necessary skill sets internally within the classrooms so we have hands-on activities where kids are really highly engaged in the learning process and are able to become design thinkers, are able to problem solve and be prepared for jobs that don’t exist today but will in the future,” he said.

The principals will take what they learn back to their schools. They will pass it on to their teachers, who in turn will incorporate into their classroom lessons for all subjects.

The goal, Davis said, is to create a mentality where students are creative, collaborative, communicative and thinking critically.

“If we get them to do those four elements every single day in their classrooms they will be prepared to compete inside and outside of our classrooms,” Davis said.



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

Principal Treasure Pickett of Oakleaf High School and her colleagues Tuesday built their way up from basic LEGO robotics such as a mini-desk fan to more complex projects such as a small battery-operated car and the coding to operate it.

“It’s fun. We’re learning,” Pickett said with a smile as she carefully pieced together the foundation of a small robot. As a youngster, she played with Lincoln Logs because they didn’t have many LEGOs back then, she said.

Kids today, she said, are all about LEGOs. That will inspire and help them learn, Pickett said.

“I think it will bring out creativity and exposing students’ creativity,” said Pickett, who is the district’s 2018 Principal of the Year. Students also will benefit from learning the technology of robotics as well as translate the critical thinking skills required in trouble-shooting and problem solving to other subjects and aspects of their lives.

Kathleen Schofield, executive director of STEM2Hub, said similar training will be held in the other school districts in organization’s service area. It is funded by a \$975,000 state appropriation. State Sen. Aaron Bean, R-Fernandina Beach was instrumental in getting the money for the program, she said.

“It’s to assure all children get access to the skills they will need for the jobs of tomorrow,” said Schofield, who previously served as a Clay school district administrator.

Teresa Stepzinski: (904) 359-4075

In reflection of the day, Clay Superintendent Addison Davis stated, “Yesterday was an AMAZING learning experience for us all! I truly enjoyed watching each of you collaborate, communicate, critically think, and be creative in order to learn! While Clay County District Schools has had robotics for several years, it is important that we begin utilizing STEAM resources in our classrooms with the goal to create the future workforce of tomorrow. As you know, we are just beginning our STEAM and problem-based learning journey in our classrooms and yesterday was designed as a launch toward infusing these learning experiences in every day practice. Please know that I am committed to providing you and your teachers with the necessary support to implement this vision for our students.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



 **Addison Davis** @ADOneClay · 5h
Thanks to the LEGO Education Team and
@NEFLSTEM2 for partnering with
@oneclayschools to train our principals and
staff in the latest robotics! #ElevateClay



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

MOSH Outreach

Bringing interactive and engaging experiences to students utilizing a standards aligned approach that is highly engaging is an important strategy to help students build interest in STEM classes and careers. Students gain have experiences such as this by visiting places such as a science museum. However, due to the high cost of transportation, it is not feasible to bring every fifth-grade student from a given county to the MOSH. Through outreach, however, every fifth-grade student in St. Johns County has been able to have this museum type experience.

The MOSH developed a program called Red Rover Robotics, a standards-based experience, that was brought to all fifth-grade students in every Saint John's County elementary school. The standards alignment and the lesson plan for the outreach follows:

MOSH Outreach Program: "Red Rover Robotics"

NGSS Standards Alignment

SC.35.CS-CS.6.1: Describe how hardware applications (e.g., Global Positioning System (GPS) navigation for driving directions, text-to-speech translation, and language translation) can enable everyone to do things they could not do otherwise.

SC.35.CS-CC.1.4: Describe how collaborating with others can be beneficial to a digital project.

SC.35.CS-CC.1.5: Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.

SS.5. G.1.2: Use latitude and longitude to locate places.

MAFS.5. G.1.1: Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

MAFS.5. G.1.2: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.

MOSH Outreach Lesson Plan (Facilitated by MOSH Education Staff)

Time: ~1-hour **Capacity:** ~50 students (split into teams of 4) **#** **of**
Educators: 2

Introduction:

In August 2012, NASA engineers successfully landed the *Curiosity* Rover on Mars. This completed a journey that began 9 months prior and 350 million miles away, back on Earth at Cape Canaveral, Florida. Since that time, *Curiosity* has explored over 11 square miles of the Martian surface, analyzing soil samples, collecting data, and discovering new evidence of water on the Red Planet. Yet *Curiosity* does not accomplish these amazing feats all on its own; NASA scientists and engineers are in constant communication with the rover, telling Curiosity what to do and where to go using directional commands. It takes 8-20 minutes for NASA's data signal to reach Mars, so the engineers who control the rover do not use a joystick; instead, they use a series of programming commands. One mistake in the code and Curiosity may drive into a crater or miss the opportunity to find evidence of water on Mars!

This activity will simulate part of that communication process, allowing students to work together to program a "Mars Rover" (Sphero Robot) using coding commands to accomplish a specific goal. By the end of the activity, students will have a deeper understanding of the importance of accuracy in communication, collaboration, and problem-solving when faced with a challenge, both in the classroom and when controlling a rover on another planet.

