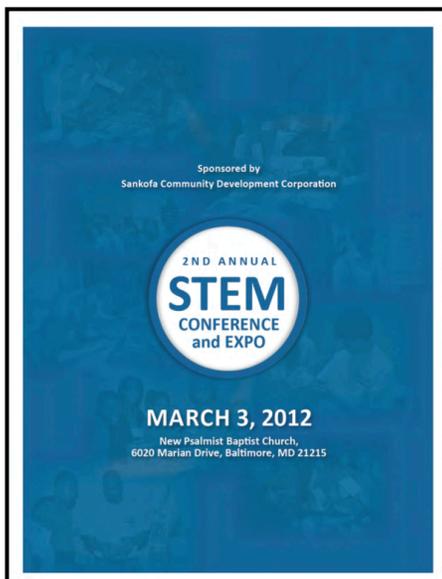


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# 2<sup>nd</sup> Annual STEMcx



## 2012 Student Assessment

### Summary of Key Findings

Shannon Yvonne Adams

June, 2012

*with assistance from*  
Anderson Hamilton Consulting

**Student Workshops**

The colors below indicate the assigned colors for each student workshop. Students will be seated during breakfast and lunch by assigned workshop. Volunteers with flag will escort students to and from workshops.

**MIDDLE SCHOOL TRACK**

- Rocket Scientist and Flight
- The Big Dig
- A Bridge to Nowhere
- The Science of Superheroes
- Slam Dunk: The Physics of Basketball
- Architecture 101
- Shark Week
- Mission Impossible

**HIGH SCHOOL TRACK**

- The Physics of Football
- Exploring the Universe Beyond Our Eyes
- Kinect with Microsoft: Xbox 360 Exposed!
- The Chemistry of Cover Girl
- Trauma 101
- Science Internships
- CSI Baltimore
- Alternate Energy and Cars



## Introduction

81% of the American workforce in Science, Technology, Engineering and Math (STEM) related fields are white males. Only 3% are African-American. Why is it that we seem to be falling so far behind in a sphere that will undoubtedly be the crux of our world in the 21<sup>st</sup> Century? Baltimore City Schools (BCS) have shown particular difficulty in educating their youth in these academic areas. According to Dr. Andres Alonso, CEO of City Schools, the U.S. Department of Education's National Center for Education ranked BCS "unacceptably low" compared to its big-city peers on the science portion of the report card just last year. Dr. Alonso demanded that this dismal reality be a wake-up call – the spark we as a community needed to make a change in what and how we teach our children. So, that's exactly why we have become committed to this annual conference.

A group of volunteers, led by the Sankofa Development Corporation organized The Science, Technology, Engineering and Math Conference and Expo (STEMcx) to address this gap, and stimulate an interest in the field among African American youth in Baltimore. Without the contributions of the event sponsors the event could not have been held. **These sponsors are T. Rowe Price, Northrop Grumman, Baltimore Gas and Electric, Johns Hopkins Center for Talented Youth, Anysolv Technologies, Vaughn C. Greene Funeral Services, National Pan-Hellenic Council Inc., VAZtech Inc., The Hilton Inn in Pikesville, the National Society of Black Engineers, Metropolitan Alumni, and Pepsi Bottling Company.**



The event, which brought together youth, parents, and STEM professionals, was designed to highlight the importance of education in STEM and how academic achievement in STEM subjects can translate into rewarding career opportunities and exciting real-life applications. The event ran from 8:00 AM to 4:30 PM and students were served breakfast and lunch. Each student received an event tee-shirt and an event bag which included STEM related paraphernalia. Each student was also automatically registered to attend, free of charge, Dr. Benjamin Caron's "THINK BIG" presentation held on June 25<sup>th</sup>, 2012.

## Overview of STEMcx

The conference was organized into three key segments, which were designed to engage students parents in the STEMcx experience using different techniques. After an introduction from Baltimore Mayor Stephanie Rawlings Blake as well as sponsor pastor Dr. Walter Scott Thomas, the conference began with a motivational keynote address by Robert Curbeam. Mr. Curbeam, a native Baltimorean, former NASA astronaut and Captain in the United States Navy, moved on to pursue a career in the private sector at the Aerospace and Defense Division for the ARES Corporation where he became President, and finally to Raytheon, a major American Defense Contractor and industrial corporation where he now remains, as Vice President of their Integrated Defense System (IDS) business. He used personal anecdotes to motivate the students to not only get as much out of STEMcx as they could, but to stay connected to the professionals they would meet, and to make a commitment to pursuing a STEM career.



