



Interim Outcomes Presented by:

Gary Chartrand Chairman of the Board of Directors NEFL Regional STEM2 Hub Kathleen Schofield Executive Director NEFL Regional STEM2 Hub



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 STEMrelated 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 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 implementing the programs and curricula. Stakeholder 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.

Since our inception, we worked to build a board of committed business leaders in the Jacksonville community, and to pinpoint and target areas of the greatest need to begin this work. We began our work with a study of the State of STEM and held a kick-off event to share the findings with the community. Then, we got to work. We began in the after school arena with a focus in robotics. Through this project, our work continues to



advance beyond the after school setting, with the foundations of infusion into the school day through resource and media, science and math, and career/technical education programs. As the project continues to advance, we aim to develop a mindset of STEM learning across the school day through deliberate integration of meaningful and engaging STEM projects and advance the school climate of innovation and creativity.

We recognized the critical need to bring high quality computer science experiences to our region, so we fostered a partnership with the national nonprofit, Code.org, while they were still in their infancy. We began with two facilitators in our region introducing coding to elementary teachers, and now have blossomed into a full pathway continuing to offer Computer Science Fundamentals to elementary school teachers and expanded the program to include a middle school course (Computer Science Fundamentals) and high school courses (Advanced Placement and General Ed Computer Science Principles). We have gotten course codes added to the state catalogue so that these courses can be widely offered all around the state. Planning for summer teacher professional development to increase the impact of this work is currently underway. We also recognize that mathematics is critical for success in the computer science and tech fields, therefore we supported the expansion of Math Counts across our region, as well as the continued development of strong teachers to provide instruction to our students in mathematics so that we may empower students toward limitless options as they follow their passion from school to career.

In our second year, we applied to and joined the National STEM Learning Ecosystems work. We now are one of the forefront communities leading the national work and sharing our experiences at the national level. We also have the opportunity to learn about the great work that is being done around the nation and bring ideas back to Jacksonville. As the nation looks to STEM ecosystems as part of the newly released National STEM 5-Year Plan, we are closely following that work, gleaning best practices and bringing those best ideas here to the region.

During our earlier years, we began to build a foundation that would enable us to receive state funding to accelerate our work. The 2018-19 budget year yielded positive results of the appropriation process. We were awarded the Northeast Florida 21st Century Workforce Development Program.

We are pleased to present our continued progress.

The following pages discuss project interim outcomes from January through April of 2019 as we continue to build upon the work previously reported.



Thanks to this funding and our initiatives, we are accelerating access and equity in STEM + Computer Science learning for students across the region. We continue to strengthen and develop partnerships with companies such as MIT Media Center, Lego Education, Code.org, and Microsoft. Through our partnership with Microsoft, we will be implementing Hacking STEM into both our upcoming summer camps, as well as into teacher professional development. Due to the depth of this partnership, we will have an unprecedented opportunity to participate and build solution alongside Microsoft builders and engineers in the near future that will have a profound positive impact on the nature of STEM education in our region and state



Microsoft Military Affairs partnered with the SITEM2 Hub to bring Youth Spark event to local military connected students.

during the global hack-a-thon. We continue to expand our partnership with WozU Education, bringing career facing drones pathways into our schools, as we are now exploring cybersecurity and other pathways that have been developed. Many of our partners are providing in-kind programs and services to us at no charge to our project to help enhance and amplify the work happening across our region.

Ongoing Projects:

After School Robotics

Robotics 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 initial competitive level of the FIRST program. Students use an EV2 robot to learn to code and prepare for competitions. 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.

Our approach to implementation of this program was to work with community partners and school districts to directly fund or reimburse fees for new teams to be established.



Registration fees, and equipment costs were covered, and the district or organization provided teacher or staff compensation to the mentor of 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 1,000 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.

A total of 65 new robotics clubs & teams had been successfully 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 interested 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 amongst those who have funded this stipend for every school. We continue to work with after school programs in Duval County to expand access. 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: 2018-19 Season in Review:

The 2018 – 19 Robotics Competitive Season reached new heights in Northeast Florida. The season began with 300 students from all areas of the region attending the state kick-off event at Kennedy Space Center, an appropriate location for the overarching theme of Space Exploration.

The students who were able to attend have reflected on this experience throughout the year. In their projects for the competition season, there were no shortages of examples from the students who had applied the knowledge that they gained into their project for the robotics season. Dehydrated proteins, sources of fruit, ways to grow food in the confines of a space mission, engineered and 3D renderings of student projects were represented at every event. Community members and official judges often reported that when speaking with students, the students described how speaking with an astronaut while visiting the space center, gave them the inspiration for their project.



New teams were developed all around the region. Ongoing support was provided throughout the season. Dozens of competitions have taken place, with many of our teams winning awards, and moving on to regional, state, and national competitions.



Pictured are the Luna-Tics, an all-girl team comprised of girls from a Girl Scout Troop from Flagler County. The girls combined forces to include girls from four troops representing three grade levels under the mentorship of two girl scout leaders! These girls made it all the way to the state championship where they won second place in the category of research!

A summary of the total number of First Lego League Teams is provided below. This represents a strong commitment of our partner, Renaissance Jax, our school districts and colleges, and our business community and STEM2 Hub Board.

