



BUSINESS PARTNERSHIPS TO ADVANCE STEM EDUCATION: A Model of Success for the Nation

Report

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Program

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Business Partnerships of José Martí MAST 6-12 Academy

Educational Partners

Ben Sheppard Elementary: JM-MAST invites the Pre-MAST students to participate in lab experiments at the school on a regular basis in order to promote STEM in elementary.

Council for Educational Change: the CEC has assisted JM-MAST in obtaining partnerships, managing the grant, offering advice and promoting the school.

Committee for Economic Development: the CED provided JM-Mast with a \$90,000 grant for the Business Partnerships to Advance STEM Success (B-PASS).

Florida International University: faculty of JM-MAST participated in professional development focusing on The Common Understanding of STEM and Instructional Strategies for all subject areas. Students participate in the FIU Annual Honors College Research Conference.

LARC Technology Institute: established the website for the JM-MAST/B-PASS grant information and implementation. LARC has provided: students with hands on workshops; teachers with professional development on web design; offers free computer repair to faculty, staff, parents and students of JM-MAST.

Miami Dade College-North Campus: MDC has selected JM-MAST to participate in the FCCAgE/USDA Florida Caribbean Consortium for an Agriculture Education Grant which has enabled our students to build and maintain an herb garden. MDC offers many field trips to our students, they participate in presentations and lab experiments at the college. MDC has also provided professional development to faculty on STEM across the curriculum.

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Miami, Florida

Supportive Partners

Cleveland Clinic: JM-MAST students participated in the eXpressions™ award winning educational initiative that utilizes creative expression to engage high school students in the exploration of science and medicine.

Ford Motor Company: JM-MAST students participated in the Driving Skills for Life which is part of Ford's long-standing commitment to teen driver safety.

Junior Achievement of Miami: JM-MAST students participated in JA personal finance and recognized the fundamental elements for their personal finances: earnings, saving and investing, budgeting, credit risk management and giving.

Miami Science Museum: students of JM-MAST participated in the National Youth Summit focusing on contemporary environmental issues and the legacy (as well as lessons learned) from the Dust Bowl. Students have also prototyped a new live surgery fieldtrip for the museum and participated in the Brain Fair.

NASCAR: Through hands on activities and driver integration, NASCAR and its educational partners showcased how STEM and teamwork come alive outside the classroom in sports and potential careers in a ten-week interactive program.

NOAA: JM-MAST students participated in engaging presentations by NOAA and used their data to practice gathering and analyzing.

¡Yo Soy Hialeah! through this community website, we post videos, articles and important events that take place at José Martí throughout the school year. This also assists us in marketing the school and recruiting more students.

Zoo Miami: students of JM-MAST have the opportunity to participate in the Conservation Teen Scientist program (CTS). It offers high school students valuable volunteer opportunities, while fulfilling the Zoo Miami's mission of wildlife conservation and enhancing the visitor experience through eco-literacy interpretation. Zoo Miami also offers field trips and presentations.

Extracurricular Partners

ALM Sports: JM-MAST students have the opportunity to play sports afterschool with ALM Sports, as a Magnet School we cannot offer sports.

AmericaTévé: JM-MAST Spanish speaking students report on topics of interest and appear in the America Tévé "Los Reporteritos" segment of the local news.

Dream in Green: the students in the Green Club are participating in Dream in Green to create environmental educational programs that decrease greenhouse gas emission through a multi-pronged approach that promotes energy efficiency, conservation, and the use of renewable energy.

Fairchild: JM-MAST students have the opportunity to participate in a collection of challenges that offers an exciting mix of environmental educational opportunities. JM-MAST teachers have the opportunity to participate in Fairchild's professional development courses.

Rhythm and Pitch School of Performing Arts: Rhythm & Pitch is providing the students of JM-MAST the opportunity to participate in Dance and Musical Ensemble after school.

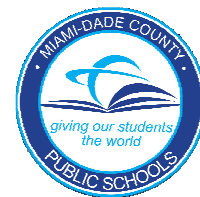
Women of Tomorrow: the Women of Tomorrow Mentor & Scholarship Program mission is to inspire, motivate and empower young women to live up to their full potential through a unique mentoring program with highly accomplished professional women and scholarships.