The second segment of STEMcx was organized around sixteen breakout sessions - eight designated for middle school students and eight designated for high school students - that were designed to encourage students to view the STEM disciplines in a new and exciting way. Each student pre-registered for two breakout sessions, which were each 90 minutes in duration. The sessions were designed to be very hands-on—offering the chance for students to create, innovate, collaborate and explore a variety of fascinating (and fun) experiences related to STEM careers.



The final segment of the conference was a "STEM Fair and Exhibit" which was organized much like a career fair. Presenters from local colleges and universities set up tables to allow students and parents to learn about educational opportunities available locally. Employers representing STEM professions were there to discuss internship, training and employment opportunities.

The day also included a parent session. Congressman Elijah Cummings kicked off the session, discussing the need for parents to be involved in their children's academic careers and encourage them to take advantage of the STEM opportunities available to them, such as the summer engineering program at the US Naval Academy. A representative of the College Savings Plan of Maryland followed, discussing how to finance a higher education, and Willie Little of the Calvert School, Math teacher and Middle Grades Partnership Director, discussed standardized testing.

## Media Attention

Two articles have been published about the STEMcx conference to date. The first "Science, Technology, Engineering and Math Not Just For Geeks" by Belinda Merritt, was published on April 14<sup>th</sup>, 2012 by the Afro American Newspapers and raved about the event. The second, lengthier article, "STEM Conference and Expo Held in Baltimore" by Kerri Phillips, was published in AmericaSpace and praised the volunteers in their efforts to educate African-American children in these fields.



## Student Assessment

The evaluation of STEMcx was designed to assess what students learned and valued most about the conference and expo. The organizers of STEMcx were most interested in learning what worked well and what could be improved from the point of view of the students in attendance. Therefore the data collection and analysis focused on student respondents, despite that fact that there was a session at the conference specifically targeted to parents.

After the conference, each student was invited to complete a student satisfaction survey, which was designed to get their candid feedback about their experience of the event.

This brief evaluation report will describe the STEMcx activities and attendee and report on student perceptions of STEMcx, with a focus on:

- What excited the students most
- What students learned
- What improvements students suggest for upcoming STEMcx conferences.

The student assessment will be broken into three parts: description of the attending students, general statistics of the conference as reported in the post-event survey, and the students' written responses to the survey.

### a) Description of Attendees

The response to the invitation to participate in STEMcx was consistent with what program planners had expected after the success of the 2011 conference, due to aggressive outreach by STEMcx organizers and the event's previously established reputation. 456 students registered to attend the conference, significantly more than the year prior, representing elementary, middle, and high schools in Baltimore City and the surrounding counties. Students came from public, private, parochial and magnet schools, with a number coming from high schools that specialize in STEM (such as Baltimore Polytechnic Institute, Friendship Academy of Science and Technology, Western School of Technology, and the Bluford Drew Jemison STEM Academy)

Of the registered participants, 238 (52.2%) were girls and 218 (47.8%) were boys. The age range in the group was fairly mixed: 40.57% of students were 11-13 years old; 42.1% were 14-16 years old; and 9.86% of students were 17-19 years old. Only 1.97% of students were 10 years old.



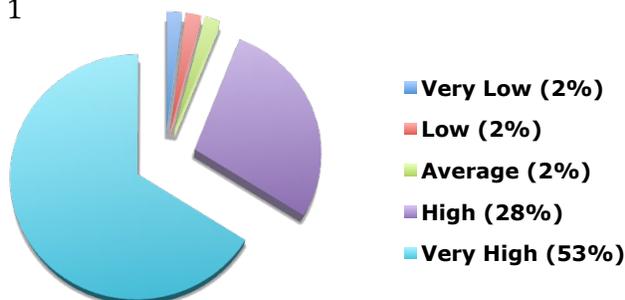
The survey was sent via email two weeks after the conference had ended. Although the survey was offered to all the registered students, only 53 students (11.62%) responded. This may seem like a very low number, but according to a study conducted by Michael Hamilton, Online Survey Analyst for Super Survey online software, the "total response rate" for surveys of this nature is 13.35%. This "total response rate" represents the percentage of invitations to complete a survey during a set period of time that resulted in a response. This statistic is only slightly higher than our 11.62%, meaning that ours is a respectable rate. The study also says that telephone and/or face-to-face surveys result in a higher response rate, so in the future we may choose to lean towards this type of data collection.