•		
	0145	
	DEA Xa	Nome INSERT ARADO ADMAINS HIGH LUMAN

County	Number of First Lego League Teams (FLL)
	(Grades 4 – 8)
Baker	2
Clay	27
Duval	103
Flagler	6
Nassau	4
Putnam	10
St. Johns	19
Region:	171

Pictured to the left is Fleming Island High School Junior, Katelyn Ludlam, with her coach, Rachael Schofield, who is a world language teacher. Katelyn is a Girl Scout and the founder of a student chapter of the



Society for Women Engineers (SWE) was nominated for Dean's List and will be representing our program at the World Event in Houston, Texas.

In Duval County alone, working through after school community partner organizations, we recruited and trained mentors, provided equipment and registration fees, plus ongoing training and support, for new robotics programs at the following locations.

Summary Data for STEM2 Hub's Support to

FIRST Lego League Robotics "Into Orbit" 2018-2019 Season

The STEM2 Hub Support 103 FIRST Lego League Teams this Season

- 51 Teams 1st-time registered with *FIRST*[©] Lego League
- 92 Teams supported with EV3 Lego Core and/or Expansion Robot Kits and/or Into Orbit Challenge Kits:
 - o 19 St. John's County
 - o 12 Putnam County
 - 35 Duval County (20 Boys & Girls Clubs of NE FL; 11 Communities-in-Schools; 4 YMCA)
 - o 26 Clay County
 - o 2 Baker County
- 12 Team's registrations supported to the Regional and State Tournaments
- 8 FLL Jr. Robotics Teams/2 Schools supported in Baker County. 2 teams won awards at their tournament. Both are Title 1 Schools.

NOTE: Nassau County's Boys and Girls Clubs will participate in STEM2 Hub's 2019 STEM Summer Camps at A. Phillip Randolph and Andrew Jackson High Schools (An additional 10 Robot Kits).





Team that Advanced to the State Championship

• 38133 The Luna-Tics (Girl Scouts) – Won Project Research 2nd Place

Teams Won an Award at the Regional Championship

- 38133 The Luna-Tics (Girl Scouts) Strategy and Innovation 1st Place
- 25919 Team Thunder BEST Academy Project Research 2nd Place
- 25923 Team Lightning BEST Academy Project Presentation 1st Place
- Rocking Robo Narwhals (Girl Scouts) Global Innovation Award
- MaliVal Exotic Robotics Judge's Award

Teams that advanced to the Regional Championship

- 25919 Team Thunder BEST Academy
- 25923 Team Lightning BEST Academy
- 31980 Orange Eaters (Girl Scouts)
- Rocking Robo Narwhals (Girl Scouts)
- 38133 The Luna-Tics (Girl Scouts)
- 42243 Winston YMCA Gamma Bots
- 6816 Paterson Elementary
- 6813 Argyle Elementary
- 43131 McRae Elementary
- 27588 Rideout Elementary



- 32849 JEB Stuart Middle
- Baker Bots

Teams That Won an Award at their Qualifier Tournament

- *25919 Team Thunder BEST Academy Champions Award
- *31980 Orange Eaters (Girl Scouts) Champions Award
- *MaliVal Exotic Robotics Champions Award
- *25923 Team Lightning BEST Academy Research Project
- 42240 Brooks YMCA Team Eclipse Project
- 7442 Orange Park Elementary Project
- *36212 Rocking Robo Narwhals (Girl Scouts) Project
- *42243 Winston YMCA Gamma Bots Robot Design
- 28674 Gamble Rogers Robotics Robot Design
- Baker Bots Core Values
- 6816 Paterson Elementary Core Values
- 20652 Wilkinson Elementary Core Values
- *38133 The Luna-Tics (Girl Scouts) Core Values
- *32851 Matthew Gilbert Core Values
- *41629 Northwestern Yellow Jackie Bots Rising Star
- 29349 Charles E. Bennet Elementary Rising Star
- 43131 McRae Elementary Rising Star
- 42907 IES Ramming Rams Rising Star
- 42911 Melrose Star Horse Rising Star
- 42908 James Long Rising Star
- 27004 High Tech Hunt Judges' Award
- *41838 ACA Eagles Judges' Award
- *42912 Moseley The Mighty Marlins Judges' Award
- *Jean Ribault Elite Squad Judges' Award
- 18560 Keystone Heights Elementary Qualifier Specific Award





The Raiderbots competed hard, scoring all possible points on EVERY mission attempted on the competition field!

As much as we provided support through our after school and community partners for this growth in programs and access, we continued to support growth of the programs in the surrounding counties. Putnam County, through our programs, and the coordination of other projects, now has a robotics competitive team in each of its 10 elementary schools. Saint Johns County continues to grow access, with teams in 19 schools. To build the competitive edge, teams will continue to work in a club setting for the

remainder of the school year. Baker County now has two competitive teams, with one team, the Baker Bots making it all to the regional championship.

Detailed data for the surrounding districts will be provided in the final report. And the journey is not yet over for several of our local teams who continue to compete. Results for state and national events will be discussed in the final report for the year.





Empowering Girls through Partnership with Girl Scouts of Gateway Council



At the conclusion of the season, students were administered a retrospective student survey to reflect upo their experiences. Results are as follows:



STEM in the School Day

To achieve the overarching purpose of this project, which 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 we must bring these skills and programs into the school day so that, eventually, all learners will be availed these opportunities and exposures. To this end, we are continuing to work with our school and district partners to align our work to impact the school day. The identified workforce-ready careers skills and dispositions that we continue to build include computer science and coding, competency in mathematics, and introductions to cutting edge and immerging technologies that are now beginning to enter the workforce and change the career outlooks. To continue this work, we are building upon projects that we began in the earlier part of the year, and – as planned – bring them into the next stages for capacity building.



STEM in the Elementary Media Center - Coding & 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, and 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 project 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.

