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This landscape was researched by the Maryland Out of School Time (MOST) Network. MOST is a statewide youth development organization dedicated to more and better opportunities in the out of school hours for all of Maryland's young people.

For more information visit: www.mdoutofschooltime.org.

Research and writing conducted by:

Lead: Paul Mincarelli, STEM AmeriCorps VISTA

Contributor: Ellie Mitchell, Director

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*Sharon Ball, Patterson High School Consortium for Urban Education (CUE) *Justin Eames, SEED School of Maryland *Josh Gabrielse, Baltimore City Public Schools *lpsita Ghosh, Baltimore Polytechnic High School *Rob Glotfelty, Patterson Park Public Charter School Sheryl Goldstein, Harry and Jeanette Weinberg Foundation *Nicholas Greer, Baltimore City Public Schools Cindy Hasselbring, Maryland State Department of Education Steve Kaiser, Kaiser Associates Alok Kommajesula, the Family League of Baltimore City **Bonnie Legro, Abell Foundation** *Dr. Luis Lima, Baltimore City Public Schools *Joseph Manko, Liberty Elementary School *Jenna Shaw. Patterson Park Public Charter School *Joshua Shaw, Baltimore City Public Schools T. Rowe Price Foundation *Michael Thomas, Baltimore City Public Schools *Interview participant

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Introduction



STEM is happening all around Baltimore City.

The nation is sharpening its focus on STEM education.

Global competitiveness and national security are often cited as two of the most urgent concerns as the United States slip in performance rankings on math and science, and our schools fail to produce enough qualified graduates to fill jobs in the new economy. For advocates concerned about equal access to quality education, STEM learning poses another challenge: minorities and women are underrepresented in STEM fields. Lack of role models is a challenge, and access to engaging and high quality instruction in STEM areas is a major barrier. Urban school districts like Baltimore City are often under-resourced, with limited staff supporting science teaching and learning at the administrative level, and limited access to science trained teachers, particularly in the elementary grades. Additionally, access to materials and appropriate technology can be challenging. According to Governor Martin O'Malley's 2009 STEM Task Force, annually 6,000 new STEM jobs are created in the state of Maryland with only 4,000 students able to fill them¹. In cyber-security alone, there are 18.1 new job postings for every 10,000 Maryland residents, second only to Virginia². It is imperative that students are aware of and given the tools to fill these jobs.

Despite these hurdles, STEM education is happening all around Baltimore City. There are STEM initiatives within the school system and individual schools. There are informal and formal STEM programs occurring after school and during the summer. Though there are many partnerships involved in these programs, they often are disconnected from each other and from a larger goal, vision, or strategic plan to address scale and gaps.

Understanding the current landscape of opportunities is a critical first step to bringing the STEM education community together to create a web or ladder of STEM opportunities that allows students to ratchet up from engagement to skill building to skill application.

A recent paper funded by the Noyce Foundation and co-authored by Saskia Traill and Kathleen Traphagen entitled *How Cross Sector Collaborations are Advancing STEM Learning* provides a definition for a STEM Ecosystem:

A STEM learning ecosystem encompasses schools, community settings such as afterschool and summer programs, science centers and museums, and informal experiences at home and in a variety of environments that together constitute a rich array of learning opportunities for young people. A learning ecosystem harnesses the unique contributions of all these different settings in symbiosis to deliver STEM learning for all children. Designed pathways enable young people to become engaged, knowledgeable and skilled in the STEM disciplines as they progress through childhood into adolescence and early adulthood.

^{1 &}lt;u>http://www.gov.state.md.us/documents/090806stemReport.pdf</u>

^{2 &}lt;u>http://www.washingtonpost.com/business/capitalbusiness/report-finds-dc-area-a-hotbed-for-cybersecurity-jobs/2014/03/08/1b72ff1e-a560-11e3-8466-d34c451760b9_story.html</u>

Stakeholders in a STEM ecosystem develop a shared vision and assess the strengths and gaps of their efforts to reach that vision. Educators, whether K-12 teachers, after-school staff, or experts in informal STEM institutions, work across settings to increase their individual efficacy, while at the same time deepening understanding and respect of the role of educators in other settings. Effective practices are shared across settings, while innovative program models are flexibly adapted to solve entrenched STEM learning challenges. Cross-sector professional development opportunities and communities of practice improve pedagogy and build knowledge among educators across settings³.

In addition to this definition, the paper identifies fifteen examples of efforts across the country to bolster and coordinate STEM learning opportunities within a city or region. These examples provide lessons that can be used by Baltimore's STEM education community.

MOST undertook a five month effort to collect a snapshot of **STEM education opportunities** within Baltimore City.

With support from the Abell Foundation, the Maryland Out of School Time Network (MOST) undertook a five month effort to collect a snapshot of STEM education opportunities for school aged young people available within Baltimore City.

Data for the Baltimore City STEM Education Landscape was collected through an online survey, mining public data including information collected by a variety of local and state STEM-focused working groups, and engaging in key stakeholder interviews. The online survey was distributed through our statewide sySTEM Learning Community, as well as sent directly to funders, local partners, and MOST's general constituent list. Key stakeholders were identified within the Baltimore City Public School System, and interviews were performed using a standard question battery and a protocol that ensured confidentiality of quotes. In every interview the respondents were shown a diagram representing a draft "STEM Ecosystem" (Appendix C: Fig. 1) and they were asked to identify the areas in which they were most involved and areas in which they would like to be more involved. A "heat map" of their responses is represented in Appendix C: Fig. 2 and Fig. 3 where the deeper orange indicates greater frequency of selection.

3 http://www.expandedschools.org/sites/default/files/STEM_ECOSYSTEMS_REPORT_140128.pdf

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Results

As a result of this research, information on formal, informal, and Out of School Time (OST) STEM education programs in Baltimore City is available in a centralized and organized series of documents.



The STEM Education Landscape has produced:

- Landscaping Baltimore's STEM Ecosystem, a narrative based on the synthesis of survey data and the 11 key stakeholder interviews conducted in the Baltimore City Public School System
- The Baltimore City STEM Directory featuring 91 opportunities
- A school-by-school directory with all 195 Baltimore City Public Schools and 30 in school STEM programs
- A school-by-school directory of all 195 Baltimore City Public Schools and 15 STEM competitions
- A school-by-school directory of 18 out of school time STEM programs

The resources can now be used by Baltimore City educators, parents, students, and funders to enhance collaboration and build awareness of and participation in STEM learning opportunities. The following are lists of schools that offer in school STEM, STEM competitions, and OST STEM opportunities.

These resources can now be used to **enhance collaboration and build awareness** of STEM learning opportunities.





Finding In School STEM Opportunities

Of the in school STEM programs surveyed, 89—45% of all Baltimore City public elementary, middle, and high schools—offer at least one program. The following high schools offer the most in school STEM programs:

 Mergenthaler Vocational Technical High School

 (11 programs: PLTW: Engineering, CTE: Arts, Media, and Communication, CTE: Business, Management, and Finance, CTE: Construction and Development, CTE: Consumer Sciences, Hospitality, and Tourism, CTE: Health and Biosciences, CTE: Human Resources and Services, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, CTE:

 Transportation Technologies, and Academy of Health Professions)

2. Edmondson-Westside High School

(11 programs: PLTW: Engineering, CTE: Arts, Media, and Communication, CTE: Business, Management, and Finance, CTE: Construction and Development, CTE: Consumer Sciences, Hospitality, and Tourism, CTE: Health and Biosciences, CTE: Human Resource Services, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, CTE: Transportation Technologies, and Academy of Health Professions)



3. National Academy Foundation

(8 programs: PLTW: Gateway to Technology, PLTW: Engineering, CTE: Business, Management, and Finance, CTE: Consumer Sciences, Hospitality, and Tourism, CTE: Human Resource Services, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, and Project BioEYES)

4. Western High School

(8 programs: PLTW: Biomedical Sciences, CTE: Health and Biosciences, CTE: Human Resource Services, CTE: Information Technology, Engineering Innovation, Women in Science and Engineering, Science Communications, and Project BioEYES)

5. Carver Vocational-Technology High School

(7 Programs: CTE: Arts, Media, and Communication, CTE: Business, Management, and Finance, CTE: Construction and Development, CTE: Consumer Sciences, Hospitality, and Tourism, CTE: Human Resources Services, CTE: Information Technology, and CTE: Manufacturing, Engineering, and Technology)

6. Patterson High School

(7 Programs: PLTW: Engineering, CTE: Arts, Media, and Communication, CTE: Business, Management, and Finance, CTE: Health and Biosciences, CTE: Human Resource Services, CTE: Manufacturing, Engineering, and Technology, and Academy of Health Professions)

7. Bluford Drew Jemison STEM Academy West

(6 Programs: PLTW: Gateway to Technology, PLTW: Engineering, CTE: Health and Biosciences, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, and Center for Talented Youth Summer Residential Program)

8. Friendship Academy of Science and Technology (closed 2014) (6 Programs: PLTW: Biomedical, PLTW: Engineering, CTE: Health and Biosciences, CTE: Human Resource Services, CTE: Information Technology, Project BioEYES)