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Business Partnership to Advance STEM Success (B-PASS)



Committee for Economic Development (CED)

www.CED.org

Council for Educational Change (CEC)

www.ChangeEducation.org

José Martí MAST 6-12 Academy

www.mast3.com

www.mast3.larctech.com

Miami Dade County Public Schools

www.dadeschools.net

Importance of STEM Education & the Role of Business

International assessments show U.S. students in elementary, middle, and high school are being outperformed on assessments of mathematics and science by students across Asia and Europe (Trends in International Mathematics and Science Study, 2011). This trend is alarming and places the future of U.S. students, as well as the productivity and stability of the country, in jeopardy. Numerous studies

One of our most important economic issues of our time: the skills and education of our workforce, because every business leader in this room knows that the single most important predictor of America's success in the 21st century is how well our workers can compete with workers all around the world.

(Obama, 2012)

have reported on the failure of the American public school system to meet the educational needs of our increasingly diverse student population and the changing demands of our ever more technology-based economy. “The challenge for our education system is to leverage the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures” (Duncan, 2010). In fact, Microsoft was reported as being unable to fill more than 6,000 high-paying technology-related jobs because the job applicants lacked the necessary education and skills (Mazzela, 2013).

In order to best prepare the U.S. workforce, schools need to focus on science, technology, engineering, and mathematics (STEM) education. However, given the current educational climate of reduced school funding, high teacher turnover, and increasing student diversity, the public school system simply cannot do this alone. This is where businesses can play a role.

Businesses and education-focused organizations offer real-world applications associated with the lessons teachers need to provide. School and business collaboration can also provide teacher support, student mentorship, classroom resources, and help students see the value in what they are learning in terms of their own life success and the success of the nation. Business partnerships can provide a number of different resources to schools. Examples of ways businesses can support teachers, schools and students include:

- Offer career presentations that allow students to consider career opportunities.
- Support employees to become mentors to students and teachers in particular fields. Such experiences can have a tremendous impact, given that “[h]aving a mentor significantly influences students’ decisions to pursue STEM degrees and occupations, especially for women and minorities” (Joint Economic Committee, 2012 pg. 8).
- Facilitate field trips to their sites for hands-on understanding of the organization.

- Work directly with teachers in the classroom to make lessons more practical for students. Offer high school students externships and the opportunity to augment classroom study with real-world work experience, as well as internships that offer applied training. Most business people want to get involved with school partnerships because students are their future workforce.

In a time of declining fiscal resources and greater demand for public services, school districts with fewer dollars to spread around have learned that forming partnerships can also be fiscally prudent

(Blank, Jacobson, & Melaville, 2012).

School and business partnerships help supplement lessons and facilitate teaching and learning when done correctly. In the area of STEM education, the need for resources and partnerships is even greater due to the current and projected job outlook. STEM related jobs are on a long-term rise and there is a high demand nationally and internationally for individuals with STEM educations. In order to prepare for tomorrow's demand of STEM occupations, we must prepare K-12 students today.



Women in STEM Panel

Establishing the B-PASS Grant

Recognizing the need to advance STEM education and the role businesses can play, the Committee for Economic Development (CED), a nonprofit, nonpartisan business-led public policy agency, sought to mobilize school-business partnerships that could support schools and businesses in preparing the American workforce of tomorrow. Such partnerships go beyond philanthropy and involve mutually-beneficial relationships that can have a life-long impact on individuals, schools, and communities.

Working together, the Council for Educational Change (CEC), a Florida education think tank and the CED established the Business Partnership to Advance STEM Success (B-PASS) grant. In 2012, this grant was awarded to José Martí Mathematics And Science Technology (MAST) 6-12 Academy in Miami-Dade. The grant has fostered a model for the development and implementation of effective partnerships between the school and local businesses, museums and professional organizations.

José Martí MAST 6-12 Academy

José Martí MAST 6-12 Academy (JM-MAST) was previously a traditional middle school serving neighborhood students in grades six through eight. The school was recently converted into a STEM magnet school for qualifying students in grades six through twelve. This transition has had many obstacles related to teacher development and the implementation of a new, more rigorous mathematics and science curriculum. Limited by their lack of real-world experience teachers struggled to provide students innovative and genuine educational opportunities to apply their STEM knowledge in ways that were aligned with the skills required of the 21st century workforce. Further complicating the practical application issue was the lack of school funds available to engage in hands-on activities, such as laboratory experiments for high school science courses. These activities are designed to supplement the curriculum and target the participation of marginalized students.