Although this is a respectable response rate, we must not assume that the responses of these students are reflective of the entire population of students who attended the conference. Therefore, the results of the survey can be used to generate a general impression of student attitudes, but should not be understood to reflect all STEMcx participants' understanding of STEM or interest in pursuing STEM careers. It is likely that the most motivated or engaged students were those who responded to the online survey (or that the respondents were those who have internet-access in their homes), so the results are likely to be positively skewed. In follow-up evaluations, efforts will be made to incentive all registered students to complete the online survey.

### b) General Survey Statistics

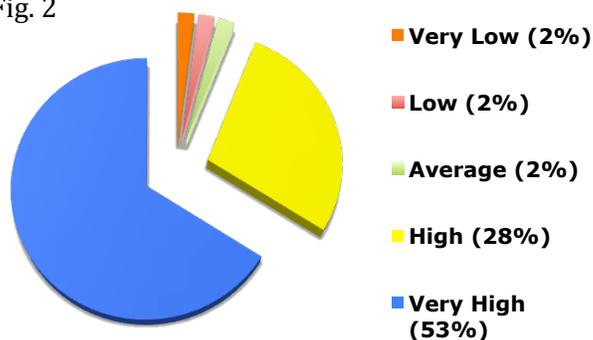
A number of questions on the survey were designed to assess students' feelings about their STEMcx experience. The results are shared below.

Fig. 1



**Fig. 1:** When asked how they would rate the STEMcx 2012 conference on a scale of 1 to 5, 1 being very low and 5 being very high, 53% of students reported that they would rate their experience as very high while 0% reported that they would rate their experience as very low or low.

Fig. 2



**Fig. 2:** When asked how they would rate the venue of the STEMcx 2012 conference on a scale of 1 to 5, 1 being very low and 5 being very high, 66% of students reported that they would rate their experience as very high while 2% reported that they would rate their experience as very low, low, or average.

### c) Written Responses

*"My daughter stated that the conference opened her eyes to how broad science and technology are and that there are many more aspects outside of what you learn in school."*

The open-ended questions on the survey allowed us to get students' impressions about their overall experience of STEMcx in their own words. The majority of survey respondents felt positively about the overall STEMcx experience, writing that it was "fun," that they "learned a lot" and it gave them goals for the future. Some representative quotes from the surveys illustrate an overwhelmingly positive appraisal of the EXPO.

*"Yes! We love science. If school was this fun the drop out rate would be in the low twenty range."*

*"I would like to be in more workshops or classes that involved STEM. This one day helped me to look at the future differently. I want to learn more about STEM. I would like to learn more about careers in science, technology, math, and science."*



Many children and families expressed interest in expanding on the experiences they had at STEMcx 2012. They remarked on how attending the workshops and interacting with professionals made the students motivated to learn, and commented on how much more there is out there for them to discover in these particular fields of scholarship:

*"I am eager to learn more with experience."*

*"From what my children stated to me, they loved it. And would like to come back."*

*"[You should] have the event twice a year, instead of once."*



While we would not expect a one-day event to be life changing, we did have expectations that the conference would be inspirational and could motivate some immediate changes in participants' attitudes toward the possibility of a future career in the STEM fields and their performance in school.



Some of the most compelling quotes from the survey results came when the students were asked the question "What is the one thing you really liked about this event?" Students came forth with so much excitement, and it was instantly clear just how much their STEMcx experience has impacted them already.

*"Everything was truly wonderful. The presenters and guest speaker were awesome."*

*"My son was happy and wanted to come back the next day. He is begging me to go to a Stem school."*

*"I really like that i got to hang with my friends and make new friends and also that I learned a lot of new things I never knew about!"*



One item that was frequently mentioned was the value of hands-on learning. There was a lot of positive feedback from the students to this regard:

*"The hands-on experiments/activities were exciting and taught us more about science."*

*"What I really liked about the event is the hands on experience."*

*"I liked the workshops that had hands on experiences. I'm visual."*



## Comments and Reflections

The second STEMcx conference was a success by many measures: student enrollment drastically increased from the 2011 event (27% more students participated in 2012); there was parity in the gender and age representation of participants; students were highly engaged in each of the sessions and reported new things and being inspired to apply themselves in school now and pursue STEM careers in the future. The community benefited greatly and the level of excitement about the subjects covered during the conference was palpable during the workshops, as well as evident in the survey responses. Additionally, very few students gave the sessions low marks.

After combing through the responses we accumulated a few specific recommendations for improving the event next year that came up several times. In the past these recommendations have proven very helpful in the organization of the following year. Two suggestions from the 2011 assessment - shortening the day from 6 pm to 4:30 pm and separating the workshops by middle and high school - were implemented in 2012. The recommendations from the 2012 survey fall into 8 categories:

- A more flexible venue with classrooms that comfortably hold the large number of students in each workshop.
- Opening the event to elementary age students who have expressed interest in learning more about STEM fields.
- Organizers may want to consider planning the conference around shorter sessions so that the day is not so hours long, particularly for the younger students.