Required Materials (brought from museum):

-12 Sphero Bots & Charging Carrier Case	-12 Kindle Fire Tablets w/Charging Cords
	-Mars Floor Map



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

-Portable Screen (for MOSH Educators)	-Extension Cord & Power Strip
-Portable Projector (for MOSH Educators)	-Graph Paper (1 sheet per group)
-Portable Speakers (for MOSH Educators)	-White Paper (1 sheet per group)
-MOSH Outreach Laptop w/Adaptor	-Colored Pencils
	-Regular Pencils

Supplemental/Optional Materials (Brought from museum): Giant Mars Map

Required Materials Provided by School:

Open floor space (can be gym, auditorium, cafeteria, library or classroom)
 1 table (~5ft)

Learning Objectives

The students will:

- Describe positions on an X/Y coordinate plane
- Use latitude and longitude to locate places
- Describe how hardware applications can enable everyone to do things they could not do otherwise
- Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation
- Describe how collaborating with others can be beneficial to a digital project
- Work collaboratively to solve a problem using technology

Key Questions for Students to Consider:

- How can we use technology to solve problems and accomplish what we otherwise couldn't?
- How do scientists and engineers use communication tools and teamwork to accomplish goals?

Part 1 - Exploring the Red Planet and Introducing the Goal (15 minutes)

- Students will gather around the Mars Map, leaving the center of the map open to view and facing the front of the room.
- MOSH Educators will introduce the overall premise of the day's lesson as covered in the introduction above.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

- The framework that the program will be built around is the idea that humanity will soon be exploring and colonizing Mars. By the time that this class of 5th graders are all adults, humans will be living on the Red Planet. How do we prepare ourselves for making such an incredible leap forward? By using technology to explore and learn as much as possible about Mars before we send people there.
- The Educators will ask students key questions, including, “*Why do we want to explore space/Mars?*” “*How do we explore other worlds?*” and “*How does technology help us (humans/engineers) explore other worlds and go places we otherwise couldn’t?*”
- Students will then be asked to turn their attention to the Mars Map itself, taking note of the terrain, including the visible craters, canyons, and mountains. “*What do you notice about the Martian surface?*” and “*What sort of vehicles would be best suited for exploring Mars?*”





Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

These questions and the ensuing discussion will be accompanied by supplemental images/video illustrating how NASA launches rovers to Mars and introducing some of the key aspects of how NASA engineers and scientists use rovers like *Curiosity* to explore the Martian surface.

Elevation gives us insights into the temperature and air pressure of areas on Mars, two key elements that will determine where best to set up a colony in the future. The Martian Atmosphere is 1% the thickness of Earth's, meaning that every bit of air will count when it comes to settling people and potentially plants on the Red planet. Even though Mar's air is over 95% CO₂, making it toxic to humans, plant life could theoretically survive in that environment with proper atmospheric pressure and mild enough temperatures. Areas with higher elevation will have lower air pressure, while areas with lower elevation will have higher air pressure. The time of day and the seasons also have huge impacts on the temperature of Mars. Just like on Earth, when the Northern hemisphere is in Summer, the Southern Hemisphere is in Winter, and vice versa. Day and Night also create wild swings in temperature, from 60 degrees during the day to -80 degrees or lower at night. Elevation also gives clues to Mars' watery past, as the areas of the planet with lower than normal elevation can be easily interpreted as ancient riverbeds and ocean floors, having disappeared over 1 billion years ago. Some craters and other low-lying areas still contain briny salt water that reveals itself during the Spring and Summer months.

Note: Video content will be produced in-house by MOSH. Links to video materials may also be included in pre-visit material for teachers and students to review prior to the program.

At this point, MOSH Educators will Introduce the Mission to Students:

- In this scenario, students will use rovers to navigate the Martian surface and collect reconnaissance data in preparation for future human colonization.
- Teams will use the latitude/longitude lines on the Mars Map to navigate from point to point.
- At each point they stop their rover at, teams must record data such as latitude/longitude, elevation, key features (craters, mountains, etc.), and best estimates of temperature and air pressure before they move on.
- The goal is to recreate the map as accurately as possible.
- Educators will explain to students that the data they will collect will be extremely important to NASA in determining where people will live on Mars.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Rules for the Activity (Also Displayed on the Screen as a Bullet List):

- Students will be in groups of 4.
- Teammates must work together to map the Martian surface as accurately as they can, recording data such as elevation, key features (canyons, mountains, craters, etc.), and other notable landmarks.
- Only **one student per team** will be allowed to see the Mars Map during the activity.
- This student will be the navigator, serving as the eyes and ears of the rover, and will be stationed next to the map. This student will report back to NASA (the other team members) with descriptions of elevation, key features, and best guesses of temperature and air pressure.
- The remaining students will be the NASA engineering team, “back on Earth” (out of view of the Mars Map). These team members will be “blind,” relying on the information that the navigator relays back to the team to record data and recreate the map.
- One student will be the Driver, using a Kindle Tablet to program the rover. The Driver may also have an assistant to help them program the robot.
- One student will be the Recorder, keeping track of elevation, temperature, and other stats from each point visited.
- The last member will be the Map-Maker, using colored pencils and graph paper to recreate the map based off of the data they receive from the Navigator and Recorder.

Part 3 - Forming Teams and Controlling the Sphero Bots (5-10 minutes)

- At this point, students will split into their teams of 4 and teams will receive their Sphero Bots and their tablets, as well as their map-making and data recording sheets and materials.
- This block of time will be for the teams to learn the basics of how to control and program their bots, as well as work out how to communicate from their Mars rover back to their team’s base on Earth (from the navigator to the rest of the team).

***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



Part 4 - Exploring the Surface (20 minutes)

Teams will “crash land” at a random starting Latitude/Longitude coordinate of their choice on the map. This point on the map will be the team’s home base.

Educators will have a 20-minute timer running on the projector screen during their data collection, to keep teams on track.