9. Baltimore Polytechnic Institute

(5 Programs: Ingenuity Project, PLTW: Engineering, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, and Engineering Innovation)

10. Digital Harbor High School

(5 Programs: CTE: Arts, Media, and Communication, CTE: Human Resource Services, CTE: Information Technology, Project BioEYES, and CS Matters in Maryland)

The following middle schools offer the most in school STEM programs:

1. National Academy Foundation

(8 programs: PLTW: Gateway to Technology, PLTW: Engineering, CTE: Business, Management, and Finance, CTE: Consumer Sciences, Hospitality, and Tourism, CTE: Human Resource Services, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, and Project BioEYES)

2. Bluford Drew Jemison STEM Academy West

(6 Programs: PLTW: Gateway to Technology, PLTW: Engineering, CTE: Health and Biosciences, CTE: Information Technology, CTE: Manufacturing, Engineering, and Technology, and Center for Talented Youth Summer Residential Program)

3. Friendship Academy of Science and Technology (closed 2014) (6 Programs: PLTW: Biomedical, PLTW: Engineering, CTE: Health and Biosciences, CTE: Human Resource Services, CTE: Information Technology, Project BioEYES)

4. Roland Park Elementary/Middle School

(5 Programs: Ingenuity Project, Project BioEYES, Center for Talented Youth Summer Day Programs, Center for Talented Youth Summer Camp Programs, and CS Matters in Maryland)

- 5. Maryland Academy of Technology and Health Sciences (4 Programs: PLTW: Biomedical, PLTW: Engineering, CTE: Health and Biosciences, and CTE: Manufacturing, Engineering, and Technology)
- 6. Margaret Brent Elementary/Middle School (4 Programs: SABES, Engineering Design Intersession Course, Making Neuroscience Fun, and Project BioEYES)
- Academy for College and Career Education

 (3 Programs: PLTW: Gateway to Technology, CTE: Information Technology, and Engineering Innovation)
- 8. New Era Academy (3 Programs: PLTW: Gateway to Technology, CTE: Information

Technology, and Project BioEYES)

- 9. Bluford Drew Jemison STEM Academy Middle (closed 2014) (3 Programs: PLTW: Gateway to Technology, Project BioEYES, and Center for Talented Youth Summer Residential Programs)
- 10. Armistead Gardens Elementary/Middle School (3 Programs: Project BioEYES, Your Watershed Your Backyard, and Center for Talented Youth Summer Residential Programs)

Finding Out of School Time (OST) STEM Opportunities

Of the OST STEM programs surveyed, 56 – 28% of Baltimore City public elementary, middle, and high schools – offer at least one out of school time STEM program. The following high schools offer the most out of school time STEM programs:

1. Academy for College and Career Exploration (3 Programs: Engineering Innovation, Parks and People Foundation, and the Patterson Park Audubon Center)

- 2. Baltimore Polytechnic High School (2 Programs: Engineering Innovation and Medical Education Resources for Teens (MERIT))
- **3. Patterson High School** (2 Programs: Building STEPS and the Y of Central Maryland)
- 4. P.L. Dunbar High School (2 Programs: Building STEPS and MERIT)
- 5. Western High School (2 Programs: Engineering Innovation and MERIT)

The following middle schools offer the most out of school time STEM programs:

- 1. Academy for College and Career Exploration (3 Programs: Engineering Innovation, Parks and People Foundation, and the Patterson Park Audubon Center)
- Commodore John Rodgers Elementary/Middle

 (3 Programs: Living Classrooms Foundation, Junior Achievement of Central Maryland, and LET'S GO Boys and Girls)
- 3. Patterson Park Public Charter School (3 Programs: Building STEPS, Patterson Park Audubon Center, and Junior Achievement of Central Maryland)
- 4. Booker T. Washington Middle School (2 Programs: Junior Achievement of Central Maryland and the Y of Central Maryland)
- 5. Calverton Elementary/Middle School (2 Programs: Parks and People Foundation and Junior Achievement of Central Maryland)



Schools that Participate in STEM Competitions

Of the STEM competitions surveyed, 72 – 37% of Baltimore City public elementary, middle, and high schools – participate in at least one STEM competition. Of that number, 45 (73%) participate in only one STEM competition. The following high schools participate in the most STEM competitions:

- 1. Patterson High School (4 competitions: VEX, MESA, NFTE, and Skills USA)
- 2. Digital Harbor High School (3 competitions: VEX, NFTE, and Skills USA)
- 3. Friendship Academy of Engineering and Technology (3 competitions: VEX, MESA, and NFTE)
- 4. Paul Laurence Dunbar High School (3 competitions: VEX, FRC, and NFTE)
- 5. Baltimore City College (2 competitions: VEX and MESA)
- 6. Baltimore Polytechnic Institute (2 competitions: VEX and Technovation)

The following middle schools participate in the most STEM competitions:

- 1. Francis Scott Key Elementary/Middle School (3 competitions: VEX, FLL, and NFTE)
- 2. Lakeland Elementary/Middle School (3 competitions: VEX, FLL, and MSO)
- 3. Roland Park Elementary/Middle School (3 competitions: FLL, NFTE, and Destination Imagination)
- 4. Arlington Elementary (2 competitions: VEX and FLL)
- 5. Baltimore International Academy (2 competitions: FLL and MESA)

Conclusions From Data

In School STEM

Of the in school STEM programs surveyed, nearly half of Baltimore City Public Schools offer at least one program, and over half of those offer more than one program. The most popular in school STEM programs can be found within the school system's CTE track, as well as PLTW. Schools that offer multiple STEM programs often include at least one PLTW and many CTE track options.

In school STEM partners, such as institutions of higher education, typically offer programs to fewer than ten schools. If in school STEM opportunities are to be expanded throughout the district, then it is important that these institutions of higher learning offer these programs to more schools.

There is a significant discrepancy between available in school STEM programs in high school and the lower grade levels. It is important that this discrepancy is addressed, and that elementary and middle schools offer STEM programs to their students since these are the ages where students develop interest in STEM topics. STEM programming offered in high school is typically for students already interested in STEM. A strong STEM pipeline and ecosystem lattices student interest through grade levels, and supports their gradients of curiosity. Within this narrative, we recommend the expansion of scalable programs like Project Lead the Way (PLTW) for formal elementary STEM education.

OST STEM

Less than a third of Baltimore City Public Schools offer at least one of the OST programs surveyed. While this number is low, we do attach the caveat that it does not include the above competitions, or in school programs that also offer an out of school time supplement. This was in the interest of not double-counting programs. The out of school time informal education setting is tailor-made for quality STEM programming as it offers students a venue for exploration and iteration without the constraints of tests and class time. Only three schools offer more than two STEM programs in their OST catalogue. Of the 56 schools that offer OST STEM, 19 offer more than one program.

From these data, we can determine that the majority of STEM programming in Baltimore City occurs in the formal education setting, and these opportunities are not as equally represented in the OST space. There are also a handful of schools that offer a variety of in school STEM, OST STEM, and STEM competitions for their students. The goal of gathering this information on schools is not only to highlight those that offer such opportunities, but also to elucidate some of the gaps in programming.

Competitions

Slightly over a third of Baltimore City Public Schools participate in our surveyed competitions. Of those, over half participate in only one competition. All students in the school system have the opportunity to compete in athletics, however, the opportunity for students interested in STEM have far less of an opportunity to participate in STEM competitions.

The most popular competition amongst the schools is VEX robotics followed closely by FLL. VEX and FLL offer a full competition season for several students at each school, and a chance to win championships and awards against other city schools.

For competitions to be expanded, it is important that locally-run programs such as Technovation (5 schools), MESA (8 schools), and MSO (5 schools) recruit more schools. These STEM competitions are available free or low-cost to schools, and offer the opportunity-much like in robotics—to gain firsthand experience in working on a design team. MSO is especially attractive as it introduces students to a variety of STEM topics through project-based learning. Engineering teamwork allows students to realize their strengths and how they fit in to the greater STEM picture.

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Themes

An analysis of the Baltimore STEM Landscape Data revealed a number of cross-cutting and recurring themes that have applications to the formal, informal, and OST STEM worlds. The following narrative briefly explores five areas:

Richness of Local STEM Resources Communication and Networking Among STEM Educators Teacher and Facilitator Professional Development and Recruitment Materials and Technology Integration Relevance and Career Connections



Richness of Local STEM Resources

Teachers and administrators interviewed for the STEM Landscape spoke highly of their nonprofit, university, and corporate partners in and out of the classroom. Those interviewed that were involved with PLTW cited the most supporting resources for their STEM curricula. PLTW provides an Industry Advisory Board for its educators, which is comprised of engineers from Lockheed Martin and Northrop Grumman, as well as educators from the nine PLTW certified schools within Baltimore City Public Schools. According to one PLTW educator, Lockheed Martin engineers often make classroom visits to directly interact with students. Despite the success of PLTW, there are ongoing challenges at the school level to fund the materials costs and PLTW has not yet reached its full potential in scale across the district.