These challenges presented the need for teacher support in the form of professional development and mentors designed to assist teachers in incorporating real-world applications into the curriculum. This is where business partnerships helped bridge the gap. With the need for teacher and curricular support identified, JM-MAST Principal, Mr. Jose Enriquez, discussed the school's needs with the CEC at a PASS meeting. The CEC later aligned our STEM focused school with the CED's B-PASS Grant.

BY THE NUMBERS...

Economy

3 million the projected shortage of workers with U.S. college associate degrees or better, by 2018

785,700

Number of projected new jobs by 2018 in computer & mathematical science occupations

Women

20%

Women account for the **Bachelor's degrees** in engineering, computer science, and physics

25%

of positions are **held by women** regardless of specific area of STEM

Education

17 nations

number of industrialized nations whose 15 year olds performed significantly **better than U.S. students in science**

25 nations

number of industrialized nations whose 15 year olds performed significantly **better than U.S. students in math**

José Martí MAST

29% increase in applicants to José Martí MAST 6-12 Academy from 2012 to 2013

64.9% of all grades earned by students which are **As or Bs**

100% of JM-MAST students who take **advanced math and science courses**

B-PASS Model for Successful Partnerships

Once the B-PASS grant was awarded, the school established a JM-MAST/B-PASS Design Team. Collaboration and communication were essential for planning and implementation. The Design Team, composed of the school administration, science and math department chairs, along with interested faculty and parents, provided the venue for identifying the most compelling needs to:

- develop training for the faculty in order to promote STEM understanding across all of the disciplines
- offer students real-world experiences related to the STEM concepts they would be learning in class
- document activities and create a resource for replication and marketing to recruit and attract new students

Professional Development:

The school's need for teacher training was at the forefront of areas identified by the B-PASS Design Team. Teachers at JM-MAST did not have the skills or tools necessary to implement all the components of the new science curriculum which consisted of: a traditional science course; a hands-on laboratory course to complement the science course; and a research course where students would learn to conduct their own research. Through the B-PASS grant, science professors at Florida International University (FIU) and Miami Dade College (MDC) were able to support and guide the transition to this new curriculum. They provided teachers advice, and professional development on topics such as STEM integration, problem-based inquiry, and hands-on classroom activities. In addition, MDC invited students to participate in presentations and allowed them to use the college's scientific labs to conduct elaborate lab activities that could not be done at JM-MAST. This collaboration with MDC and FIU afforded teachers at JM-MAST with much needed professional development and use of scientific laboratories, and offered FIU and MDC the opportunity to inspire potential college students.

Real World Experiences:

The B-PASS Design Team realized the importance of providing the students a unique educational experience beyond the classroom. They initiated a strategic pursuit of business partners by assessing previous relationships in hopes of establishing more robust partnerships with those organizations.

One such partner is Zoo Miami which provided students with real-life experience to develop interpersonal and professional skills in addition to application of scientific concepts. Through this



Female students participate in gender-specific workshops, engage with female professionals in STEM careers, work side-by-side with the boys in engineering and chemistry competitions, and are mentored through Women of Tomorrow.

partnership, students are able to engage in field trips and interactive presentations. Students are also provided the opportunity to participate in the Conservation Teen Scientist program (CTS). The CTS program develops leadership and public speaking skills, work ethic, and teamwork by applying knowledge gained through weekend classes and group work activities. CTS enhances life skills by teaching students to collaborate, share ideas, speak formally, problem solve, and be punctual and respectful. Students explore careers including zookeeper, conservation educator, and field conservationist. The CTS program teaches students how to write a resume, prepare for, and participate in, job interviews, and understand the job market.

The B-PASS design team also pursued business partners who could offer students real-world experiences aligned to JM-MAST's three academy tracks: physical science, life science and math/computer science.