Using the Sphero EDU App on their tablets, students will program their Mars Rover (Sphero) to one coordinate at a time, gradually making their way across the map while navigators communicate to their teams, recorders record the data, and map-makers draw their maps.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***



One educator will be with the map as a “referee,” to make sure that the navigators are not cheating. The other educator will be with the remaining students to answer any questions they may have.

Once teams finish the mission, Educators will collect their maps and data sheets.

Part 5 - Wrap-Up and Conclusion (5 minutes)

Congratulations! You and your team have successfully navigated the Martian surface using programming technology. NASA engineers use the same essential skills to explore Mars and beyond every single day. Who knows, maybe one day one of you will be driving a true Mars rover across the surface of the Red Planet!



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Everyone will come together around the Mars Map to see how well they did in recreating an image of the surface that they explored. Even if their map is not 100% accurate, the data they collected and interpreted to create it is extremely helpful for helping to understand the Martian landscape as it exists today and as it once existed billions of years ago. With the entire class' data compiled together, you all have formed a more complete picture of the Martian surface and formed a more complete understanding of what this alien world looks like.

MOSH Educators will share with students a compilation of all of the maps drawn by students over all of the previous programs that MOSH has done, creating a student-made mosaic of the Martian topographic landscape.

Educators will also briefly discuss with students and reiterate the program's themes of space exploration, teamwork, and using math, engineering, and programming skills to accomplish great things.

After the end of the program, Educators will also compile and share the mapping and data collection results of the group to teachers as a tie-in to the post-visit activity.

Educators will collect materials from teams and dismiss them to their teachers.

End of MOSH Program.

It would not be possible or practical for an individual teacher or team of teachers to develop or build an experience such as this for their students or expect an experience like this to be replicated at each elementary school. By working with a partner, such as we have done with the MOSH, experiences like this are able to reach many students around our region.

It is important to note that, through other private funding sources, this same experience is being made available to students in Putnam, Baker, and Clay counties, expanding access and scaling best practices from this work, expanding the access to reach as many as another 5,000 students across the region.

A survey was administered to the 79 teacher participants who received the program.



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

Comprehensive Tally of 2018-19 Outreach Evaluations											
				0	1	2	3	4	5	N/A	Average Score
Ease of Scheduling						2	2	6	50	17	4.73
Usefulness of confirmation packets				2			3	3	29	36	4.49
Presenter knowledge base								6	73		4.92
Presenter skills, interaction, and attitude								4	74		4.95
Program content relevant to previous classwork							3	18	52	6	4.67
Program filled your expectations							2	7	68	2	4.86
Program met your curriculum standards							4	8	64	3	4.79
Program content appropriate for grade								4	75		4.95
Program style and structure appropriate							4	4	71		4.85
Overall experience							2	3	74		4.91

Informational Principal's Meeting

Led by Superintendent, Dr. Diana Green, Duval County Public Schools serves over 125,000 students attending just under 150 public schools, along with multiple high quality charter schools, some of which have a STEM focus. STEM2 Hub leadership convened a meeting with Dr. Green prior to her taking the reins of the district. District data were reviewed and discussed. Dr. Green indicated that she would like to see coding and robotics implemented in the middle school through the science classes. The STEM2 Hub team then met with district leadership for middle schools and formulated a plan to integrate computer science standards through robotics into the science block.

Two informational meetings were held with the middle school principals to receive feedback and suggestion on the plan which was prepared collaboratively with the district leadership team. Twenty-two middle schools signed on to pilot the integration plan into the school day. Dates for full day trainings were set and trainings were provided to 61 Duval county science teachers who reach almost 10,000 students.

Computer Science in Middle School Science

With Duval County Pubic Schools as the target of the incorporation of computer science and coding into middle school science, other districts were invited to participate to spread the reach and impact of the work. One Clay County Junior High School opted in to pilot the program, training 3 science teachers who impact approximately 450 students.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

LEGO Education provided two full day of training, introducing the EV3 robot in the context of science content, as well as training on additional science tools and probe ware that is used as a data collection element in other areas of science. Teachers were enthusiastic to implement that robotics into their programs. Teachers left with a class set of robots and other equipment to be shared by their teams.



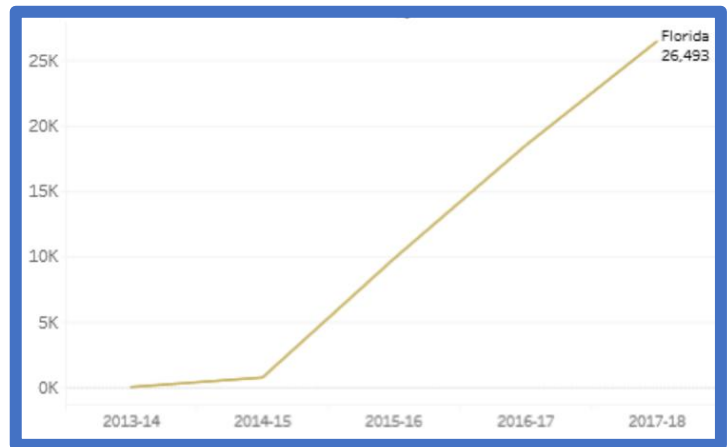


Northeast Florida 21st Century Workforce Development Project **Midyear Progress & Outcomes** **July 1 through December 31, 2018**

Computer Science

Computer science is one of the most critical need for the workforce. Computer science will continue to be a critical part in most every industry moving forward. Through this project, we are providing ongoing support to teachers and students, and expanding the number of teachers who will be able to provide instruction in this area so that school will be able to offer more sections of the course in the years to follow.