Local universities were cited by educators and administrators as providing a wealth of STEM resources for students and teacher professional development. STEM Achievement in Baltimore Elementary Schools (SABES), which can be found in nine city elementary schools, is a five year grant in partnership with Johns Hopkins University's Whiting School of Engineering. Educators were quick to identify SABES schools as exemplary sites of in school STEM. One educator mentioned, "What I like about the SABES sites, all of the materials are there, so even if you don't have a strong science background, you can teach it." The same educator mentioned Project BioEYES, which is another Johns Hopkins University expanded learning opportunity, and is available to dozens of city schools.

Many of Baltimore's STEM non-profit organizations were identified as partners in providing quality after-school or in school STEM opportunities. Local organizations identified include: Maryland Science Olympiad, the Baltimore City Robotics Center, Code in the Schools, and the Digital Harbor Foundation. One school administrator—in describing Baltimore's non-profit STEM organizations—said:

"I think they're doing great stuff. It's kind of in a vacuum, I don't know of a lot of great stuff going on, it's all in pockets, not anything that's being done to scale... You really need the power of some of these entities behind it. It's hard for schools to do it alone."

This administrator stressed the need for deeper collaboration between the schools and the city's non-profit education sector, especially in delivering STEM opportunities to scale. One organization, the Maryland Science Olympiad, offers such a scalable learning tool at various schools throughout the district.

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Communication and Networking Among STEM Educators

One-hundred percent of survey respondents indicated that partnerships were a key part of their afterschool and summer STEM programs, however, many of survey respondents and interviewees indicated that they would value more information about available resources and additional organizations with whom to partner. There was also sense among the interviewees that STEM education work was often occurring in isolation with pockets of excellence emerging at specific schools, while other schools and communities were having difficulty tapping in to STEM resources. Many indicated they were interested in both virtual (i.e. online platforms to share curricula and strategies) and inperson connection opportunities (i.e. trainings, workshops, networking events and conferences).

Emphasis was placed on improving communication about STEM within the school district and between the school district and STEM partners.

100%

of survey respondents indicated that partnerships were a key part of their afterschool and summer STEM programs, but needed more information about available resources and partners.

In particular, several interviewees identified the need to provide more guidance to principals on best practices and resources to support STEM in their schools:

"...I think communicating all the way from the top to the bottom: what are the district's STEM goals, where do we want our students to be? And then, who at the district are the STEM experts? Who do we go to? And then how do we get that out to principals, how do principals know what to look for, how do teachers know what to be teaching, where can they go for more resources?"

Teacher and Facilitator Professional Development and Recruitment

During the school day, teachers are the frontline for children's learning. Afterschool, youth development professionals provide expanded learning opportunities and additional connections to students. All of these points of contact require training and professional development so that the relationships and instruction can be successful and productive. Effective STEM instruction requires additional layers of support including developing an understanding of the principles of project based learning, and building an ability to facilitate learning of specific knowledge and skills.

Many elementary school educators lack a science specialization, and similarly many OST program providers do not come from a science background. Therefore, the overall confidence in educators interacting with early grades students in teaching STEM subjects is low. Unfortunately, this is an important time of activation and engagement with STEM. Both the survey respondents and interviewees identified teacher professional development at all grade levels as a key barrier to implementing STEM: Many elementary school educators **lack a Science Specialization**, and similarly many OST program providers do not come from a science background.

"The other key area that we could improve would be funding for professional development for teachers, and more opportunities for professional development... Sustained professional development throughout the year, more than just the assigned PD days... To be the most effective you have to have coaches in place that could embed the PD through the day, or you would have structures in place for the teachers to come out of the classroom for some period of time, and then go back to transfer that knowledge."

One of the best practices in professional development is modeling and site based coaching. According to a Brown University Annenberg Institute report, "a well-designed and supported coaching program weds core elements of effective professional development with the essential gains of professional learning communities in ways that advance both school and systemic improvement." ⁴ Implementing this practice, however, is always challenging from a resource and time perspective. Communities of practice and program quality observation can also be elements of an effective strategy to support quality instruction.

4 <u>http://annenberginstitute.org/pdf/instructionalcoaching.pdf</u>



Materials and Technology Integration

A common theme among STEM instructors was the need for technology to become ubiquitous in the classroom. Students exploring STEM content should be able to access up to date technology such as tablets, laptops, software, and hardware such as robotics parts or 3D printers. Tech integration allows students the opportunity to explore STEM using tools with which employers will be expecting literacy.

While infusing STEM learning with up to date technology is important, administrators and educators stressed that merely using the tools is not enough, and that students should be expected to create and manipulate the technology. One principal said:

Technology should become ubiquitous in the STEM classroom.

"The holy grail of tech integration is when the tools aren't used for consumption, but are used for creation. That's what we're pushing towards."

Schools such as Patterson Park Charter School, Liberty Elementary, Commodore John Rodgers, and Ben Franklin High School were mentioned as top examples of tech integration in learning experiences.

Educators also spoke of the opportunities to collaborate with non-profit organizations working in the OST space to connect young people to technology not available in the classroom. Code in the Schools and the Digital Harbor Foundation Tech Center were cited as partners that provide unique technology-based STEM experiences to students as well as teacher training and professional development around technology.

Non-technology based STEM materials present a challenge as well for both in school and OST STEM programs. Many curricula that focus on STEM project based learning, particularly those focusing on the engineering design process can require specific materials that if not available in a kit format may require specialty shopping—a process that is time consuming and sometimes expensive. Where kits are available for order, they don't always meet the classroom size and they can become expensive.

Relevance and Career Connections

Building awareness of STEM careers and the relevance of STEM in everyday life was listed as one of the top goals for Baltimore's STEM OST programs. Making STEM experiences meaningful for Baltimore students and building awareness of the potential careers in the local STEM economy was also a universal theme in the interviews. A common frustration was expressed that many teachers and schools lack curricula and instructional resources that match today's workforce skills, along with the need for additional partnerships with business and industry. One interviewee indicated appreciation of the current business partners that interact with students; however added, "I need engineers that aren't afraid of seeing Baltimore City students up close and personal." Several interviewees were concerned about the disconnect between Baltimore City students and their awareness of the opportunities in local STEM fields:

I would like to see **potential partnerships** where kids are helping solve problems that we have in the city day.

"Our students don't see the local opportunities. There's a direct correlation with socioeconomic status, and when you have about 50% of your student population that's generationally poor, the realm of possibilities is very limited. If the school cannot provide the opportunities to engage these additional experiences that middle class families would naturally engage their children in, we can't move. This is where I think the next step needs to be, because if you can't offer them the right career education route-in STEM in particular-they're going to miss the opportunities to engage in anything. We have a huge biomedical park here, you have hospitals and clinics-the amount of kids engaged in higher level career tracks and interaction with them is minimal."

One strategy that the most STEM engaged teachers are implementing is focusing STEM instruction on real world challenges. One of our interviewees said: "I am always looking for opportunities for students to think about their place in the world. I would like to see potential partnerships that we could have where kids are helping solve problems that we have in the city, instead of saying, 'You could do this one day.'- how do we make that more of an experience that they could be having now?"

In the formal and informal education spaces, there are examples of STEM programs that include mentorship, job shadowing, and hands-on career experience. Johns Hopkins University, for instance, offers programs like Biophysics Research for Baltimore Teens (BRBT) and the Center Scholars Program where students take college-level courses and develop professional lab experience over the summer. There is a robust Career and Technology Education (CTE) program within the Baltimore City Public School System which contains nine STEM tracks that can be found at 66 schools. The Project Lead the Way (PLTW) and CTE programs are–according to our research and interviews–the most prominent in school STEM programs, and offer an avenue towards career readiness.

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OST STEM Survey Highlights (N = 30)

54% involve parents and families in their programs

Top 3 Goals for programs

 \rightarrow Youth develop STEM skills \rightarrow Youth develop interest in STEM activities \rightarrow Youth develop an understanding of STEM careers and STEM in everyday life

76% utilize state or national education standards in designing or selecting STEM activities: \rightarrow 62%: State Specific \rightarrow 87%: Common Core \rightarrow 37%: Next Generation Science Standards

70% charge nothing for participation

50% rely on school day teachers to provide OST STEM instruction

85% provide some kind of STEM professional development, 37% only provide PD once (or less than once) a year

83% Indicate Colleges and Universities as the most common partner

90% conduct some kind of evaluation on their STEM programming

The informal, afterschool, and summer spaces provide a necessary complement to authentic learning during the school day and within the classroom. Partnerships with STEM rich institutions like museums, industry, and higher education link students and teachers to STEM expertise, practical applications of learning, and opportunities to interact with unique resources not always available in the classroom. OST programs where students participate in afterschool or summer programs that offer robotics, coding clubs, engineering, and design challenges, offer a different kind of STEM engagement opportunity. Free from the pressures of time limitations, grades, and testing, students can experiment, get messy–even fail (and fail again)–while developing skills of persistence and learning the importance of iteration. In designing authentic STEM learning opportunities, collaboration and partnership between teachers in classrooms, OST programs, and STEM rich institutions create a "learning ecology" that also has the opportunity to engage parents and families.