The need for assistance with technology and computer science led to a partnership with Alberto Ruiz, founder of LARC Technical Institute. This partnership has provided JM-MAST students with workshops such as the evolution of the video game, and how to disassemble and reassemble a computer. With Mr. Ruiz's cooperation, the assembling computer workshops were gender specific. This allowed the female students the opportunity to freely ask questions. A female freshman said, "I never thought I could break a computer apart and put it back together again. That was awesome. I want to do it again". Whether you are a school

looking to enhance a curriculum, or a business looking to promote a product, it is important to know exactly what you hope to gain from the relationship. The partnership with LARC provided a mutual benefit to both partners. JM-MAST received important technical and computer science support while LARC benefited from free marketing and the ability to offer free computer repair to all faculty, staff, parents, and students of JM-MAST.

In the area of physical science, a partnership with NASCAR and its educational partners showcased how STEM and teamwork come alive outside the classroom applying engineering skills to the sports arena. The program began with a pen pal driver sending a series of videos that explained how mathematical and scientific concepts apply to the race track. Lessons, such as the difference of the drive based on the slope of the track or the humidity in the climate, opened the door for teachers to discuss the concepts in class. Phase two offered hands-on and in-person activities designed by Ten80 Education. Students worked in teams to build stock cars and race them against each other under the direction of the NASCAR professionals. Phase three culminated with a thrilling trip to Homestead-Miami Speedway to see everything they learned come to life.

A partnership with the Miami Science Museum provided anatomy students the chance to bring their lessons to life. Students were part of a pilot program that included an occasion to observe and interact in a live hand surgery. Students were able to dialogue with the surgeon before, during and after the surgery. The live video stream of the actual surgery was so real that a few students even got queasy. “Now I know that if I want to pursue a career in medicine, I have to stay away from surgery” said one student after having to step outside to get some fresh air during the live presentation.

Resource for Replication and Marketing:

Documentation and validation of the steps taken and the activities implemented were essential in order to provide a resource for others to replicate the B-PASS program. Additionally, the school needed a mechanism to showcase student success in order to celebrate accomplishments, market the STEM curriculum, and attract new students. The Design Team conceptualized a website that could host information about all partners, document all activities with photographs and videos, and provide a virtual resource center, as well as a guide to replicate the model at district and statewide levels. Through the partnership with LARC Technical Institute, the establishment of a website for the JM-MAST/B-PASS was created.

Ensuring Success

The start-up of programs and partnerships like the JM-MAST B-PASS efforts certainly come with obstacles and challenges that must be navigated. As JM-MAST began the process of developing partnerships and implementing programs, it had to consider the most effective project management structure – balancing workloads, tight budgets and demanding schedules. The engagement and buy-in of teachers was also an important element of the early work.

Streamline Project Management

Successful projects and collaborations require the consistency of having one main liaison. While businesses often do not have difficulty doing this it can be more of a challenge at the school level. With limited funding and restrictive budgets, administrators and teachers often wear many hats. At times, an administrator may need to establish the contacts, negotiate the projects or collaborations, and then delegate to a faculty member to implement and complete the project. For example, the partnership

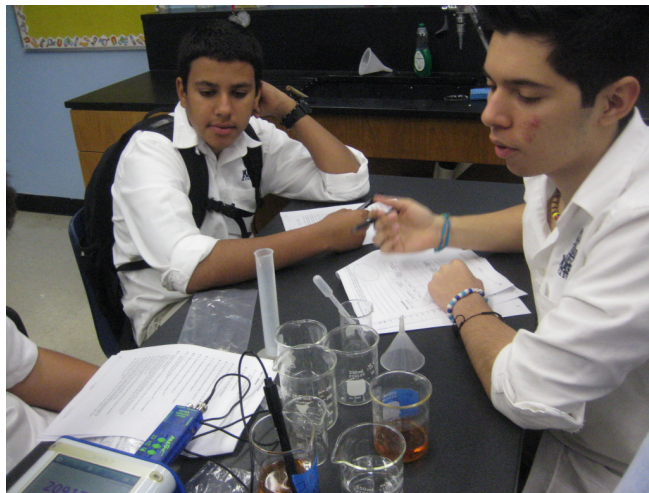
The global economy demands knowledge and skills, and America cannot afford to ignore the gaps in educational achievement and disparate high school graduation rates that keep it from producing a workforce that possesses both. Failing to close these gaps, especially given the nation’s changing demographics, will have dire consequences for the American economy.
–Alliance for Excellent Education

Business leaders worry that this growing gap poses a serious threat to America’s competitiveness, prosperity and health as a democracy. Without a firm grounding in STEM, our students will have little chance to contribute to the kinds of innovation that have fueled U.S. economic growth for decades.
–Change the Equation

with NASCAR included various teachers and several events both on campus and off campus. By having the Assistant Principal serving as the main liaison and organizing all of these events at the school level, the events and programs were scheduled without difficulties or confusion. While this system can work well, it is time consuming. As a result, it is important that the main contact be able to appropriately manage the components of the partnership and maintain good rapport with the business partners.

