The children in preschools this fall will graduate from high school in 2024. They do not know it yet, as they play and learn with blocks and paints, but their future will be even more closely tied to the science and technology, engineering and mathematics that already pervade our everyday lives.

Even today, the vast majority of the fastest-growing professions require significant scientific or mathematical training. Positions in those fields are increasing far more quickly than in the overall job market. And jobs in science-related fields pay nearly three times as much as the average job.

But Florida, like much of the United States, is not preparing its children for that future. The state’s students trail national averages in math and science, and lag behind a long list of fast-developing countries in both fields.

That slow start ripples through to the country’s higher-education system, where fewer students are graduating with science and engineering degrees. And that comes as businesses in Florida and nationwide desperately seek more workers with skills in science, technology, and math to help them compete against established and emerging economies.

For those reasons, Gulf Coast Community Foundation of Venice is investing $2.5 million in a five-year initiative at eight secondary schools in Sarasota and Charlotte counties. It aims to improve achievement in science, technology, engineering, and mathematics—known collectively to educators and industry as STEM.

“As a community foundation, we invest in long-term, systemic change,” said Teri A Hansen, president and CEO of Gulf Coast Community Foundation. “This STEM initiative starts in our schools, but it goes far beyond the classroom. It tackles issues critical to our region’s future prosperity and quality of life.”

With the launch of the initiative, the Foundation and the districts join a growing national movement to provide teachers with the training and tools they need to prepare their students for the changing world.
In its 2009 report “The Opportunity Equation,” the Carnegie Corporation of New York identified how these efforts are crucial for not only the economy, but society as well:

“Over the coming decades, today’s young people will depend on the skills and knowledge developed from learning math and science to analyze problems, imagine solutions, and bring productive new ideas into being. The nation’s capacity to innovate for economic growth and the ability of American workers to thrive in the global economy depend on a broad foundation of math and science learning, as do our hopes for preserving a vibrant democracy and the social contract with young people that lies at the heart of the American dream: **Invest in yourself, work hard and learn, and you will have opportunities for rewarding work and meaningful choices about your future.**”

**What STEM Means**

In its simplest definition, STEM education is the teaching of physical sciences and mathematics. But it has a broader meaning to those who see it as crucial to economic competitiveness and success.

To Dr. Laurey Stryker, the education innovator who is planning the Foundation’s initiative, STEM is shorthand for “schools must do a better job preparing students for an economy that will require different and technically challenging skills.”

Stryker is the former Florida assistant commissioner of education and was most recently CEO of University of South Florida’s Sarasota-Manatee campus, where she led efforts to modernize programs and better tie them to the needs of business.

To pioneering schools and their partners, at colleges and businesses, academic societies and trade associations, STEM means the end of the “mile-wide and inch-deep” approach to sciences.

In those cutting-edge classrooms, STEM is students programming computers to study the relationship between math and music, building rockets and measuring flight data to study Newton’s laws, and working with modeling software to draw DNA and simulate protein synthesis. “STEM is really the language of innovation,” Stryker said.

**Why STEM Matters**

The United States has long been seen as the world’s leader in innovation. But that is changing.

From Eastern Europe to Southeast Asia, developing countries are catching up, investing in education, in research and development, in infrastructure and more. The United States is now
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last among 40 major economies for its pace of innovation, according to a 2009 study by the Information Technology and Innovation Foundation.

To match and surpass those swift and nimble global competitors, businesses need employees who can create equations and mechanical systems that model and solve realistic problems—like Sarasota-based METI, which designs and builds robotic medical simulators used by hospitals, medical schools, and the military.

“The simulation of reality involves the creation of highly complex mathematical algorithms and computer-driven systems that mimic the real world—in METI’s case, human physiology,” company Chairman Lou Oberndorf said. “Any one of METI’s high-fidelity patient simulators represents an extremely complex system that requires the interaction of skilled engineers with mechanical, electronic, and software backgrounds.”

Technology-driven companies will seek out communities that produce graduates with those skills, bringing jobs and financial stability to a region. “Industry is going to locate in areas where they can pull from that community and hire more and more employees with strong math and science skills,” said Norbert Donelly, chairman of Venice-based manufacturer Tervis Tumbler.

Even today, seven of the nation’s 10 fastest-growing professions, and 19 of the top 30, require significant scientific or mathematical training, according to the Department of Labor. Positions in science-intensive fields are projected to grow 60 percent faster than the overall employment market this decade, the agency found. And the typical engineering job pays nearly triple the median of other jobs.

“Businesses are just getting more technologically oriented and getting more efficient, and they’re evolving more and more quickly,” Donelly said. “People who have these skills are going to have a huge advantage.”