Recommendations



- Continue to add to the catalogue of STEM learning
- opportunities and make the catalogue available to the public.
- **2** Support the scaling of effective programs.
- **3** Create opportunities to network STEM educators.
- 4. Increase the amount and quality of teacher/facilitator professional development opportunities and where possible include on-site coaching and quality observations.
 - Increase mentorship, internships, field trips and other
- **D** connections between local STEM businesses and institutions.
- **6.** Increase access to technology and STEM materials for both in school and out of school educators.

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1. Continue to add to the catalogue of STEM learning opportunities and make the catalogue available to the public.

While conducting the landscape work, new opportunities were revealed throughout the process. Ultimately, an online database that would be available to both educators and parents should be the goal. We recommend the database be housed by the Maryland State Library System for multiple considerations: 1) many of the opportunities cross jurisdictions; 2) the library system has considerable experience with organizing and collecting data; and, 3) the library system is a trusted public institution who can sustain the resource. In the interim, providing a version of the current landscape directory available both online and through print versions can increase the information available in Baltimore City. Ideally, the directory would be updated annually with input from a broad based collection of partners.

2. Support the scaling of effective programs.

There are many programs operating both in schools and outside of the school day that could scale effectively to reach more students. Examples include Project Lead the Way's expansion to Elementary School, Maryland Science Olympiad, First Lego League, and VEX Robotics. Many interviewees cited robotics as a great tool for engagement and latticing student's interest in STEM to high levels. However, the challenges facing teachers who choose to be robotics coaches also was a common theme. Despite the many hours of volunteer service provided by teachers who choose to facilitate robotics, their efforts are largely unrewarded. A junior varsity volleyball coach in Baltimore City will earn a stipend for the season, while robotics coaches go largely uncompensated for their efforts. These kinds of barriers keep programs from effectively scaling. This kind of funding could apply to any afterschool science activity, and could increase participation and team successes not just in robotics but many of the state and national competitions.

3. Create opportunities to network STEM educators.

People who love STEM are passionate about the topic and are encouraged and inspired by learning about the good work of other colleagues. This shared passion and cross fertilization is the central reason to build connections between STEM educators in all spheres (formal, informal, and OST). A STEM Educator's Network for Baltimore City could provide greater sharing of knowledge, models, and resources while hopefully reducing replication and increasing collaboration and coordination. The Consortium for Urban Education (CUE) has already begun convening a STEM education workgroup focused on the efforts of higher education. The EdTech (Educational Technology) sector has regular meetups and utilizes social media and networking sites to stay connected. There are several examples of more formalized efforts to build STEM networks in the Traill, Traphagen publication in particular the Orange County and New York City STEM initiatives.

4. Increase the amount and quality of teacher/facilitator professional development opportunities and where possible include on-site coaching and guality observations. As science curricula are aligned to the Next Generation Science Standards, teachers will be expected to facilitate design challenges, and deeper-dive STEM in the classroom. This will drive the need for teachers—especially at the elementary level-towards professional development to enhance subject matter confidence. Currently, there are numerous opportunities through local universities for teacher professional development. University of Maryland Baltimore County, Towson University, and Notre Dame of Maryland University offer courses for teachers to build STEM content confidence. Professional development for content extends to informal STEM educators as well, and robust STEM ecosystem would see cross-enrollment of formal and informal educators. Our recommendation is to provide incentive for educators to attend these courses, and build a learning community around teachers who have taken courses with currently enrolled educators.

5. Increase mentorship, internships, field trips and other connections between local STEM businesses and institutions. The Greater Baltimore area is one of the nation's most STEMrich corridors for business, higher education, and federal institutions. Yet many of Baltimore City's school students do not understand how STEM applies to their daily lives or their future career choices. One way students understand how to connect their futures to local opportunities is through interactive field trip experiences. Recently, Higher Achievement, an afterschool mentoring program in Baltimore City, took their scholars to the BGE training center in White Marsh where they learned that men and women from their neighborhood were part of the BGE workforce being trained to keep the power lines intact and safe. These role models served as an inspiration to the students to learn more about electricity and about careers in the field. There are a number of STEM High School internship programs, but most focus on students who are already engaged in STEM learning and are performing well academically. We need more mentorship and internship opportunities for a broader base of students. For these initiatives to achieve success, however, potential mentors will need to be prepared with some knowledge of youth development and students will need support and coaching on the social norms and soft skills of the workplace. Programs like BuildingSTEPS provide models that can be expanded upon to reach more students.

6. Increase access to technology and STEM materials for both in school and out of school educators.

As Baltimore City Schools are renovated under the 21st Century Buildings plans, careful attention should be paid to technology integration and developing classrooms that facilitate STEM learning. Creative and collaborative thinking about materials could support broader access including developing a central repository for kit development and distribution and creating a "Tool Bank" type loan system for more expensive and hard to access technology like 3D printers. The majority of interviewees described their current involvement in technology integration in the classroom, and the time is at hand where "tech is the new pencil." Recognizing this, schools in Baltimore City are applying for technology grants to achieve 1:1 iPad ratios, or otherwise outfitting their students with a ubiquitous technology experience. As technology access is increased, and STEM courses are augmented with technology, students will be able to achieve vital tech literacy that will make them competitive in the 21st century job market.

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Institutes of Higher Learning

Johns Hopkins University

www.jhu.edu

3400 N. Charles St., Baltimore, MD 21218

Johns Hopkins University (JHU) is a major partner for in school and out of school time STEM programs for Baltimore City youth. Through the Whiting School of Engineering, the Center for Educational Outreach, Center for Talented Youth, Institute for Nanobiotechnology, and Applied Physics Lab, JHU sponsors 18 programs that are found in many Baltimore City Public Schools and community centers.

Biophysics Research for Baltimore Teens (BRBT) http://pmb.jhu.edu/brbt/index.html

The Biophysics Research for Baltimore Teens (BRBT) program is sponsored by JHU's Program in Molecular Biophysics. Baltimore City high school students received paid internships for eight weeks through the summer to experience hands-on biomedical lab work. Students work side by side with JHU research faculty and undergraduates, and develop professional relationships that will help them pursue biomedical careers.

CTY Online:

www.cty.jhu.edu/ctyonline/

Sponsored by the Center for Talented Youth, CTY Online offers online courses for high performing students in grades K-12. CTY instructors proctor STEM courses year round for individual students as well as schools. CTY Online math courses were attended by students at the Mt. Washington School, and Highlandtown Elementary and Federal Hill Preparatory also worked with CTY Online.

Center for Talented Youth Family Academic Programs: <u>www.cty.jhu.edu/family/</u>

Held as one day or weekend events for students and parents, CTY Family Academic Programs are designed for CTY Talent Search participants and their families to explore broad-based education and life-long learning curriculum. CTY Family Academic Programs are available for students in grades 2-12.

Center for Talented Youth Summer Programs: www.cty.jhu.edu/summer/

Available as day and residential programs, the CTY Summer Programs are for students in elementary through high schools. The program takes place over three weeks and students develop academic talent through rigorous academics and learning.

Center Scholars Program

www.cty.jhu.edu/research/projects/scholarprog.html

Funded through the National Institutes of Health's National Human Genome Research Institute (NHGRI), the Center Scholars Program seeks to improve diversity in the field of genomics research. The Program operates through JHU's Center for Talented Youth (CTY), and recruits ethnically and socially diverse high school students. Programming for Center Scholars occurs in three consecutive summers where they participate in college-level courses and laboratory internships.

Charm City Science League (CCSL):

https://johnshopkins.collegiatelink.net/organization/charmcityscienceleague

CCSL supports the Science Olympiad students at Barclay Middle School with undergraduate student mentors from the Whiting School of Engineering and the Center for Educational Outreach.

Community Robotics Club:

Located at the 29th St Community Center and sponsored by the Center for Educational Outreach, the Community Robotics Club serves students at Margaret Brent Middle School and others in the Charles Village community

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through VEX Robotics. The Community Robotics team competes with other Baltimore City Public School teams, and is mentored by Johns Hopkins' Baltimore Robotics Institute students.

Engineering Design - Intersession Course:

During their January intersession, undergraduate students at JHU's Whiting School of Engineering teach engineering design through a hands-on design challenge to middle school students at Margaret Brent Elementary/Middle School. Participating students are from 7th and 8th grades.

Engineering Innovation:

www.engineering.jhu.edu/ei/

A summer, college-level, hands-on, engineering course for high school students sponsored by the Whiting School of Engineering and the Center for Educational Outreach. Engineering Innovation can be found in Western, Baltimore Polytechnic Institute, and ACCE Academy.

Girl Power STEM Expo:

Hosted by the JHU Applied Physics Lab, the Girl Power STEM Expo is a one day event held annually in March featuring demo tables, activities, and takehome materials for middle and high school girls. At the Expo, girls have the opportunity for professional networking with women in STEM careers.

Hopkins Robotics Cup:

www.engineering.jhu.edu/outreach/get-involved/hopkins_robotics_cup/

Every April, the Johns Hopkins Center for Educational Outreach hosts the Hopkins Robotics Cup for Baltimore City Public School's VEX Robotics teams that compete at the middle and high school level. All teams are invited to compete for a chance to win the Hopkins Cup.