Engage Teachers & Foster Faculty Buy-In

An important factor that cannot be neglected is faculty buy in. While the businesses may be eager and willing to collaborate, if the teachers are not motivated to cooperate, the partnership will struggle. Many veteran teachers are accustomed to their way of teaching and it is a challenge to get them to open up to new things. Others see new programs or educational initiatives as the latest educational fad that will eventually fade away. Teachers feel the pressure of the standardized assessments and fear that veering off track from their lessons to go on a field trip or participate in a presentation will hinder their students' progress. Collaboration with teachers on the identification of partnerships and program opportunities is essential to fostering buy-in and ensuring these partnerships enhance student experience and supplement the instruction and curriculum.



Even at this early stage of implementation, JM-MAST teachers have already begun to embrace strategies acquired during professional development and report increased student engagement as a direct result of the positive impact of the business partnerships. Additional emerging successes can be seen in the classrooms where interactive lessons and projects have become commonplace and students are fully engaged in rigorous lessons. As a high school student said, "I was bored in my other school and the teachers didn't know me. Here, [JM-MAST] I'm excited about coming to school and the teachers don't let me slack off."

In assessing our progress, we have identified the following recommendations for teacher engagement:

- communicate with your faculty and staff and explain the objectives and goals of embracing professional development and business partnerships
- empower teachers that embrace the concept and allow them to establish partnerships and develop projects that benefit their classes
- do not get discouraged by teachers that are not on board. Paradigm shifts are difficult to embrace and it will take time for some to become supportive

Conclusion: Recommendations for Getting Started

The need for schools to partner with businesses and education-focused organizations has never been greater. José Martí MAST 6-12 Academy is only in its second year and B-PASS implementation began just seven months ago. Yet this grant has allowed the school to expand its resources at a rate that would have taken years to develop alone. Based on the experience of developing and beginning to implement the B-PASS partnerships and programs, the following action steps are suggested for businesses, schools or other entities interested in establishing collaborative relationships:

- Create a design team to identify needs, goals and measurable metrics
- Review current and past partners or collaborating businesses to determine suitability
- Meet with the partners and discuss the focus on STEM in order for them to gain a better understanding of the importance the partnership has on the students' future
- Assess the partnerships and be realistic. Quality is more important than quantity. Needs change and therefore, so will the partners
- Seek out new partners based on needs: a) visit the business' website to gain pertinent information, b) reach out to parents and community members, and c) always call or email someone specific and introduce yourself and your school's goal
- Be sure to offer the business something in return such as marketing opportunities
- Establish a positive rapport with each business by remaining actively engaged
- Streamline project management by establishing main points of contact for the school and business who will work together to facilitate all programs, activities and collaborations between the partners.
- Provide opportunities to showcase business involvement and subsequent student success; continuously celebrate the good things that are happening
- Market your program on an ongoing basis to area schools and community entities
- Begin discussing opportunities for student internships as early as possible
- Engage teachers in the identification of the partnerships and development of programs

It is Your Business: Providing Opportunity for Students & Teachers

As José Martí MAST 6-12 Academy continues to grow, the school will foster current partnerships as well as venture to establish new ones. We will conclude the school year by assessing programs and partnerships that worked and those that need to be developed further. Over the summer, we will be facilitating collaborative workshops for our teachers to begin planning their pacing guides for the following school year to include participation in field trips, presentations and activities with the business partners. By allowing the teachers to plan ahead and incorporate these activities into their lessons in advance, it will help diminish some of the pressure they feel. At José Martí MAST 6-12 Academy we hope to change the way students are taught, in order to make learning an active experience, while nurturing the opportunities to pursue STEM endeavors.

Visit the JM-MAST/B-PASS website at www.mast3.larctech.com to get a more in-depth look at the Business Partnership to Advance STEM Success initiative and to learn how it can change a school.

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