Northeast Florida is in the fourth year of our regional partnership with the nonprofit organization, Code.org. Code.org has funded the first three years of this partnership for implementing a middle school course, Computer Science Discoveries, and a high school course, Advanced Placement Computer Science Principals, and a general education course, Computer Science Principals. The graph below shows the number of students who are now proficient in northeast Florida as a result of the work of this partnership. These data is provided by Code.org. Through the work of this project, the region is able to continue this work,





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

providing follow up workshops to teacher trained and providing instruction in computer science to students across our region, and extending to the panhandle. Two fall workshops were held for teachers actively teaching computer science to middle and high school students.

Principles of physical computing were introduced to teachers in the first workshop by LEGO education. Teachers in attendance returned to their schools with a robot to use in the classroom to apply to these concepts.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Computer Science in Elementary School continues to be funded by our regional partnership with Code.org. We continue to build capacity in elementary schools train teachers to provide an introduction to computer science beginning with our youngest learners.



Hour of Code

The first week of December is known as National Computer Science Education Week. Students all around the world are invited to participate in a coding experience for one hour at some time during the week. This year, participation in our region occurred all at record breaking levels, leading to national recognition of the efforts. Highlighted below of are some of the successes.

Hour of Code in Clay County

Clay County School District had 100% of the schools, with over 27,000 students, participate in the Hour of Code. STEM2 Hub worked with the district to collect numbers, school by school, and the schools also reported the plan describing how they



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

accomplished this incredible level of participation. This data will be used to create a blueprint for the region for the 2019 Hour of Code, providing ideas for how every district in the region can achieve 100% participation.

Clay County Codes!



Hour of Code in Putnam County

During National Computer Science Week 2018, Learning Blade launched the Hour of Learning Blade, which utilized the express version Hack Attack mission to introduce students to CS careers. The most active partner in Hour of Learning Blade in the



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

country was Putnam County. During Hour of Learning Blade, 9 Putnam County schools with 636 students logged in completing 2,424 lessons using the Learning Blade Hack Attack Mission.

Hour of Code in St. Johns County

St. Johns County leadership represented our region as an invited guest of Code.org to attend the National Kick-Off Summit in Seattle this year. Emily Harrison, director of career and technical education, heard directly from Brad Smith, president of Microsoft, and Melinda Gates, of the Bill and Melinda Gates Foundation about the critical importance of computer science. The event was covered live through social media. The commitment Saint Johns County and of our region was spotlighted and highlighted to the world.



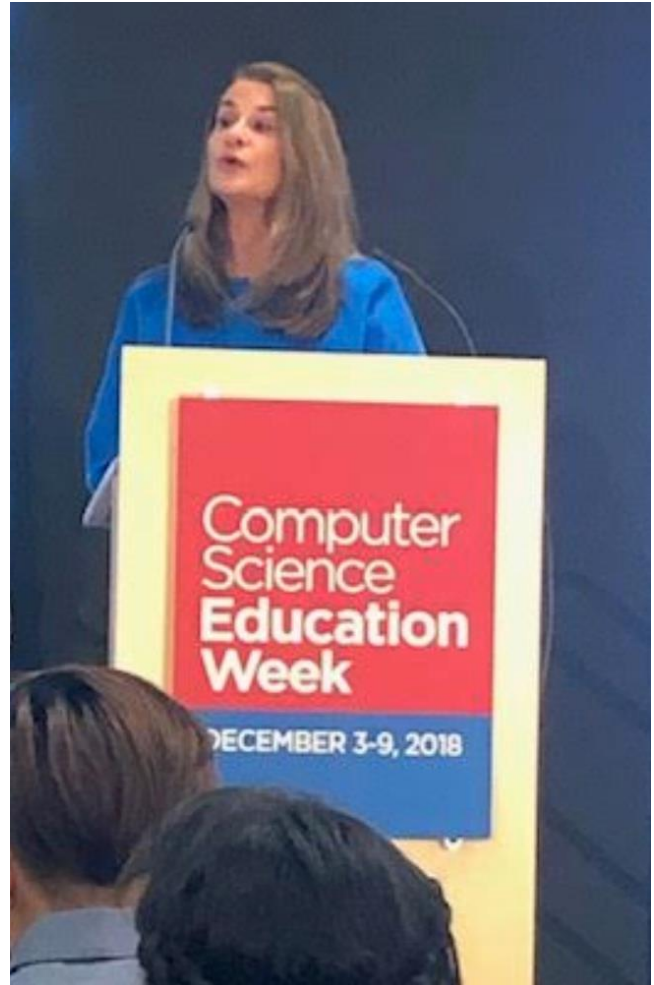


***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Over 12,500 students in St. Johns County participated in the Hour of Code through their media centers in the schools.

Computer Science Networking Event

The second annual Computer Science Networking Event took place in December at the Museum of Science and History, the MOSH, in Jacksonville. Members of the Jacksonville business community at the CIO level came out to interact with school principals and guidance counselors so that school and district leaders would hear directly from the business community about the needs for computer science to be aggressively scaled in schools to fill the need for STEM ready graduates. Great networking occurred and new partnerships were developed. Approximately 55 people, representing Baker, Clay, Nassau, Putnam, St. Johns, and Duval Counties were in attendance. Emily Harrison, of St. Johns County, shared her commitment and inspiration from her travels as the guest of Code.org.