Johns Hopkins Internship in Brain Science Program (JHIBS) www.hopkinsmedicine.org/neurology_neurosurgery/research/jhibs/

Held at JHU's School of Medicine, Department of Neurology at the East Baltimore Campus, JHIBS is a hands-on research and mentorship experience for Baltimore City high school students. Selected students receive a stipend during the eight week summer program, and participate in research projects and clinical rotations with JHU neurologists. Space is limited, and students are selected through an application process

Making Neuroscience Fun (MNF): http://mnf.jhu.edu/

Sponsored by the Department of Neuroscience, MNF is an outreach program that consists of volunteer students and practicum for local Baltimore City elementary and middle school youth. MNF was found at a variety of public and private schools in Baltimore last fall, including Harford Heights Elementary, Windsor Hills Elementary, Hampstead Hill Academy, Margaret Brent Elementary/Middle School, and Harlem Park Elementary.

Mathematics Engineering Science Achievement (MESA): www.jhuapl.edu/MESA/home/default.asp

A member of the national MESA USA program, Maryland MESA is sponsored by JHU Applied Physics Lab. MESA is a school-based, year-round K-12 STEM program that engages students in STEM competition allowing them to work collaboratively to solve complex problems. Maryland MESA is found in Baltimore City College High School, Friendship Academy of Engineering & Technology High School, Patterson High School, W.E.B. DuBois High School, Baltimore International Academy, Coldstream Middle School, Friendship Academy of Engineering & Technology Middle School, Waverly Elementary/Middle School, Friendship Preparatory Academy at Calverton, and Thomas Jefferson Elementary.

Project BioEYES:

<u>www.bioeyes.org/</u>

Project BioEYES is a K-12 science outreach education program that provides outdoor and in-class, hands-on learning opportunities through the use of live zebrafish. BioEYES engages students in experiments based on life science curriculum standards in cell biology, genetics, and animal development as students explore scientific careers. Project BioEYES can be found at: Abbottston Elementary, Armistead Gardens Elementary/ Middle School, Augusta Fells Savage Institute of Visual Arts, Baltimore School for the Arts, Beechfield Elementary/Middle School, Bluford Drew Jemison STEM Academy Middle (closed 2014), Booker T Washington Middle, Calverton Elementary/Middle School, City Springs Elementary/ Middle School, Commodore John Rodgers Elementary/Middle School, Cross Country Elementary/Middle School, Digital Harbor High School, Empowerment Academy, Federal Hill Preparatory Academy, Francis Scott Key Elementary/Middle School, Frederick Douglass High School, Friendship Academy of Science And Technology, Gardenville Elementary, Govans Elementary, Guilford Elementary/Middle School, Hamilton Elementary/

Middle School, Hampden, Hampstead Hill Academy, Highlandtown Elementary/Middle School #237, Hilton Elementary, Inner Harbor East Academy, John Ruhrah Elementary/Middle School, Lakeland Elementary/ Middle School, Lyndhurst Elementary, Margaret Brent Elementary/Middle School, Medfield Heights Elementary, Monarch Academy Public Charter School, National Academy Foundation, New Era Academy, North Bend Elementary/Middle School, Northwestern High School, Patterson Park Public Charter School, Roland Park Elementary/Middle School, Thomas Jefferson Elementary/Middle, Western High School, Westport Academy, and William Paca Elementary.

RoboChallenge:

https://cogito.cty.jhu.edu/36340/johns-hopkins-robo-challenge/

Open to all middle and high school students in Baltimore City, RoboChallenge is hosted by the JHU Laboratory for Computational Sensing and Robotics. Student teams construct and program small robots that compete in several challenges. The RoboChallenge event was held during the Hopkins Robotics Cup in April of 2014.

Science Communications Course:

Found at a Western High School physics class, the Science Communications Course taught by JHU Engineering students offers hands-on demonstrations and activities for career exploration for high school aged students.

STEM Achievement in Baltimore Elementary Schools (SABES): www.engineering.jhu.edu/sabes/

SABES is a five-year project that will serve nine Baltimore City elementary and middle schools by 2017 to improve STEM curriculum in grades 3-5. Currently, SABES can be found in John Ruhrah Elementary/Middle School, Barclay Elementary/Middle, Arlington Elementary/Middle, and will expand to Highlandtown Elementary/Middle School #215, Dallas F. Nicholas Sr. Elementary, and Dr. Martin Luther King, Jr. Elementary/Middle School for the 2014-2015 school year. SABES offers STEM curriculum, coaching around a professional learning community, a STEM academy for professional development, afterschool programming, and community events.

Summer Academic Research Experience (SARE): www.inbt.jhu.edu/education/outreach/boys-hope/

SARE is an eight week paid internship program for 5 eligible high school students. Sponsored by the JHU Institute of Nanobiotechnology, SARE provides urban high school youth with unique exposure to modern scientific research combined with academic tutoring.

Women in Science and Engineering (WISE):

www.engineering.jhu.edu/outreach/get-involved/women-in-science-andengineering-wise-program/

Found at the all-girls Western High School, WISE is an experiential learning opportunity for young women who are mentored by JHU professionals and graduate students at the Center for Educational Outreach. The goal of WISE is to encourage high school young women to pursue majors in science and engineering in college.

Your Watershed, Your Backyard:

www.bioeyes.org/programs/ywyb.html

In collaboration with Project BioEYES, Blue Water Baltimore, Trout Unlimited, Earth Force, and General Motors, Your Watershed, Your Backyard is a stream water ecology unit for middle school students that takes place over two weeks. Found at Armistead Gardens Elementary/ Middle School, Booker T. Washington Middle School, Guilford Elementary/ Middle School, Hamilton Elementary/Middle School, Hampden Elementary/ Middle School, Thomas Jefferson Elementary/Middle School, and Walter P. Carter Elementary/Middle School.

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Loyola University

www.loyola.edu

4501 N. Charles St., Baltimore, MD 21210

In partnership with Roland Park Country School, Loyola University offers two STEM extended learning opportunities for young women: NEXT STEP, and Girls and Gardens.

Girls and Gardens:

www.sp.rpcs.org/faculty/HamptonM/SitePages/Outreach.aspx

In tandem with the NEXT STEP program, Girls and Gardens is a one day program for middle school girls with interest in STEM topics. Students rotate through STEM stations and attend luncheon seminars with presentations from Loyola's Hauber Research fellows.

NEXT STEP:

www.sp.rpcs.org/faculty/HamptonM/SiteAssets/The%20Next%20Step.aspx

A collaboration between Roland Park Country School and Loyola University's Division of Natural Sciences, NEXT STEP is a summer program for high school girls. Students explore computer science, engineering, physics, chemistry, and mathematics. Programming lasts 5-6 weeks, and is geared for students with aptitude and interest in STEM topics.

Morgan State University

www.morgan.edu

1700 East Cold Spring Lane, Baltimore, MD 21251

As an institution of higher learning, Morgan State University is an active partner in STEM education throughout Baltimore City. Morgan State's Center for Excellence in Mathematics and Science Education (CEMSE) hosts an annual STEM Education, Career, and Jobs Expo. Morgan State University is also a key collaborator in Project Lead the Way (PLTW) programs throughout Baltimore City Public Schools, as well as through a summer transportation institute and annual science fair.

Morgan State University Educational Talent Search Program www.morgan.edu/administration/academic_outreach_and_engagement/ trio_programs/educational_talent_search.html

Morgan State's Educational Talent Search Program (ETS) serves students in grades 6-12 with academic counseling, career planning, and financial aid. Each year, ETS enrolls over 600 students from the Baltimore community and target schools. Interested students can apply through the Morgan State website.

Science, Engineering, Mathematics, Aerospace Academy (SEMAA) www.morgan.edu/administration/academic_affairs/office_of_assessment_ and_operations/semaa_program.html

Sponsored by NASA, SEMAA is a national project for historically underrepresented K-12 students interested in STEM programming. SEMAA is free and open to 50 students per grade for K-12 students across Maryland. SEEMA meets on Saturdays from 10:00am to 1:00pm during the fall, winter, and spring sessions. During the summer, there are four oneweek sessions where classes meet Monday-Friday in the Science Complex from 10:00am to 1:00pm.

Notre Dame of Maryland University

www.ndm.edu/

4701 North Charles Street, Baltimore, MD 21210

Notre Dame of Maryland University (NDMU) School of Education offers STEM training courses for Baltimore City teachers through their STEM Summer Institute. All Baltimore City Public School teachers are eligible to enroll in environmental education courses that will allow them to meaningfully engage their students in environmental literacy, natural sciences, and geography. Notre Dame also engages young Baltimore students during the summer through their STEM Camp.

Exploring the Local Environment through Field Study: ENV562

New for 2014, ENV562 invites teachers from grades K-12 to attend a week-long – August 4th through 8th, 8:30am to 3:30pm–environmental science field study. Following the course, teachers will possess the information, resources, and experience to meaningfully engage students with environmental education. Teachers will learn to prepare and conduct environmental field studies aligned with Next Generation Science Standards and Maryland's Environmental Literacy standards. Much of the course occurs outdoors at Gunpowder Falls, Cromwell Valley Park, Oregon Ridge, and Dundee Creek. Upon completion, teachers will receive three graduate credits. Cost of registration is \$1200 which includes books and materials.