- Offering multiple sessions of the high demands workshops to allow interested students to experience them.
- Allow parents to sit in on the keynote address and include more STEM parent training to provide them with the tools to further assist their children in these fields.
- Provide hot lunches, if possible, for the children during the lunch period.
- Have more presenters at the STEM exhibit.
- Organizers should develop a more affective method of getting participants to respond to the post-event online survey.

Overall, the STEMcx 2012 organizers can proudly say, "Mission accomplished!" Students left the day motivated to succeed and to apply the lessons they learned immediately to their studies. They left with role models that they will hold in mind as they plan their own STEM careers. Their imaginations were stimulated, and they saw first hand that "you can do anything that you put your mind to."

We suspect that the biggest challenge for organizing STEMcx 2013 will be managing the overwhelming demand, as all of the students we interacted with planned to tell their friends to make sure to attend the event next year.

It has been a blessing to be able to watch all these young children, the future leaders of America, learn and grow from just one day of STEM exposure. We can only hope that they will continue to do so.



# Workshop Presenters and STEM Fair Exhibitors

The organizers want to give special thanks to the workshop presenters who were the key component in the event's success. In addition, the interactive exhibit hall in the second half of the afternoon introduced a myriad of interactive activities focused around STEM.

## MIDDLE SCHOOL TRACK:

### **ROCKET SCIENTIST AND FLIGHT**

Presenters: Trena Ferrell, Maryland Education Liaison for NASA

### **THE BIG DIG**

Presenters: David Wilcots, P.G., Environment & Geological Consulting and Volunteer at the Public Dinosaur Lab. Academy of Natural Science of Philadelphia museum. Pete Yancone, Director of Education at the Maryland Science Center

### **A BRIDGE TO NOWHERE**

Presenters: Representatives from the National Building Museum and the National Capitol Section of the American Society of Civil Engineers

### **THE SCIENCE OF SUPERHEROES**

Presenters: Gene Adams, Director of Collaborative Education at Bronx Community College, and Alex Simmons, Executive Director of the Kids' Comic Con

### **SLAM DUNK: THE PHYSICS OF BASKETBALL**

Presenters: Physicist and author of "The Physics of Basketball", Professor John Fontanella and a professional basketball player

### **ARCHITECTURE 101**

Presenters: National Organization of Minority Architects at Morgan State University

### **SHARK WEEK**

Presenters: Joe Barber, Director of Education Programs National Aquarium, Baltimore and research at the Shark Research Institute (SRI) in Princeton, NJ

## HIGH SCHOOL TRACK:

### **THE PHYSICS OF FOOTBALL**

Presenters: Dr. Sylvester James Gates, Professor of Physics and contributor to NBC Learn Series The Science of NFL Football with special appearance by Aaron Maybin of the New York Jets, Keion Carpenter, retired Atlanta Falcon, and Bryant Johnson of the Houston Texans



### **EXPLORING THE UNIVERSE BEYOND OUR EYES**

Presenters: Staff from Johns Hopkins Space Telescope Institute

### **KINECT WITH MICROSOFT: XBOX 360 EXPOSED!**

Presenters: Representatives of Microsoft

### **THE CHEMISTRY OF COVERGIRL**

Presenters: Procter and Gamble Scientists and Nnenna Adba from season 6 of America's Next Top Model

### **TRAUMA 101**

Presenters: Health Professionals at LifeBridge Health and Dr. Miles Harrison, Division Head, General Surgery at Maryland General Hospital

### **SCIENCE INTERNSHIPS**

Presenters: Scientists and Engineers from the Army Educational Opportunity Program

### **CSI BALTIMORE**

Presenters: Letitia Etheridge, CSI Forensic Education at the National Museum of Crime & Punishment and Dawn Johnson forensic scientist with the Montgomery County Police

### **ALTERNATE ENERGY AND CARS**

Presenters: John Murach, Director of Business Planning and Corporate Performance, BGE and a representative of the Baltimore-Washington Electric Vehicle Initiative (BEVI)

## STEM FAIR EXHIBITORS:

- Morgan State University Actuarial Science Program
- University of Baltimore
- Johns Hopkins University CTY
- National Technical Association- Baltimore Chapter
- Coppin State University Upward Bound
- Living Classrooms
- Caring for in Young Minds Foundation
- FIRST Robotics of Maryland
- Baltimore Zoo
- NASA (SAIC)