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. Continued support for this work is being provided to the 71 media specialists and district leaders through continued professional development. From the initial 3-day



professional learning experience, teachers left the training with equipment to take back to their schools for immediate implementation. Prior to bringing the teachers back together for the second iteration of the training, a survey was distributed to ask for what is working, and what challenges exist in the implementation so that the correct support can be provided for participants. Excerpts from that report are provided below.

How are you using your equipment?	Greatest success?	Challenges?	What support do you need?	Suggestions for future trainings.	How many use materials regularly?
We are coding, building and designing, using in science with motion lesson, using in after school Lego club, and for competition with FLL Jr and FLL,	My students are learning how to construct robots that move and code the movements/acti vities on their own without teacher assistance	Not having enough for an entire class set. I would like to have the groups be smaller.	More 1x1 hands on activities - where we can manipulate our own so as to run through the errors and processing.	More opportunities to attend coding workshops to get more hands-on experiences with robotics and coding.	600
One of the main and core ways we are using the materials is in the classrooms to aid students in comprehending and understanding standards in which the equipment can correlate with. We are also helping the students use the equipment to stimulate their creativity while in the media center when possible and able to show simple motion mechanics and such to even the lowest grade levels.	Engagement and teaching concepts with hands-on experience. ex: students find parts that move, find and sort gears, connect parts to make other parts move, build using task cards, build an object that moves	Storage is a challenge.	I would like to see more tutorials available to help our students with visual support on missions/explora tion to show them examples to stimulate their imagination and ideas on their creations.	I would like to know about any new information for the 2019/2020 school year, so we are able to prepare for the upcoming year.	530



We have used the LEGO STEAM Park with the K and 1 student. One example of using it was with the book, "The Storybook Knight". After reading the book, students used the Legos to build a castle.	Helping students with learning challenges to better understand and comprehend classroom material through the presentation and use of the STEM 2 materials, having visual aid and good representation to align with the different curriculum's in the classrooms.	Keeping the kits organized and pieces together, which is a given with the smaller materials involved.	Some print outs and suggestions for use and trouble shooting.	More training or time to practice with support so I can become more proficient in using the materials.	430
We have also used the Makey Makey circuits. Students explored making circuits and tried to answer the question, "How does the Makey Makey work?" We discussed terms like, circuit, open and closed circuits, conductor, and insulator.	Students are engaged and become very excited when they use their creativity to build different creations. I also like to implement different subject areas, using vocabulary that students will need.	More materials to help cover our class sizes.	Lesson ideas for 20 min. blocksideas to use with small groups or large groups how to use one or two kits with that amount of time	It's a great opportunity, all teachers should get the opportunity to participate, including the regular classroom teachers	500

An analysis of the need shows that these media specialists, who are not STEM teachers, or math/science teachers by profession, are engaged in teaching standards that cross into the STEM content areas. They recognize the need for more training and support in both coding and robotics, as well as in content development. They also are loving using the materials with their students but have identified the need for the ratio of student to equipment to be much smaller. Some media centers are using a rotation model, while others are working with larger groups using a whole-class model. In either case, there is a need to increase access to the amount of equipment available to the teachers. In addition to this, teachers have identified the benefits to having classroom teachers become trained in the model so that infusion into the classroom can occur.



This teacher-identified strategy leads well into the next phase of the project, which is to build capacity through demonstration schools.

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 built 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.



MIT's Mitch Resnick lends his thoughts to the visual representation of Schofield's visual logic model for systems transformation.

To plan for the capacity building through the establishment of demonstration schools. time was taken to review all the data collected throughout the trainings, and to discuss with district leadership in the initial districts moving to this model. Schools most ready have been identified, and equipment has been ordered to build capacity for the implementation of the learning tools. Training plans are in the process of being made and will take place so that the first classroom lessons will take place during the 4th 9-week period in the schools.

The STEM2 Hub has had several high-level planning meetings and has consulted with national experts to develop a model for grade level

appropriate experiences that are fully aligned to Florida standards across the curriculum. A theory of change and a logic model have been developed to guide the implementation of the next phase of project, building upon the prior work undertaken.



Northeast Florida Regional STEM2 Hub STEM/Robotics + Computer Science Infusion Logic Model Systems Capacity Building Model

			Outcomes	
Inputs	Activities	Short Term	Long Term	Systems
District Admin	Training (How do I use this?)	Teacher Self Efficacy	Teachers Self Facilitate	Increase Proficiency in Algebra I (9 th Grade)
School Admin Media Specialists	Professional Development (Why do I use this?)	Teacher Confidence	Increased Participation in URM, particularly females	Increased enrollment in JH Algebra I
Classroom Teachers	Lesson Study (What does it Look Like?)	Teacher Competence	Growth in FSA Scores	Increased Enrollment in CS Courses
Intel Math	Site Visits	Teacher Attitudes	Entry Point in New State Assessments	Increased Proficiency in CS Courses
MIT/Scratch	Feedback Cycle	Student Attitudes	Increased Enrollment in	Increased Demand for High Level Math
LEGO/Spike			C3 Courses	Courses
Robots Code.org	Classroom Instruction	Student Collaborations	Increased Proficiency in CS Courses	Increased Teacher Quality in STEM Content Areas
g				
Hacking STEM	Competitions	Student Engagement		Increased Participation in STEM +CS Careers
WozU Cyber	Entrepreneurship Hackathons	Student Career		
Biomimicry	Shifts in Methods Class Instruction	Interest		
Preservice				
Faculty	Shifts in Field			
Preservice Teachers	and Internship Experiences			
				l



Two districts did not fully participate in the first implementation of the elementary media center project because they had chosen to begin the journey with us with a different area of focus. They each have now collaborated with us to develop a modified implementation strategy that will allow them to join into this successful region-wide model. Those two districts are St. Johns County and Duval County.