STEM Camp

www.ndm.edu/about/summer-camps/httpwwwndmedustemcamp

Notre Dame's summer STEM Camp helps students maintain and expand the STEM skills they developed during the school year. Students enjoy quality STEM programming 5 full days in late July, and activities are taught by local STEM education professionals from area schools. All area students are eligible to attend, and registration costs \$500.

STEM Summer Institute Course: ENV561

www.ndm.edu/academics/school-of-education/stem-summer-institute/

This graduate-level course is a week-long program – July 28th through August 1st, seven hours per day—that provides teachers with the resources, knowledge, and methodology to engage their students in natural and environmental sciences subject matter. Guides for the course are created by the Department of Natural Resources and National Geographic. Teachers are eligible for three graduate credits upon completion. Registration fee is \$1200, which includes books and materials. Capacity is 30 teachers, and all Baltimore City Public School teachers are invited to register.

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Stevenson University

www.stevenson.edu

1525 Greenspring Valley Road, Stevenson, MD 21153

Stevenson University provides teacher development and training for Baltimore City Public School teachers, as well as extended learning opportunities for youth interested in STEM topics. Stevenson's focus as an institution of higher learning is career readiness through mentorship and experiential education.

Academy of Health Professions

www.marylandahp.org/

Established in 2008 as a partnership between Stevenson University and the Maryland State Department of Education (MSDE) Division of College and Career Readiness, the Academy of Health Professions trains Maryland high school teachers to develop and pilot activities for projects found within the Academy of Health Professions curriculum. Baltimore City teachers from Patterson High School, Vivien T. Thomas Medical Arts Academy, Edmondson-Westside High School, Mergenthaler Vocational-Technical High School.

Baltimore Area STEM Collaborative

The Baltimore Area STEM Collaborative is a professional development program for a small group of elementary school teachers in the Baltimore area that implement after-school STEM programming. Wolfe Street Academy represents Baltimore City's participation in the Collaborative.

Project Lead the Way: Core Training Institute

www.pltw.org/stevenson-university

While PLTW teachers are especially encouraged to attend, all Baltimore City Public School teachers are able to take part in this training. Typically 4-5 summer courses are offered with a capacity of 16-18 teachers per course. In 2013, teachers from Western High School, Eastern High School, P.L Dunbar High School, Friendship Academy of Science and Technology, Maryland Academy of Technology and Health Science, and Bluford Drew Jemison STEM Academy West attended.

Summer Science Camp

www.sciencecamp.stematsu.org

Stevenson's week-long Summer Science Camp is open to all area middle school students (grades 6, 7, 8) to engage in lab-based, experiential learning to promote interest and expertise in STEM. Registration is capped at 50 students.

Towson University

www.towson.edu

8000 York Road, Towson, MD 21252

As a major university strategically located near Baltimore and the Hunt Valley technology corridor, Towson University emphasizes community collaboration. Towson University's Center for STEM Excellence offers several training opportunities for Baltimore City STEM teachers, and engages Baltimore's youth with expanded STEM learning opportunities.

Baltimore Excellence in STEM Teaching (BEST) Project www.towson.edu/cse/best/

With funding from NASA, Towson University's BEST Project seeks to improve middle and high school STEM instruction throughout Baltimore City. BEST offers training and mentoring opportunities for current STEM teachers, and educational outreach to STEM students. Teachers enrolled in BEST are partnered with a local STEM professional for a six week summer internship. Following the summer internship, teachers meet as a learning community to explore inquiry in STEM lessons as well as alignment with NGSS and Common Core standards. Teachers craft a module of lessons that draws from their summer research experiences into an authentic learning experience for their STEM students. Baltimore City teachers from A.C.C.E Academy, Bluford Drew Jemison STEM Academy East, Bluford Drew Jemison STEM Academy West, Digital Harbor High School, Green Street Academy, Lakeland Elementary/Middle School, New Era Academy Middle/ High School, P.L Dunbar High School, and Renaissance Academy have participated in Towson University's BEST Project.

Inquiry and the Framework

This spring professional development opportunity available to middle and high school science teachers introduces The Framework for K-12 Science Education and Next Generation Science Standards (NGSS) as they pertain to learning science and engineering practices through explicit science instruction. Teachers will learn to align their teaching practices to NGSS through inquiry-based instruction. This spring course is open to 20 area teachers with Baltimore School for the Arts, Patterson High School, The Stadium School, and Dunbar High School representing Baltimore City in its latest offering.

Jr. FIRST Lego League Expo

http://www.mdfirst.org/programs/junior-first-lego-league/jrfll-expos

In the spring of 2014, Towson University's Center for STEM Excellence hosted a Jr. FIRST Lego League Expo at the Columbus Center in Baltimore's Inner Harbor. Students that compete on Jr. FIRST Lego League teams typically grades one through four—are eligible to register. The Expo gave students the chance to show off their work to other teams and STEM professionals at Towson University.

Maryland Loaner Lab (MDLL)

www.towson.edu/cse/beop/mdll/

The MDLL is available to Maryland middle and high school science teachers as a resource offering a variety of activities to the classroom. Activities are aligned to MSDE's Core Learning Goals, and include kits with manuals, student protocols, supplies, and reagents. Kits are designed for up to ten work stations of between one and four students, and are shipped free of charge. Teachers can rent kits for a two week period, one kit at a time, and must have attended a lab skills training through either MDBioLab or the Towson University Center for STEM Excellence to be eligible. All Baltimore City Public Schools can rent kits.

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Maryland Loaner Lab (MDLL) Training Workshop www.towson.edu/cse/beop/prof_dev/index.asp

The MDLL Training Workshop is open to all middle and high school science teachers in Maryland who would like to access the MDLL for their students to practice high-quality STEM lab activities. The training workshop is open yearround, and is located at the Columbus Center in Baltimore's Inner Harbor. Since it started, the MDLL has trained and certified over 1,000 teachers. All Baltimore City Public School science teachers are eligible to attend.

NGSS in Your Classroom

NGSS in your classroom is a free, five day professional development opportunity for middle and high school science teachers offered in the summer and fall. Teachers will have the opportunity explore The Framework for K-12 Science Education and the Next Generation Science Standards (NGSS) through a hands-on, collaborative course, and gain the knowledge necessary to align to the NGSS. This five day workshop is made up of four summer workshops in July, and a follow-up meeting in October. Baltimore City teachers are eligible for two AU Credits following successful completion of the program.

SciTech Student Learning Lab www.towson.edu/cse/beop/Scitech/

The SciTech Learning Lab offers K-12 students a field trip opportunity with "hands-on, minds-on" bioscience learning opportunities. The lab is located on Pratt Street in Baltimore's Inner Harbor, and offers ten different, intensive lab opportunities where students explore real-world problems using their classroom skills. Lab activities take about three hours to complete, and are offered on week days throughout the year. Students are charged \$10 each to use the lab, while teachers and chaperones enter for free. All Baltimore City students are encouraged to attend.

University of Maryland – Baltimore (UMB)

www.umaryland.edu

620 W Lexington St. , Baltimore, MD 21201

As a biomedical research institution, UMB offers two distinct STEM extended learning opportunities for youth in Baltimore City Public Schools. Students are paired with UMB students and scientists, and are given hands-on mentorship in the biosciences. UMB's community outreach includes the state-of-the-art UM BioPark in west Baltimore, which fosters innovation through a start-up incubator.

CLUB UMB

CLUB UMB is an afterschool mentoring and youth leadership program sponsored by UMB's Office of Government and Community Affairs and the UMB President's Outreach council. CLUB UMB matches first year med school students with middle school students from Southwest Baltimore Charter School, and act as mentors. Mentor/mentee pairs participate in the Maryland Science Olympiad by choosing science and engineering projects to work on from October through February.

Summer Bioscience Research Program

The UMB Summer Bioscience Research Program offers bioscience research opportunities for school-age youth living or attending school in West Baltimore. Students are paired with UMB scientists for a 5 week paid summer internship where they apply their STEM knowledge to realworld lab research. Students also receive professional development in the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the Collaborative Institutional Training Initiative (CITI), financial literacy training, and environmental health safety. Following the 5 week program, students give a presentation on the research they supported.

University of Maryland – Baltimore County (UMBC)

www.umbc.edu

1000 Hilltop Circle, Baltimore, MD 21250

UMBC's College of Engineering and Information Technology collaborates with STEM teachers and students in the Baltimore area as a Project Lead the Way (PLTW) affiliate, as well as through events such as the Athena Conference. UMBC is also home to The Center for Women and Information Technology (CWIT), which is dedicated to increasing the representation of women in the fields of engineering and information technology.

The Athena Conference http://my.umbc.edu/events/20768

Held in the spring, the Athena Conference is a one day event that invites high school aged girls to explore technology and engineering education and career areas. The event is free, is open to all high school girls in the area, and includes panel discussions from CWIT and STEM professionals at UMBC's renowned programs.

Computer Science (CS) Matters in Maryland http://ce21maryland.umbc.edu/projects/cs-matters/

In collaboration with the University of Maryland - College Park, UMBC's CS Matters in Maryland professional development program for high school teachers focuses on enhancing the expertise of computer science teachers throughout the state. Experienced computer science faculty from higher education and high school computer science teachers are paired with other high school teachers to create course materials, training materials, and curriculum in a "master teacher/apprentice teacher" model. Teachers from Roland Park Country School and Digital Harbor High School have participated on behalf of Baltimore City Public Schools.