Pilot Projects Underway

Mixed and Virtual Reality Pilot

The jobs of tomorrow are changing and new, cutting edge technologies will make a difference in so many of the industries in our area. Mixed and virtual reality systems provide multiple lenses by which to view the workplace. Applications for these technologies include medicine, construction, and manufacturing, as well as general applications. For example, Augmented Reality industrial application for wearables such



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

as smart glasses and helmets which supports operators with step-by-step instructions using text, icons, images, 3D models and animations to complete specific tasks. This allows workers to access, capture and send digital information about the activity in real time, and receive expert instruction from a project supervisor in a remote location. There are many applications for this technology, and, according to Forbes, the costs saving measures for industry will be tremendous. In fact, without the adoption and implementation of these technologies, it is likely that a business will not be competitive unless these immersive technologies are adopted and implement.

To prepare our students for the 21st century workforce, they must be aware of these technologies, know how to use them, and even more, students must have the opportunity to learn to develop apps for these devices. Thanks to our partnership with Microsoft, we are piloting this cutting edge technology at Andrew Jackson High School in Duval County. Students are using virtual reality headsets to develop content in the Computer Science and Gaming classes.



FIRSTCOASTNEWS.COM

HoloLens technology, mixed reality glasses gets local high school ready for the future



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Students in the Health Sciences Academy are using mixed reality and HoloLens technology to study the human body by exploring in a virtual setting. Students are also using the equipment in a mock surgery allowing them to have experiences that would never be possible without access to this technology. Recently, the FDA approved the Microsoft HoloLens as a presurgical planning tool. Images from patient MRI's are now being rendered in an augmented reality setting where a surgeon can explore all surgical options. Our students are truly being given a tremendous advantage through exposure to this technology.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Spotlighted Club - Girls in IT

Throughout this project, numerous after school clubs have been started to expand access to high quality experiences for students to increase interest in critical STEM careers. Utilizing equipment provided to Andrew Jackson High School, a club formed at this school. Females, especially those from minority groups are underrepresented the tech field. Andrew Jackson High School is home to two academy programs that have a strong focus on critical technology fields, cybersecurity and gaming/animation. The Girls in IT club was formed to provide support to the young ladies in these academies to foster love of the field, as well as form a cohort of women to mentor the young ladies. Members of the business community, and institutions of higher education have come together to support these girls. Partners include Acosta, Citi, University of North Florida, College of Computer Science,



At the conclusion of the December meeting, through a private funding source, all 20 of the girls were presented with a refurbished laptop computer of their own, giving them at home access to all of their school resources. This is part of a sister project of the STEM2 Hub called “***Closing the Digital Divide***”.





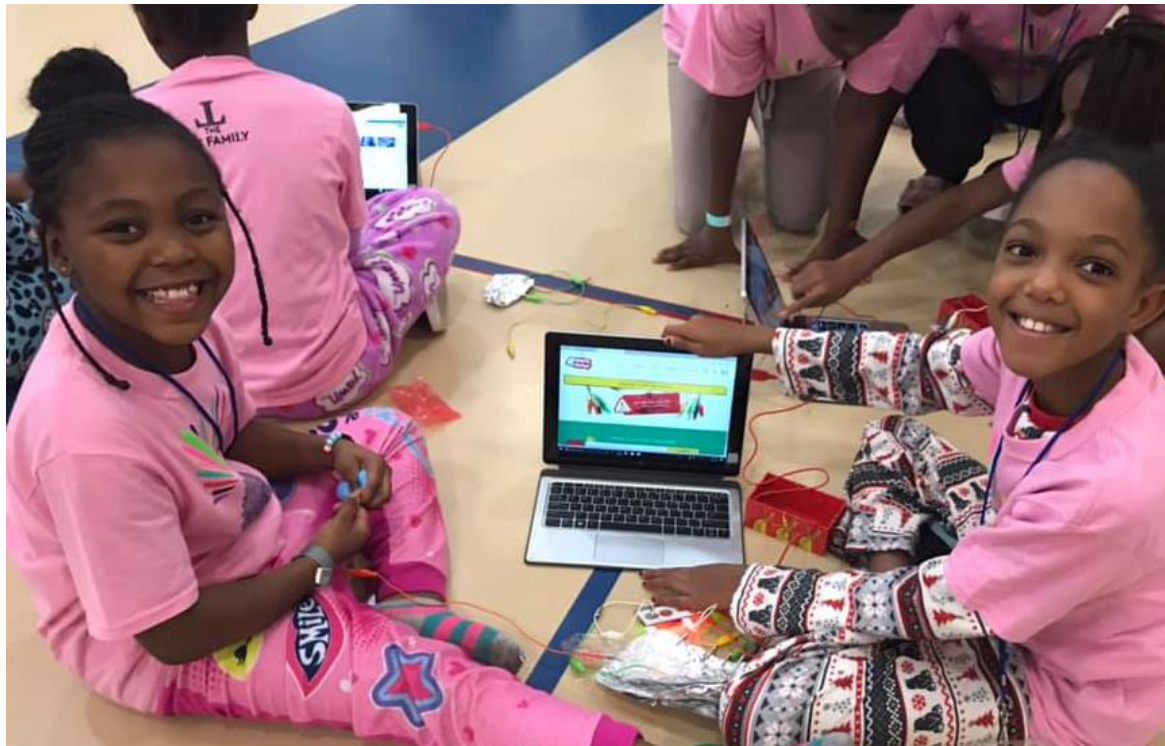
***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Spotlighted Club – CyberPatriots Pilot

Cybersecurity is amongst the most critical areas for assuring business, personal, and national security. Early introduction to cybersecurity career exploration allow students to build awareness of this critical field. At the start of the school year we began a pilot of the US Airforce CyberPatriots program. At Ridgeview High School, in Clay County, three competitive teams were formed. The project is progressing well, and each team will be competing in the spring.