Saint Johns County: While initially only sending a district STEM leader to attend the media center training to bring the ideas back to the county and discuss the strategy, through conversation and collaboration, they now wish to fully engage in implementing a media center STEM strategy. Working with the district, we have developed a plan for a centrally-based STEM lending library. In addition to this, through a STEM elective on the resource wheel, one elementary school will be coming onboard immediately to implement the Demonstration School model. This will occur while simultaneously while infusing the new robotics strategies into all media centers across the district.

Duval County: Charter schools in Duval County will be implementing the elementary media model in the upcoming round of districts, and one school in the urban core will also be selected to implement the program in the elementary schools immediately. Under the leadership of Dr. Diana Green, the district will continue to work with the STEM2 Hub team around the strong secondary implementations that were begun at the beginning of the project year and will work on expansion plans into the critical elementary areas.

Secondary School Implementations:

Led by Superintendent, Dr. Diana Green, Duval County Public Schools serves over 125,000 students attending just under 150 public schools, along with multiple highquality 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 though 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 so that the team could receive feedback and suggestions to fine tune the plan that was developed collaboratively with the district leadership team. Twenty-two middle schools signed on to pilot the integration of coding and robotics into the school day through the science block. Dates for full day trainings were set and trainings were provided to 61 Duval county science teachers who reach almost 10,000 students. The trainings were held at



the University of North Florida, and were widely attended, and enthusiastically received by participants. Due to the presence of deeply held misconceptions in science, the January training was developed to address underlying concepts that supported the infusion of robotics into the science curriculum.

January 25 2019

8:30 am - 3:30 pm

Welcome : Please sign in and see your group designation, A, B or C, by your name on the sign in sheet for today's workshop. You will be given a participant code, please hold onto it all day as you will need it at day's end. Please stay with your assigned group to ensure PD credits.

Rotations:

(Approximately two hour sessions. Each teacher will rotate through each section in their assigned group)

- Instructional Practice/Cognitive Complexity
- Standards Aligned Comprehension Strategies

Velez/Watson Fox Schofield/Conklin

Background Knowledge/ Misconceptions

Session and Times	8:30- 10:30	10:35- 12:30	12:30-1:15 Lunch	1:20- 3:30
<u>Instructional Practice -</u> Room 2520-Second Floor	Group A	Group C	All	Group B
<u>Misconceptions</u> Room 3614- Third Floor Dean's Conference Room	Group B	Group A	All	Group C
<u>Standards Strategies</u> Room 1210- First Floor	Group C	Group B	All	Group A

Recently, Dr. Green has met with the STEM2 Hub and her district leadership to begin planning for the infusion of drone technology and cybersecurity pathways to become embedded into key feeder patterns around the city. This work will integrate the WozU curriculum pathways that are presently being piloted in surrounding counties, using a combination of funding sources.



Administrator Professional Development – Leadership is a Critical Component

Previously, we reported that 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.

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." The media attention that this event received, and the impact of the training on the school leaders was so positive that other districts asked to have similar training for their leadership teams.

Putnam Schools Department of Federal Programs April 4 at 2:34 PM · 📀

Middleton Burney Elementary students are tomorrow's innovators. Thanks to instructor David Hughes and Principal Joe Theobold for your dedication to STEM education in Putnam Putnam County School District Northeast Florida Regional STEM2 Hub





In April, in **Putnam County ALL School Principals** and **District Administrators** gathered for an all-day STEM Extravaganza Event, with similar overarching themes to the November administrator training in Clay County. At this event, new STEM learning experiences, both low and high tech, were introduced to the leaders. All participants built and coded a robot, learned about machine learning and artificial intelligence by playing challenging games against an Anki Cozmo robot, demonstrating machine learning, flew a drone, and explored engineering design principles through an environmental science framework through concepts of biomimicry and a STEM lesson from Project Lemon Tree. Additionally, as we implemented the drone pilot roll out in areas in

Nassau County, Putnam County, and St. Johns County, leadership training was



provided to principals implementing the curriculum in their schools, as well as for district leadership.

MOSH Outreach

We previously reported that bringing interactive and engaging experiences to students



Teams "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 and exploration/data collection continue from there.

utilizing a standard-aligned approach that is highly engaging is an important strategy for helping students build interest in STEM classes and careers. Informal educational settings, such as the MOSH, are the perfect place for these experiences to take place. Many Duval County Schools visit the MOSH to have the experiences, however, due to the high cost of transportation, it is not feasible to bring all students from surrounding areas to the MOSH.

For this purpose, the MOSH developed a program called Red Rover Robotics for this project, a standards-based experience. The detailed standards alignment and the lesson plan for the outreach were shared in the previous report. During the last reporting period, this program was brought to all fifth-grade

students in every St. John's County elementary school. Over 3,200 students and 145 teachers have been impacted by this project. It is important to note that, through other private funding sources, this same experience has been made available to students in Putnam, Baker, and Clay counties, expanding access and scaling the best practices from this work to reach many as another 8,500 students across the region.

Further, we are pleased to report that this outreach will be infused into upcoming summer camps so that even more students, especially those in the urban core, will benefit from the development of this standards-aligned, engaging and impactful experience.