Project Lead the Way Core Training Institute www.pltw.org/university-maryland-baltimore-county-umbc

The PLTW Core training institute is open for middle and high school teachers in the PLTW Engineering track, as well as teachers not currently teaching PLTW courses. This training institute is comprised of 17 courses

for a capacity of 20 teachers. Baltimore City Public School teachers from Baltimore Polytechnic Institute, Edmondson Westside High School, Friendship Academy of Engineering and Technology, Friendship Academy of Science and Technology, Maryland Academy of Technology and Health Sciences, Mergenthaler Vocational-Technical High School, Patterson High School, The National Academy Foundation High School, W.E.B DuBois High School, A.C.C.E Academy, Baltimore Community High School, Baltimore I.T Academy, Bluford Drew Jemison STEM Academy, Calverton Elementary/ Middle School, Cherry Hill Elementary/Middle School, Coldstream Elementary/Middle School, and Cross Country Elementary/Middle School have participated in the training institute.

Young Science Explorers Program

Partnering with Lakeland Elementary/Middle School, UMBC's Young Science Explorers afterschool program provides STEM enrichment activities to under-represented elementary school youth in Baltimore City. Students focus on exploration, education, and imagination in order to fully engage in intentional STEM programs. The Young Explorers Program utilizes several different curricular providers including Earth Force, NASA's BEST, and Art With a Heart.

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Community STEM Organizations

4H- University of Maryland Extension <u>www.extension.umd.edu/4-h</u>

6615 Reisterstown Road, Suite 201, Baltimore, MD 21215

4-H youth development programs provide youth ages 5-18 opportunities to build life skills in numerous subject areas. STEM programs at 4-H include robotics, computer literacy, hands-on development of plant and animal sciences, environmental projects, and community beautification projects.
4-H programs are delivered in school buildings, community centers, recreation centers, faith-based centers, and cultural institutions. Specific out of school time STEM challenges sponsored by 4H University of Maryland Extension Network include an Aerospace Challenges and Workshops, Summer STEM Workshops, and a LEGO Robotics Challenge.

Arts Everyday/MICA

<u>www.mica.edu</u>

1800 N Charles St., Baltimore, MD 21201

Arts Everyday developed an afterschool program for students in grades 4-12 called The STEAM Team focused on conducting STEM projects through the arts that are rooted in community or urban envinromental-based issues. Mixing science, math, the engineering design process, and 2D and 3D art skills, students receive a well-rounded experience in the STEAM fields. Arts Everyday also involves STEM professionals from throughout Baltimore to act as mentors for STEAM Team students. In school, Arts Everyday's programming can be found at: Belmont Elementary, Maree Farring Elementary/Middle School, Baltimore Talent Development High School (closed 2014), Alexander Hamilton Elementary, Sarah Roach Elementary, Highlandtown Elementary/Middle School #215, Thomas Jefferson Elementary/Middle, Hampden Elementary/Middle School, and Stadium Middle School.

B&O Railroad Museum

www.borail.org

901 W. Pratt St., Baltimore, MD 21223

The B&O Railroad Museum offers STEM enrichment through the Building the Railroad STEM Series. The Building the Railroad STEM Series explores STEM content in railroad building and transportation history. Students in grades PK-12 have access to the museum's collection and workshop for hands-on STEM activities. For teacher development, the museum has constructed over a dozen downloadable lesson plans that explore STEM, history, and the local importance of the B & O Railroad. The B & O Railroad Museum has partnered with Southwest Baltimore Charter School.

Baltimore Curriculum Project www.baltimorecp.org/

2707 E. Fayette Street, Baltimore, MD 21224

The Baltimore Curriculum Project (BCP) is a nonprofit organization whose curriculum can be found in three East Baltimore charter schools: City Springs Elementary/Middle, Wolfe Street Academy, and Hampstead Hill Academy. BCP uses research-backed curriculum to strengthen schools and their communities through Direct Instruction, Restorative Practices, and CHAMPS classroom management. BCP offers stand-alone STEM afterschool programs for students in grades 1-5 at their three charter schools which include robotics competitions, family nights, and a science literacy event.

Baltimore Museum of Industry www.thebmi.org

1415 Key Highway, Baltimore, MD 21230

The Baltimore Museum of Industry offers students in grades 1-12 the opportunity to explore engineering challenges in school and at the museum. Through the Design It program, students at the museum or in the classroom work in small groups on challenges such as roller coasters, paper bridges, and wiring a house. The museum supports the Maryland Engineering Challenge in which students in grades 1-12 are introduced to modern engineering challenges and processes. Professional engineers are paired with students as coaches, which encourage students to pursue STEM careers and mentorship.

Baltimore Robotics Center

www.baltimoreroboticscenter.com

1001 W. Pratt St., Baltimore, MD 21223

Founded in 2013, the Robotics Center is a dedicated space for Baltimore's youth in competitive robotics to build, practice, and compete. The Center hosts VEX robotics scrimmages and qualifiers, and occasionally STEM workshops with local programs. VEX robotics teams from P.L. Dunbar High School,

Mergenthaler Vocational Tech, 29th St. Community Center, Patterson High School, Western High School, Digital Harbor High School, Patterson Park Public Charter School, Lakeland Elementary, W.E.B DuBois High School, and James McHenry Middle and High School have used the Center.

Baltimore United Viewfinders

www.baltimoreviewfinders.org

814 N. Collington Ave

Baltimore, MD 21205

Baltimore United Viewfinders empowers Baltimore City youth to develop technology-based critical thinking skills for artistic expression. Students in grades 6-12 create multimedia arts as social entrepreneurs for community change, and develop technical skills in photography, videography, and graphic design tools such as Adobe Photoshop.

Bluewater Baltimore

www.bluewaterbaltimore.org

3545 Belair Road, Baltimore, MD 21213

Bluewater Baltimore provides applied environmental education opportunities aligned to state curricular standards, and combines in school and out of school time activities that inspire students to become active stewards of their environment. Bluewater partners with several schools in Baltimore City on such projects as planting trees, cleaning streams, wildlife identification, constructing rain barrels and rain gardens, butterfly gardens, and plant life identification. Bluewater programs can be found at: Dickey Hill Elementary, Northeast Middle School, Southside Academy High School, Independence High School, Southwest Baltimore Charter School, and the Green School Baltimore. Bluewater Baltimore also provides assistance to schools interested in applying for the Maryland Green Schools Program.

Building STEPS

www.buildingsteps.org

PO Box 1393, Brooklandville, MD 21022

Building STEPS is a nonprofit organization that helps underrepresented communities in grades 9-12 in Baltimore City pursue college education in

science and technology education. Building STEPS provides junior seminars in science and technology-based careers through numerous regional partners, meaningful internships with over 30 industry partners, college access workshops for professional development, and a vast alumni support network. Over 100 students are served annually by Building STEPS at Patterson Park Public Charter School, Patterson High School, P.L. Dunbar High School, and W.E.B DuBois High School.

Chesapeake Bay Foundation www.cbf.org

6 Herndon Avenue, Annapolis, MD 21403

Through field programs, professional development, student leadership programs, and a wealth of educational resources, the Chesapeake Bay Foundation promotes environmental education and stewardship for the next generation of bay area residents. Through the Chesapeake Bay Trust, students in grades 4-12 receive hands-on, meaningful outdoor education in the Your Watershed, Your Backyard curriculum. Your Watershed, Your Backyard can be found in The Crossroads School, Pimlico Elementary Middle School, Augusta Fells Savage Institute of Visual Arts High School, Benjamin Franklin High School at Masonville Cove, East Baltimore Community School, and The Green School Elementary. Teachers that wish to strengthen their content knowledge in environmental literacy can take part in the Chesapeake Classrooms Teacher Professional Development Program, and Maryland Environmental Literacy Partnership.

Code in the Schools

www.codeintheschools.org

2526 St. Paul St., 3rd Floor, Baltimore, MD 21218

Founded in 2013, Code in the Schools provides high-quality computer science education for Baltimore City Public School students and afterschool providers. Students in grades K-12 experience hands-on instruction in video game design, coding, robotics, and state-of-the-art software such as Unity. Code in the Schools serves the Baltimore Design School, Digital Harbor High School, Frederick Douglass High School, Baltimore Polytechnic Institute, Federal Hill Preparatory School, the SEED School of Maryland, and Southwest Baltimore

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Charter School. In the out of school time space, Code in the Schools partners with the 29th St Community Center, St. Francis Neighborhood Center, Wide Angle Youth Media, The Village Learning Place, the Baltimore Robotics Center, and the Liberty Rec and Tech Center at Liberty Elementary.