Spotlighted Event - Police Athletic League STEM Event

The STEM2 Hub staff partnered with the Police Athletic League to incorporate STEM activities into an overnight student event for 200 girls ranging from elementary school through high school. At the event, the girls participated in rotations between STEM and literacy, self-care, and writing activities. There were four STEM rotations that the girls participated in.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

In the morning, through a private funding source, all 200 of the girls were presented with a refurbished laptop computer of their own, giving them at home access to all of their school resources. This is part of a sister project of the STEM2 Hub called “***Closing the Digital Divide***”.

Career Exploration and Readiness

All the experiences that students are having as a result of this project is building engagement and interest in STEM Careers. The Learning Blade tool is giving students a platform to study the multiple careers within any single pathway. Learning Blade is an online curriculum for middle and early high schools that is uniquely focused on increasing awareness and interest in STEM careers. Learning Blade provides exposure to STEM careers and provides lessons that are individually linked to specific academic skills and are aligned to the Florida Standards for science, math, English, and social studies.

Over 100 schools and multiple afterschool programs have access to Learning Blade as a result of this project. Districts have begun implementation and continued to come on board over the course of the fall semester. Learning Blade has provided 11 in person trainings to teachers across the region, and 28 downloads of the on-line training materials have been downloaded by teachers in the region. By the end of the first semester, students have completed 36,671 lessons and 5,129 hours of engagement have been logged.

Increase in Active Usage

453% increase in STEM lessons completed since last report of October 15, 2018

136% increase in active students since last report of October 15, 2018

Outcomes are measured by surveys administered before and after each experience. Learning Blade’s student survey found that 45% of students say they learned new things about English topics in Learning Blade while 50% of students say they learned



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

new math skills in Learning Blade. Other year to date local outcomes are represented below.



Intel Math Professional Development Facilitator Training

Competency in mathematics is required in many of the jobs of the future. A lack of proficiency in mathematics closes doors for students for careers in computer science and coding, as well as many STEM careers, including engineering, medicine, and physics. Lack of a strong mathematical competency limits entry into fields outside of STEM including finance and accounting, actuarial studies, and many manufacturing jobs. There are even disadvantages for students in their strength in managing their own financial decisions as the move from formal schooling to the workforce.

Mathematics achievement in Florida, and specifically in Northeast Florida, is not where it is needed to be. Data from the Florida State Assessment (FSA) reveals startling data. Many students are not being given adequate preparation in the area of mathematics in elementary schools. An analysis of the Florida state standards assessment revealed that only 58% of students in the third through fifth grade levels tested proficient in mathematics in 2016, and only 61% tested proficient in mathematics in 2017. Further, only 56% of students in grades six through eight tested proficient in mathematics in 2016, and only 57% tested proficient in mathematics in 2017. As students progress from elementary school to middle school, proficiency, as measured by the state assessment, drops. The problem continues to worsen as students reach algebra, with only 60% of students achieving proficiency in 2017 in all grades. Deeper analysis of these data indicate that the 60% statewide proficiency rate breaks down into two categories: students who are accelerated and students who are not accelerated. The accelerated students are those who take algebra in grades four through eight.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Overall, the first-time pass rate for this group of students was 88% in

2016 and 89% in 2017. Those students who took the algebra assessment in grades nine through twelve had an overall pass rate of only 36% in 2016, and 42% in 2017.

Northeast Florida Mathematics Achievement by Grade Groupings, 2017 Administration

District	FSA Grades 3 – 5	All Grades 6 – 8	Algebra I Grades 9 - 12
Baker	68%	54%	54%
Clay	63%	66%	58%
Duval	61%	49%	55%
Flagler	65%	65%	55%
Nassau	79%	68%	53%
Putnam	49%	36%	36%
St. Johns	81%	80%	66%

Many students in Northeast Florida do not possess strong content knowledge in mathematics, as evidenced by the result of the Algebra I end-of-course assessment presented above. Those students who take the assessment in ninth grade, or beyond begin to be at risk to drop out. These students fall behind in credit hours earned in mathematics and are working to catch up deep gaps in math content while attempting to build upon an already shaky foundation. Table 1, below, shows the progression of math achievement for students, by county, as they progress through the grade bands.

Teacher content knowledge in elementary mathematics is a topic which has been studied nationally for many years. Since 1998, there have been over 100 major studies that have been conducted on this subject and published in peer reviewed journals. An analysis of the findings from these studies provide evidence that there is a relationship between the conceptual understanding of key mathematical concepts of the teacher and the ability to adequately provide instruction to students.



**Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018**



Beginning in 2013, Clay County School District leadership decided to begin to address the systemic need for the professional development of teach content knowledge in mathematics. As such, the district decided to prioritize the implementation of a program that will directly support students by increasing the teacher's ability to dig into math content, identify gaps, and remediate students by pinpointing the gap and working to close them.

The work in Clay County provided compelling evidence that this professional development needs to be scaled and expanded to empower more teachers so that student proficiency in mathematics will rise, opening doors for more students, especially those typically underrepresented in the field of computer science, will have access to pathways leading to these careers.

Intel Math is designed to close the gap between insufficient mathematics training of elementary school teachers and the demands of the contemporary mathematics classroom and places emphasis on deepening the teacher participants' understanding of core K-8 mathematics concepts. Intel Math is an 80-hour professional development course in mathematics content for K-8 teachers. The program was adapted from the



Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

Vermont Math Initiative developed by Dr. Ken Gross. The course is collaboratively taught by a practicing mathematician and a mathematics educator. One of the goals of Intel Math is that teacher participants deepen their own understanding of math through problem-solving.