Career Exploration and Readiness through Learning Blade:

Over 100 schools and multiple after school 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. By the end of December, Learning Blade had provided 11 in person trainings to teachers across the region, and 28 downloads of the on-line training materials have been accessed 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.

All these 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.

Through April 29th, implementation of the curriculum has continued to grow explosively, with 103,966 STEM lessons completed for the year, which is up by 67,295 lessons in just the first four months of 2019.

184% Increase in STEM lessons completed since December 2018 (as of 4-2019) 41% **Increase** in STEM lessons completed in the past month!

Outcomes are measured by surveys administered before and after each experience.



The Learning Blade student survey found that 45% of students say they learned new things about English topics as they engaged with the curriculum, while 50% of students say they learned new math skills in Learning Blade. Other year to date outcomes are represented below.



The Learning Blade curriculum is engaging our students and helping them understand different pathways to a STEM career. The in-depth exploration in a game-based setting is causing increases in the affective domain, as well as in the cognitive domain around understanding of STEM content. This is especially true in the area of mathematics. The number of students expressing interest in becoming an engineer and/or scientist has doubled, while students are seeing the connection between what they are learning in school and to potential career pathways.

79% Increase In students recognizing "Math is helpful when solving interesting problems."

69% Increase In students recognizing "What I learn in school will be useful later in life."

56% Increase In students interested in **taking advanced math classes** in high school.

This growth in student
perceived value to
engaging in
mathematics and
understand how
mathematics is a
useful tool when
solving problems and
will be applied in life
represents a

substantial breakthrough in student attitude. That, coupled with deepened exposure to mathematical thinking through computer science and robotics applications offers great promise for the implications for workforce and career pathway development.

Computer Science

Computer science is one of the most critical needs 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 schools 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 Principles, and a general education course, Computer Science Principles. We have built capacity in teachers around the region to introduce computer science to the youngest of students beginning with curriculum that is both digital and off-line (or unplugged) which teaches children as young as pre-K and kindergarten serious content and early computer science and computational thinking concepts.

The graph represents the number of students who are now proficient in northeast Florida as a result of the work of this partnership.

These data were provided by Code.org. Through this project, we are able to continue building capacity by providing follow up workshops to teachers who providing instruction in computer science across our region, and extending to the panhandle. Two fall workshops were held for teachers actively providing instruction in computer science to middle and high school students.





By another measure, and as a result of these efforts, several of our high schools were recognized by the College Board for Diversity in Computer Science.

College Board's AP Computer Science Female Diversity Award recognizes schools that are closing the gender gap and engaging more female students in computer science coursework in AP Computer Science Principles (AP CSP) and AP Computer Science A (AP CSA). Specifically, College Board is honoring schools who reached 50% or higher female representation in either of the two AP computer science courses in 2018, or whose percentage of the female examinees met or exceeded that of the school's female population in 2018. Out of more than 18,000 secondary schools worldwide that offer AP courses, only 685 schools (less than 4%) have achieved this important result.

College Board's AP Computer Science Female Diversity Award 1. AP CSA Archbishop Edward A. McCarthy High School FL 2. AP CSA F. W. Buchholz High School FL 3. AP CSA First Academy FL 4. AP CSA Hollywood Hills High School FL 5. AP CSP Academy of the Holy Names FL 6. AP CSP Atlantic Technical High School FL 7. AP CSP Carrollton Sacred Heart School FL

- 8. AP CSP Crescent City Junior Senior High School FL
- 9. AP CSP Deerfield Beach High School FL
- 10. AAP CSP Dixie Hollins High School FL 11.AP CSP Edward H. White High School FL 12. AP CSP Faith Christian Academy FL 13. AP CSP Fort Pierce Westwood High School FL 14. AP CSP Jean Ribault Senior High School FL 15. AP CSP Jones High School FL 16. AP CSP Millennium 6-12 Collegiate Academy FL 17 AP CSP Monarch High School FL 18. AP CSP Montverde Academy FL 19. AP CSP Northeast High School FL 20. AP CSP Our Lady of Lourdes Academy FL 21. AP CSP Oviedo High School FL 22. AP CSP Pahokee Senior High School FL 23. AP CSP San Jose Preparatory High School FL 24. AP CSP Sheridan Hills Christian School FL 25. AP CSP William M. Raines High School FL
- 26. AP CSP & AP CSA Evans High School FL

Of the 685 schools, globally, who have achieved this measure, 26 of the schools being honored are in the State of Florida, and five of those are in our region. This achievement speaks strongly to the commitment of our state leaders, especially our Board Chair, Gary Chartrand, and his work on the State Board of Education where he placed tremendous focus on making computer science a reality in Florida schools. It is important to note that NONE of these five schools offered this course three years ago.

Computer Science in Middle School Science

With Duval County Public 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.



LEGO Education provided two full days 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 robotics into their programs. Teachers left with a class set of robots and other equipment to be shared by their teams.



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.

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

Hour of Code

Hour of Code reached record breaking numbers this year with many schools committing to affording EVERY child the opportunity to participate. Through this work, a survey was administered asking school leaders to provide a brief summary of how they were able to implement the school-wide event. Thanks to the generous sharing of strategies, we now have collected data to provide a Blueprint for Success: How to Bring Hour of Code to 100% of Students (Regardless of the Bell Schedule). This document will be widely disseminated in time for planning for Hour of Code in December 2019, with a goal of 100% of Northeast Florida





students participating in a coding experience during the week.

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 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 implemented.

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.



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.



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 in the tech fields. 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, LEGO Education, and others.





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*". The girls have since returned from winter break and have continued to attend

the meetings. They are developing profiles on LinkedIn and other professional platforms under the mentorship of our women in STEM leaders from supporting companies.