The State of STEM

For this initiative, the Foundation has entered into a partnership with eight schools in Sarasota County and Charlotte County: Venice, North Port, and Lemon Bay high schools, and Heron Creek, Laurel Nokomis, Venice, Woodland, and L.A. Ainger middle schools. The project includes almost 9,400 middle and high school students, representing 38 percent of Sarasota secondary enrollment and 28 percent of Charlotte secondary enrollment.

While that list includes some of the state’s strongest schools, the districts’ leaders say that science and mathematics education still needs improvement. “I think there is tremendous concern in terms of the level of achievement we’re seeing today in our graduates in science and math,” said Lori White, Sarasota County School District superintendent.
“Frankly, the state of achievement in science and mathematics in particular is dismal,” said Dave Gayler, superintendent of the Charlotte County School District.

Perhaps most troubling is that Florida students’ performance fails to improve with years of schooling. The percentage of children scoring average or better on the science and math FCATs decreases or flattens as grade levels advance.

Florida’s students also lag those in other states. The state’s eighth-graders performed below the national average in the National Assessment of Educational Progress for both science and mathematics. The state’s fourth-graders were below average for science and at the national average for math.

If Florida eighth-graders’ scores are measured on an international scale, they trail 19 nations in science aptitude and 12 in math, behind countries like Singapore, Japan, Estonia, and Hungary.

The poor achievement in math and science ripples through to the nation’s colleges in the form of fewer science and engineering students. Sciences, engineering, and technology accounted for just 14 percent of degrees in 2007, and the United States ranked 20th worldwide for graduate degrees in those areas.

For White, that raises the question at the heart of STEM: “How do we stay competitive in a world where everyone is focusing on these areas? We’re beginning to feel like we are being passed, and we were on top of the list previously."

The Foundation is joining educators and business leaders statewide who have recognized the urgent need to improve STEM education.

The Florida Chamber of Commerce calls for more rigorous STEM requirements for high school graduation. Workforce Florida, the Consortium of Florida Education Foundations, and Enterprise Florida created STEM Florida, where dozens of businesses, schools, and agencies are identifying ways to increase the number of technologically skilled workers.

And the “Florida Promise” project, backed by the state’s three major public universities, is training thousands of teachers in how to implement Florida’s new academic standards.

The Next Generation Sunshine State standards, to be phased in starting next year, are at the core of STEM efforts. The new curriculum is designed to improve creativity, collaboration, and problem-solving skills, and show students how their education trains them for the challenges they will see when they enter the workforce.
How the STEM Initiative Will Work

The Foundation and its partner schools recognize that a better education for students begins with better assistance and preparation for teachers.

The initiative, then, has two primary goals:

- To accelerate teachers’ readiness to meet the Next Generation math and science standards.
- To enhance opportunities for students that increase achievement and promote readiness for STEM-related postsecondary programs and careers.

For teachers, it will provide a jump-start for learning the Next Generation standards and developing new lesson plans by funding their participation in summer institutes. Meanwhile, school districts will develop plans for ongoing teacher training and coaching. The program will eventually reach 120 to 150 teachers at the eight schools.

For students, enhancement programs will focus on those performing at grade level, generally those scoring the average 3 on the FCAT exams. Focusing on average students, which make up the largest number, has the potential for the greatest impact. Remedial programs already are in place for students performing below average, while advanced students are succeeding, many already in enrichment programs.

The districts will set targets for increased student registration in upper-level math and science courses, and for results in FCAT tests and the Next Generation planned end-of-course assessments. Guidance counselors will develop approaches to encourage students to enroll in STEM classes. Staff also will review their classroom resources, labs, and equipment and write grant applications and requests to the Foundation for assistance.

“This is going to jump-start our ability to provide professional development, to provide summer camps, to provide teachers the opportunity to share and teach each other,” Charlotte Superintendent Dave Gayler said. “This is going to provide that spark, that creativity that students really need.”

The ability to assess progress toward the goals is crucial. The partner school districts will develop baseline data on students’ current achievement levels, such as grades and FCAT results in science and math, participation in advanced courses and apprenticeships, and readiness reports from colleges.

But as STEM derives its significance from the needs of the community, the state, and the country, its success also depends on winning commitment from all parties—students, parents, educators, businesses, and institutions.
The Foundation will communicate the importance of STEM education to parents, students, businesses, and other partners. It also will find opportunities to leverage the community’s investment via linkages and partnerships with similar state and national efforts.

The Foundation will help identify organizations to provide student-enrichment programs in STEM-related activities, connecting real-world experiences to math and science concepts. It will help foster relationships between the schools and workforce mentors, promoting both in-classroom visits and workplace internships. It also will create and recruit support for scholarships as an incentive for students choosing college majors in STEM-related fields.

With the STEM initiative, the schools, Foundation, and community will together plant the seeds of a talented and engaged young citizenry, and a creative, valuable, and successful workforce.

“This isn’t just an education issue; it’s an economic development and a quality-of-life issue,” said Foundation President Teri Hansen. “And it’s one that we will address as a community.”