Intel Math is a research-based, proven-effective professional development course that deepens teacher content knowledge and helps the teachers see the vertical articulation of concepts across the grade levels. Intel Math is grounded in a problem-solving approach to topics such as integer arithmetic, the decimal number system, place value, rational number arithmetic, rates, linear equations, and functions. Connections are made throughout the course as multiple representations of solutions are examined with each problem. Pedagogy comprises approximately 10% of the course. Classroom transfer is addressed primarily through opportunities to analyze student work, and instructor modeling.

Sample Cohort Data:

Intel Math Professional Development
Growth in Teacher Content Knowledge

Teacher Code	Pretest	Posttest	Points Change	Teacher Growth	
ABN120	35.71%	52.38%	16.67	47%	
ACL071	11.90%	38.10%	26.19	220%	*
ATJ120	35.71%	71.43%	35.71	100%	*
ATL120	38.10%	52.38%	14.29	38%	
BJJ030	33.33%	66.67%	33.33	100%	*
CKT092	47.62%	80.95%	33.33	70%	
ECJ070	73.81%	85.71%	11.90	16%	
ETR101	30.95%	73.81%	42.86	138%	*
GEW016	52.38%	57.14%	4.76	9%	
GRD031	30.95%	64.29%	33.33	108%	*
JVA042	19.05%	47.62%	28.57	150%	*
LCL080	42.86%	69.05%	26.19	61%	
LJP090	76.19%	85.71%	9.52	13%	
MAJ121	83.33%	100.00%	16.67	20%	
MDB101	80.95%	90.48%	9.52	12%	
MDJ010	35.71%	64.29%	28.57	80%	
MDR061	59.52%	66.67%	7.14	12%	
MML053	52.38%	78.57%	26.19	50%	
MPP120	33.33%	66.67%	33.33	100%	*
NDR080	61.90%	95.24%	33.33	54%	
NMD091	90.48%	95.24%	4.76	5%	
NRH031	57.14%	76.19%	19.05	33%	
OSJ040	76.19%	100.00%	23.81	31%	
SLL021	35.71%	85.71%	50.00	140%	*
SSJ121	59.52%	76.19%	16.67	28%	
SJV112	100.00%	85.71%	(14.29)	-14%	
Cohort Growth	52.11%	74.08%	21.98	42%	



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Sample Cohort Data by Strand :

Intel Math Professional Development
Growth by Strand

Strand	Pretest	Posttest	Gain	Percent Gain
Add Fractions	89.3	89.3	-	0.0%
Add Fractions Problem	59.3	78.6	19.3	32.5%
Multiply Fractions	71.4	92.9	21.5	30.1%
Multiply Fractions Problem	32.1	42.9	10.8	33.6%
Subtract Fractions	64.3	75.0	10.7	16.6%
Divide Fractions	70.4	89.3	18.9	26.8%
Whole Number Equations	57.1	82.1	25.0	43.8%
Rate	69.6	78.6	9.0	12.9%
Invertibility	17.9	60.7	42.8	239.1%
Ratio	58.9	73.2	14.3	24.3%
Order of Operations	72.4	89.3	16.9	23.3%
Order of Operations	71.4	85.7	14.3	20.0%
Rate	26.8	60.7	33.9	126.5%
Distribute Expressions	69.6	96.4	26.8	38.5%
Expand Expressions	44.6	66.1	21.5	48.2%
Simplify Expressions	30.4	32.1	1.7	5.6%
Factor Expressions	41.1	55.4	14.3	34.8%
Complete Table of Values	73.2	80.4	7.2	9.8%
Write Equations	32.1	50.0	17.9	55.8%
Slope	32.1	96.4	64.3	200.3%
Graph	25.0	71.4	46.4	185.6%