Spotlighted Club – CyberPatriots Pilot & New Pathways

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.

To further workforce development aligned programs in Cybersecurity, the STEM2 Hub participated in a panel at the Florida State College in Jacksonville. STEM2 Hub Board companies participated in the round table and worked with secondary and post-secondary educators to review pathways and propose new and innovative solutions to increase workforce pathways aligned with CTE and appropriate academies. The STEM2 Hub, in close collaboration with Citi and Florida Blue, are working on teacher experiences to bring content relevance through the workforce lens to teachers. We are also studying, in collaboration with Putnam County School District leadership, the implementation of cybersecurity curriculum and resources through the NICERC pathway. These curricula will be considered for programs both in and beyond the school day.

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 even limits entry into fields outside of STEM including finance and accounting, actuarial studies, and many manufacturing jobs. Students are even disadvantaged in managing their own financial decisions as they move from formal schooling to the workforce, and their adult life.

Mathematics achievement in Florida, and specifically in Northeast Florida, is not where it is needed to be. Proficiency, as reported by the Florida Standards 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.

Overall, the first-time pass rate for this accelerated 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.

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. The table 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.



District	FSA	All	Algebra I
	Grades 3 – 5	Grades 6 – 8	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%

Northeast Florida Mathematics Achievement by Grade Groupings, 2017 Administration

A cohort of teachers and administrators were recently trained by local facilitators. The growth, broken down by grade band, is shown in the charts below. It is interesting to notice the growth in the elementary teachers, from 59% pretest to 82% posttest, which closely mirrors the growth in the school administrator participants group, which showed growth from 58% at the pretest to 80% at the posttest. This indicates a strong need for administration to participate in trainings such as this, so that they can also be exposed to the deliberate look at content articulation from grade level to grade level. Junior high school math teachers began the training with a pretest score of 75%, and grew considerably, scoring an average of 85% on the posttest.

Plans are now being made for summer cohorts to run simultaneously in the month of June to help develop teacher content knowledge and to help strengthen the newly trained facilitators by offering a setting for their first experience training teachers that will allow the more experienced trainers to be present to provide guidance and support to those training for the first time. Group meetings at the end of each day will be held for the trainers to debrief their experiences and learn from one another, blending the collective experience of each training team.

We consider this a strategic time to implement this deep content training, especially as we are in the process as a state of reviewing our Florida Standards for Mathematics, and consider the deepening of content knowledge to be a critical factor as we continue to work across our region to build capacity to offer students the strongest experiences possible to build confidence, content, and self-efficacy in mathematics.



Intel Math Pretest Data:

tnioq ۲۹ أو ۲۹ ما عليه عليه عليه عليه عليه عليه عليه عليه		40.48%	14.29%	71.43%	90.48%	73.81%	58.10%	100.00%	66.67%	85.71%	90.48%	47.62%	28.57%	59.52%	9.52%	45.24%	59.26%	85.71%	45.24%	95.24%	26.19%	66.67%	90.48%	95.24%	80.95%	85.71%	80.95%	75.24%	65.67%
Сгарћ		0	0	0	2	2		0	0	2	0	0	0	2	0	2		2	0	2	0	2	2	2	2	2	2		
Slope		0	0	N	N	~		2	2	N	N	0	0	2	0	N		2	0	2	0	2	2	2	2	2	2		
nottsupe etinW		0	0	0	0	0		2	0	2	0	0	0	0	0	2		0	0	2	0	0	N	2	2	2	2		
seuler to eldet efelqmoO		0	0	2	2	2		2	0	2	2	2	0	2	0	2		2	2	2	2	2	2	2	2	2	2		
Factor expressions		0	0	0	2	0		2	2	0	2	0	0	0	0	0		2	0	2	0	0	2	2	2	2	2		
snoiseanqxə yîlq miS		0	0	0	2	2		2	2	0	0	2	0	0	0	0		2	0	2	0	0	2	2	2	2	0		
snoissenqxe bnsqx∃		٢	0	2	2	-		2	2	2	2	2	٢	٢	0	0		2	-	2	٢	0	2	2	2	2	2		
snoissenqxe etudittsiO		0	0	2	2	2		2	2	2	2	2	-	2	0	0		2	2	2	0	2	2	2	2	2	2		
ateR		2	0	2	0	2		2	0	2	2	0	0	0	0	-		2	0	2	0	2	2	2	0	2	2		
Order of operations		2	0	2	2	2		2	2	2	2	2	0	0	0	2		2	2	2	2	2	2	2	2	0	2		
Order of operations		0	0	2	2	2		2	2	2	2	2	2	2	0	2		2	2	2	0	2	2	2	2	2	2		
Ratio		0	0	0	2	2		2	2	2	2	2	0	2	2	0		2	2	2	0	2	2	2	2	0	2		
tilidînevn)		0	0	0	0	0		2	0	0	2	0	0	0	0	0		2	0	0	0	0	0	0	0	0	0		
ateR		2	0	2	2	0		2	2	2	0	0	0	2	0	2		0	2	2	2	0	2	2	2	0	2		
snoitsupe redmun elorlW		0	0	2	2	2		2	2	2	2	0	0	2	0	0		2	0	2	2	2	2	2	0	2	2		
Divide ໂຕສດນິດກະ		2	0	2	2	~		2	2	2	2	0	2	2	0	2		N	2	N	0	2	2	2	2	2	0		
Subtract Fractions		2	0	2	2	2		2	2	~	~	2	2	2	0	0		2	0	2	0	2	2	2	2	2	2		
Multiply fractions problem		0	0	0	2	0		2	0	~	~	0	0	0	0	0		0	0	2	0	0	2	2	0	2	2		
Multiply កែនថេរាពន		2	0	2	2	~		2	2	2	2	0	0	2	0	0		2	2	2	0	2	2	2	2	2	2		
Maldong anotican bbA		0	0	0	2	~		2	2	2	2	2	0	0	0	0		2	0	2	0	2	0	2	2	0	2		
kdd fractions	0	2	0	2	2	~	AGE	2	0	2	2	2	2	2	2	0	Ш	2	2	2	0	2	0	2	2	2	0	RAGE	ERAGE
	Teacher Code	TSW090	LJL033	EMJ011	ACR101	LJD121	ADMIN AVER	EEB122	XKJ053	RKR040	JKT050	FSR041	XJJ041	GBG093	AEE080	KLJ021	ELEM AVERA	LGP03X	SSW120	MLA050	XNJ040	WAE121	BVT063	FDR091	SEJ124	RGP091	LMD040	JR HIGH AVE	OVERALL AV



Intel Math Posttest Data:

Teacher Code																				0	Sains
TSW090	2	2	2	2	2	2	2	0	0	2	0	0	-	0	2	2	2	0	0	69.05%	28.57%
LJL033	0	0	2	2	0	2	0	0	0	0	2	2	2	0	2	2	0	2	0	42.86%	28.57%
EMJ011	2	0	2	2	2	2	2	~	0	2	0	0	2	2	2	2	2	2	2	90.48%	19.05%
ACR101	2	2	2	2	2	2	2	2	0	2	0	~	2	2	~	2	0	2	0	100.00%	9.52%
LJD121	2	0	2	2	2	2	2	0	0	0	0	0	2	2	2	0	~	2	0	95.24%	21.43%
ADMIN AVERAGE																				79.52%	21.43%
EEB122	2	2	2	2	2	2	2	2	2	2	0	0	2	2	2	2	2	2	2	100.00%	0.00%
XKJ053	2	2	2	2	2	2	0	0	0	2	0	0	2	2	0	2	2	2	2	85.71%	19.05%
RKR040	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	95.24%	9.52%
JKT050	2	0	2	2	2	2	2	2	2	2	0	0	2	2	2	2	2	2	2	95.24%	4.76%
FSR041	2	0	2	2	2	2	2	0	0	2	0	0	2	2	2	2	2	2	2	95.24%	47.62%
XJJ041	2	0	0	2	2	2	2	0	0	2	0	0	-	0	0	0	0	2	0	59.52%	30.95%
GBG093	2	0	2	2	2	2	2	0	2	2	0	0	2	2	2	0	0	2	0	90.48%	30.95%
AEE080	2	0	0	2	2	2	0	0	0	2	2	2	2	0	0	0	2	0	0	47.62%	38.10%
KLJ021	2	0	2	0	2	2	0	0	0	0	2	2	-	2	~	0	2	2	0	64.29%	19.05%
ELEM AVERAGE																				81.48%	22.22%
LGP03X																					
SSW120	2	0	2	2	2	2	2	0	0	2	0	2	2	0	2	0	0	2	0	66.67%	21.43%
MLA050	0	0	2	2	2	2	2	2	0	2	0	0	2	~	~	2	2	~	2	100.00%	4.76%
XNJ040	0	0	2	2	2	2	2	2	0	0	0	0	2	2	~	~	0	~	0	95.24%	69.05%
WAE121	0	0	2	2	2	2	0	2	0	0	0	0	0	~	~	~	2	~	0	90.48%	23.81%
BVT063	0	0	2	2	2	2	2	0	-	2	0	0	2	2	~	0	0	0	0	97.62%	7.14%
FDR091	0	0	2	2	2	2	2	0	0	2	0	0	2	2	~	~	2	~	0	95.24%	0.00%
SEJ124	2	0	2	2	2	2	2	0	0	2	0	2	2	2	2	~	2	~	2	90.48%	9.52%
RGP091	2	2	2	2	2	2	-	2	2	2	2	0	2	0	~	2	2	2	2	92.86%	7.14%
LMD040	2	0	2	2	2	2	2	2	0	2	2	2	2	2	~	2	2	2	2	92.86%	11.90%
JR HIGH AVERAC	щ																			91.27%	16.03%
OVERALL AVERA	GE																			84.89%	19.21%









Training Day # Math Name Three Things I Learned About * Different Methods of solving problems is necessary how they come in cheed S with solutions * Math is a language - must master words, separado ? Two Ways I Contributed lean enconva tormulas One Questions I Still Heve to write equations w/ 2:3 solutions ★ My understanding of today's content isAWESOME....SO-SO....NO GOOD!

Please write on the back any additional comments you would like to share!



Changing the Face of Teacher Preparation:

From a systems approach, we have partnered with the University of North Florida's College of Education to manage our regional partnership with Code.org. By locating the partnership at a college with a full preK-12 teacher preparation program, with the intent to empower preservice teachers to graduate ready to provide an introduction to computer sciences classes in our region.

We also included faculty from the institution in the media center trainings that were offered in the fall. The purpose of the attendance from members of the IHE's was to provide exposure to the skills being taught to practicing teachers so that preservice faculty could have opportunities to 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 teachers in these skills.