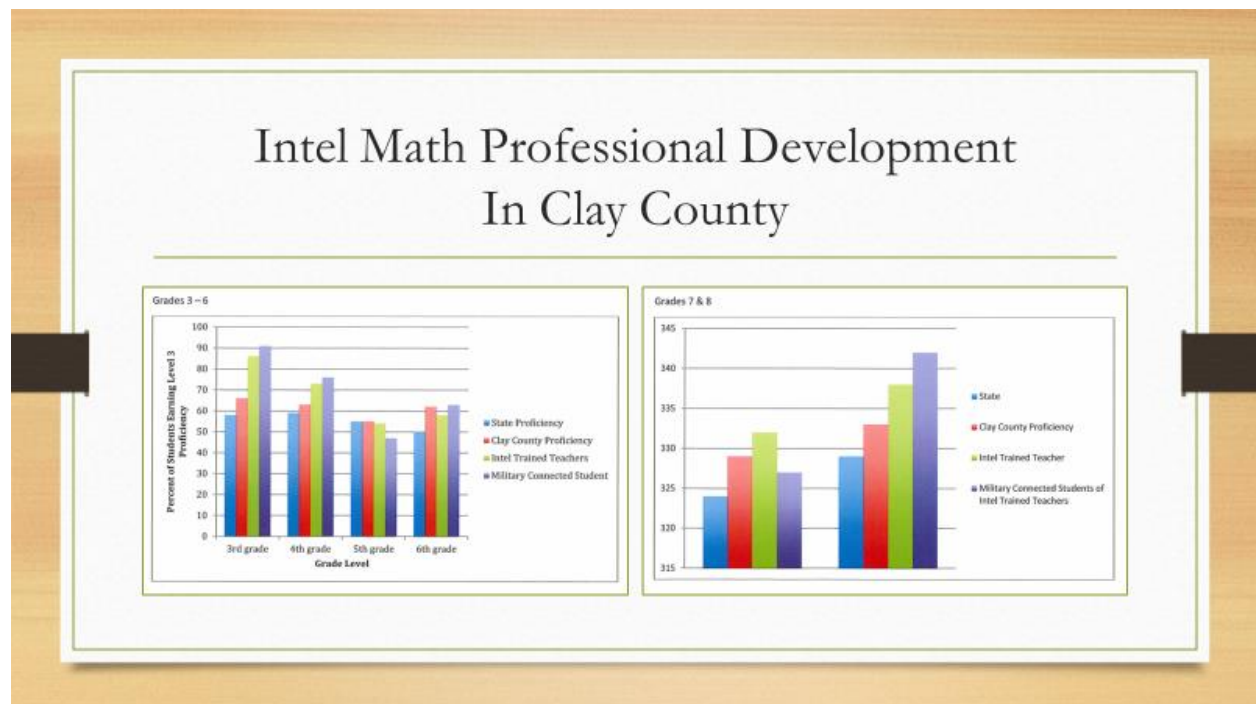


Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018

In cases where Clay County teachers have taken the INTEL Math Professional Development, the achievement gap is closing and overall proficiency is increasing. In many cases in some of the highest performing schools, students have had continuously been assigned to an Intel Math Trained teacher year after year.

Due to the success of the implementation in Clay County, it is important to begin to scale this program to other districts. Prior to this project, there were only four individuals nationally certified to provide training to teachers. During the first part of the project, the national trainers came to Jacksonville and trained 14 new instructor who are now certified to provide professional development for Intel Math. A cohort of 30 teachers is scheduled to begin in January and multiple cohorts will be run this summer in Northeast Florida.

Early implementation shown in the graph below demonstrate the potential to close student achievement gaps and raise student proficiency across our region.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Projects in Planning

Planning for STEM in Middle School

A full day workshop for middle school teachers implementing the robotics and computer science in science has been planned for January. The curriculum has been developed by a team assembled by the STEM2 Hub to cover standards alignment and pedagogy, as well as uncovering and remediating common misconceptions in the assessed science standards.

Project Based Learning

Plans have been developed to bring cross-curricular, project based learning into middle schools in Nassau County using the Defined STEM resource. Training is scheduled for February.

Planning Growth of Learning Blade

Nassau County will begin the implementation of the Learning Blade Curriculum. Teachers will be trained in early February, impacting approximately students.

After the release of the Federal Government's 5-year Strategic plan for STEM education, Learning Blade is rapidly working on a new express mission to address the needs of schools to introduce students to computer science careers and computational thinking. Early in 2019, Learning Blade will be introducing this Intro to CS Careers. All Learning Blade registered schools will have access to a 2-hour module of engaging lessons that will spark student interest in and curiosity about computer science careers and the skills needed to succeed in these.

Highlights: Mid-Year Impact:

71 Elementary Schools have implemented robotics and coding in the school day impacting **47,000 students**.

23 Middle Schools have incorporated computer science and robotics into the science block impacting **17,500 students**.

55,000 students participated in Hour of Code in the region. **27,650** students participated in Clay County.

65 new robotics teams have been launched in after school programs all around the region.

52 district administrators and **school principals** have learned to program a robot.

Capacity has been built to expand Intel Math Professional Development in the region and state.

HoloLens and Mixed Reality technologies are being piloted in the region.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Planning for Intel Math Cohort

A teacher cohort of INTEL Math is scheduled to begin in January. Plans for a full role out of multiple cohorts using the newly trained facilitators is being planned for the summer.

Planning for Drones Pilot

A middle school pilot of drone technology has been planned for February. Nassau County will be implementing at four middle schools. Putnam and St. Johns will each run a pilot in one middle school each.

Planning for 3D Printing Pilot

In the spring, a 3D printing pilot will be launched in the elementary STEM in the media center project, as well as in the middle school classrooms implementing Learning Blade.

Planning for Summer Programs, Professional Development and Camps

In partnership with Microsoft and the University of North Florida student summer camps are being planned to implement Hacking STEM curriculum.





***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***

Our region has worked together as a team, and as an ecosystem, to implement the ***Northeast Florida 21st Century Workforce Development Project***. We are looking forward to continuing our work into 2019, and building upon the work that is in progress, and planned for the spring. Should you need additional information, or have questions, please contact the STEM2 Hub's Executive Director, Kathleen Schofield, by email at kathleen@stem2hub.org or by phone at 904-502-0958. You may also visit our Facebook page to see more pictures and videos from these and other events. Please "Like" us on Facebook. @NEFLSTEM2Hub

We would also like to acknowledge and thank the following key partners in the



success of this work: The Florida Department of Education Bureau of Standards and Instruction, led by Kathy Nobles, and Chris Summers, The University of North Florida College of Education, Led by Dr. Diane Yendol-Hoppey, and the College of Computer Science, led by Dr. Chip Klostermeyer, LEGO Education, Microsoft EDU, and the Microsoft Team at the St. Johns Town Center, and WozU Education.

On behalf of all stakeholders in the region, we thank you for your commitment to our and your support as we implement this project.



***Northeast Florida 21st Century Workforce Development Project
Midyear Progress & Outcomes
July 1 through December 31, 2018***