Over the course of the past year, in collaboration with the STEM2 Hub, **and at no cost to this project**, the University of North Florida College of Education, under the leadership of Dr. Diane Yendol-Hoppey, envisioned a space within the college to be an innovative place where teacher candidates, students from across the various colleges, and educational leadership candidates could learn alongside our educators to bring practices into play that would forever change the vision of STEM education. This space was developed where a traditional, underused computer lab was situated. Faculty and stakeholders adopted the name "STEP Lab" (Solve~Tinker~Explore~Play) for this innovative space.

The space is already being used in many ways. These uses include teacher and leader preparation and development, exploration and collaboration, field trips and summer camps, along with professional development, research, and development of programs and curriculum. This central hub of learning will serve as a catalyst for testing and researching new ideas in STEM learning.



These goals, described above, represent our commitment to building pathways that will have a lasting and systemic impact on our educational system. Through the natural infusion of this work into our partnership, and with **no cost to the project**, for **the first time in the nation**, we have been able to graduate the **first cohort of 10 new teachers with a computer science education cord**, indicating that they will report to their schools with the ability to introduce computer science fundamentals to their



students. We see this as just the first step in preparing teachers who are truly ready to infuse STEM + CS learning pathways into our K-12 education system. This approach. through deep partnership, is allowing us to envision system strengthening experiences for all young people through the development of our future teachers.

Ten newly graduated teachers will enter from the University of North Florida will heads to their teaching assignment ready to introduce computer science fundamentals to their students.

<u>Planning underway for Summer Programs, Professional Development and Camps</u> In partnership with Code.org, Lego Education, Microsoft, WozU Education, and the University of North Florida, student summer camps are being planned to implement the Hacking STEM curriculum, robotics, drones, and the development of empathy through social justice projects that will impact our local communities.

Camps will be occurring all around the city and the greater region in partnership with local schools and districts, the Boys and Girls Clubs of Northeast Florida and Nassau County, Communities in Schools, and other partner locations.



We will continue to pilot new programs, such as closing the digital divide and industry certification pathways that prepare our students for the careers of the future in both traditional and nontraditional settings.



We will continue to prepare our teachers to facilitate learning in this environment and challenge our school and district leaders to continue with us on the journey to assure equitable access for all of our stakeholders.



Students engage in playing a game with a robot that is utilizing facial recognition and machine learning to get better at the game with each match (two pictures above).

Empowering girls in STEM to do more! (picture to the left).



Cybersecurity Educational Pathways

Plans are underway to engage district leaders in new strategies to engage students in the cybersecurity pathway beginning with gaining deeper understanding from our industry partners for the current and projected needs of the workforce.

<u>Chief Science Officer</u> Programs are forming for implementation in three districts.

Project Based Learning

Plans have been developed and implemented to bring cross-curricular, project-based learning into middle schools in Nassau County using the Defined STEM resource. Training occurred as scheduled in February. This project is expected to impact approximately 1,600 students.

Planning Growth of Learning Blade

Nassau County began the implementation of the Learning Blade Curriculum. Teachers were trained in early February, impacting over 1,000 students. Impact data and growth in usage is up 184%! The 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 Intel Math Cohort

A teacher cohort of INTEL Math began in January and concluded in March. 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 began in February. Nassau County led the way by implementing at four middle schools. Putnam and St. Johns will each run a pilot in one middle school. Duval County has jumped on board and is planning implantation in key feed patterns.

Highlights: Impact Update

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

Drones are flying in 6 middle school programs in 3 school districts, with more to join soon, impacting thousands of 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. Many have moved onto regional, state, and even national competitions

52 96 district administrators and school principals have learned to code and program a robot!

HoloLens and Mixed Reality

technologies continue to be piloted in the region. AI and machine learning concepts are being introduced.



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 beyond the current fiscal year and building upon the work that is in progress to bring true change to our system.

Should you need additional information, or have questions, please contact the STEM2 Hub's Executive Director, Kathleen Schofield, by email at <u>kathleen@stem2hub.org</u> 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 her team, 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, Dr. Betina Malhotra, Code.org Regional Partner, LEGO Education, Microsoft EDU, and the Microsoft Team at the St. Johns Town Center, WozU Education, Mitch Resnick at the MIT Media Lab, and all the local teachers and administrators who are working together to assure strong outcomes for our students.

On behalf of all stakeholders in the region, and our Board Members, listed below, we thank you, the members of the Florida Legislature, for your commitment to our work and your support as we continue to implement this project.



Gary Chartrand Chairman of the Board, STEM2 Hub Executive CEO Acosta Sales & Marketing

Michael Aubin President Wolfson Children's Hospital

David Balz Chief Integration Officer Haskell Corporation

Mark Bosma Senior Vice President TIAA Bank

Kathleen Brandt Senior Vice President & CIO CSX

Ido Gileadi Chief Information Officer FIS Global

Sean Hellein Executive Director Bethesda Farm

Julie Hindall Acting VP, Workforce Development JAXUSA

David Hopper CEO Auditmacs

Deanna Brown Partner Ullman Brown Wealth Advisors

The Players Ponte Vedre, Florida Matt Kane

Vice-Chair, STEM2 Hub Owner Greenshades Software

Matthew Hutchins Vice President Wells Fargo Bank

Steven Kaufman CEO Urban Mining

Jane Landon Senior Vice President & CTO Web.com

Silver McDonald President Lego Education North America

Jason Raymond Chief Information Security Officer Guidewell/Florida Blue

David Reichard Chief Executive Officer Alluvion Staffing, Inc.

Joe Nackashi President Black Knight Financial

Lisa Cochran Global Head of Operations, Digitalization & Technology Citi

Katie Enkiri Executive Director, NECA NECA/IBEW Powering America North Florida