Digital Harbor Foundation www.digitalharbor.org

1045 Light Street, Baltimore, MD 21230

The Digital Harbor Foundation offers hands-on STEM opportunities for Baltimore's elementary through high school-aged youth at the Digital Harbor Tech Center, as well as technical assistance and training for organizations through the Digital Harbor Center of Excellence for Innovation in Technology Education. Students have access to state-of-the art hardware and software on a drop-in basis, as well as through "pay what you can" camps to create projects and develop real world tech skills. Examples of camps at the Tech Center include game design, digital fabrication through 3D printing, and building remotely piloted aircraft. The Digital Harbor Foundation Tech Center offers age appropriate programs for young makers in partnership with Futuremakers in the Tech Center's Nano Lab.

Enoch Pratt Free Library www.prattlibrary.org

400 Cathedral Street, Baltimore, MD 21201

There are over 20 Enoch Pratt Free Libraries in Baltimore City, and many of them offer standalone STEM programs. The Enoch Pratt Free Libraries offer different STEM programs as part of a broader STEM initiative. Some are librarian-led afterschool programs, others are guest speakers, and others are hands-on programs led by community groups. During the summer, Enoch Pratt Free Libraries partner with the American Association for the Advancement of Science for a hands-on, multiple day workshop at several libraries.

FutureMakers

www.kidsmakethingsbetter.com

1513 Waterbury Road, Crownsville, MD 21032

FutureMakers provide youth in grades K-5 with the opportunity to make and tinker with tools in sewing, woodworking, circuitry, computing, and electronics in the out of school time space. FutureMakers run maker workshops at multiple sites throughout the DC/MD/Northern VA region including several sites in Baltimore City such as the Digital Harbor Foundation Tech Center and the Baltimore Robotics Center.

Girl Scouts of Central Maryland www.gscm.org

4806 Seton Dr., Baltimore, MD 21231

The Girl Scouts of Central Maryland is located in Anne Arundel County, Baltimore City, Baltimore County, Harford County, and Howard County. At five sites throughout Central Maryland, girls of all ages experience intentional and relevant STEM activities. Programs include Techbridge, FIRST Lego League, Science is Fun, Chemistry in the Kitchen, Science Wonders, Lady EinSTEMS, and Afterschool Universe. Annually, over 1,000 young women are served by the Girl Scouts of Central Maryland's STEM program.

Greater Homewood Community Corporation www.greaterhomewood.org

3503 North Charles St., Baltimore, MD 21218

Headquartered in north central Baltimore, the Greater Homewood Community Corporation (GHCC) strengthens neighborhoods through increased educational opportunities, youth engagement, and economic development. GHCC provides afterschool STEM opportunities at the 29th Street Community Center through a community VEX robotics team, and through hands-on video game design workshops. VEX robotics coaches for the community team are sponsored by the Johns Hopkins University Community Robotics Club, and the video game design workshops are delivered through Code in the Schools.

Higher Achievement

www.higherachievement.org/our-communities/baltimore

1500 Union Avenue, Suite 2600, Baltimore, MD 21211

Higher Achievement operates a year-round, research -based program combining high expectations and support. Higher Achievement serves hundreds of middle school students annually in the out of school time space with a combination of best-practice STEM curriculum. Higher Achievement programs can be found at three Achievement Centers in Baltimore City: Collington Square School, Arundel Elementary/Middle School, and Lakeland Elementary Middle School. Currently, over 200 students from Baltimore's most underserved neighborhoods utilize Higher Achievement's programs.

LANDSCAPING BALTIMORE'S STEM ECOSYSTEM / DIRECTORY

Immersive 3D www.immersive-3d.com

Baltimore, MD

Combining a wealth of video game development experience with hands-on STEM curricula, Immersive 3D (i3d) offers students in all grades a truly interactive learning experience. Using cutting-edge video game technology such as Xbox Kinect, students explore STEM content through fun and highly immersive video games. i3d offers four video games for youth of all ages: Alien Relocation, Merissa Lone, CyberSTEM Academy, and Tadpoles. Each game leads students through different levels of an interactive STEM world. CyberSTEM Academy is i3d's flagship game, and includes its own learning management system, thus making it a complete educational program.

The Ingenuity Project

http://www.ingenuityproject.org/

1400 W. Cold Spring Lane, Room 337, Baltimore, MD 21209

The Ingenuity Project is a non-profit collaboration between the Baltimore City Public School System, the Abell Foundation, and the greater Baltimore math and science community. The goal is to prepare Baltimore City students to achieve fluency in STEM related fields at a national level. The Ingenuity Project is free for Baltimore City residents, and provides students with the skills and education that make them highly sought after in a competitive job market. The Ingenuity Project can be found in the following Baltimore City Public Schools: Roland Park Middle School, Mount Royal Middle School, Hamilton Middle School, and Baltimore Polytechnic Institute.

Irvine Nature Center

http://www.explorenature.org/

11201 Garrison Forest Road, Owings Mills, MD 21117

The Irvine Nature Center is a nonprofit environmental organization whose mission is to engage students' awareness and appreciation of the natural world around them. The Nature Center hosts field trips for Baltimore City students of all ages, and visits the classroom through the Nature in the Classroom program, where students explore animal adaptations, environmental stewardship, the Chesapeake Bay, Native Americans, the food chain, Maryland's raptors, and minerals. Through Irvine's Urban Education Program: Schoolyard Discovery, high school students are trained to lead hands-on activities for elementary school students in Baltimore City. Schoolyard Discovery provides a sustainable model for environmental stewardship and leadership while promoting a wildlife habitat for students to experience on their school grounds. Last year, Irvine reached over 1,300 Baltimore City Public School students from 36 schools.

Junior Achievement of Central Maryland www.jamaryland.org

10711 Red Run Blvd, Suite 110, Baltimore, MD 21117

Junior Achievement is a nonprofit organization providing a series of business, economics, and life-skills programs to enhance the education of young people. Reaching over 300 schools across Maryland, Junior Achievement integrates STEM in their in school and out of school curricula for students in grades 5-12. Junior Achievement specializes in college and career readiness with an in-house developed curriculum that is aligned to state and Common Core standards. Junior Achievement can be found in the following Baltimore City Public Schools: Abbottston Elementary, Alexander Hamilton Elementary, Arlington Elementary, Baybrook Elementary, Booker T. Washington Elementary, Calverton Elementary, Cecil Elementary, Coldstream Park Elementary, Cross Country Elementary, Commodore John Rodgers Elementary, Edgecombe Circle Elementary, Fallstaff Elementary, Fort Worthington Elementary, Francis Scott Key Elementary, Furman Templeton Elementary, Hampden Elementary, Harlem Park Elementary/Middle School, Northwood Elementary, Patterson Park Public Charter School, Roland Park Country School, SEED School of Maryland, Violetville Elementary, William Paca Elementary, and Windsor Hills Elementary. In the out of school time space, Junior Achievement also partners with Living Classrooms Foundation, the Y of Central Maryland, and the Mayor's Office of Employment Development.

LET'S GO Boys and Girls

www.letsgoboysandgirls.com

703 Giddings Ave, Annapolis, MD 21401

LET'S GO Boys and Girls provides hands-on STEM activities in robotics, math, science, and engineering at over 20 sites throughout the state

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including several in Baltimore City. LET'S GO serves students in grades 1-8 in out of school time sites to inspire and support students to become STEM professionals. Using their own curriculum, LET'S GO offers hands-on activities for robotics, science and engineering, and mathematics.

Liberty Elementary School Tech Center www.baltimorecityschools.org/64

3901 Maine Avenue, Baltimore, MD 21207

Adjacent to Liberty Elementary school is the Liberty Rec and Tech Center, which offers technology programming and a dedicated space for afterschool technical assistance. In school, Liberty Elementary boasts a 1:1 student to iPad ratio, and was an early pilot site for the EdTech Fellowship Program. Liberty Elementary School serves students in grades PK-5, and while Liberty students are the primary audience for the Tech Center, school-age youth and their families in the Central Forest Park neighborhood are encouraged to attend. Liberty Elementary has partnered with Code in the Schools for computer science afterschool expanded learning opportunities.

LifeJourney, USA LLC

<u>www.lifejourney.com</u>

621 E. Pratt St., Suite 300, Baltimore, MD 21202

LifeJourney is a web-based tool for students in grades 6-12 to explore STEM careers and gain firsthand experience from professionals. Students are paired with industry leaders through the LifeJourney STEM Ideation Experience in STEM fields from partners such as Intel, Symantec, and Lockheed Martin to name a few. Students progress through interactive modules and compile a STEM Resume that is verified by teachers, schools, and school districts via a detailed Dashboard.

Living Classrooms Foundation www.livingclassrooms.org

802 S. Caroline Street, Baltimore, MD 21231

Found at the Crossroads School and Commodore John Rodgers Elementary/ Middle School, the Living Classrooms Foundation implements STEM education through the Baltimore Urban Gardening with Students (BUGS) afterschool program, and Integrated Curriculum of Math Engineering Technology & Science at Crossroads (iCOMETS). BUGS serves students in grades 2-5 at Commodore John Rodgers with hands-on gardening, environmental, cooking and nutrition, and creative arts education. iCOMETS serves 6th grade students at the Crossroads Schools with an integrated curriculum that allows them to solve real-world problems, such as the Healthy Harbor 2020 initiative.

MDBio Foundation www.mdbiofoundation.org

9210 Corporate Blvd., Suite 470, Rockville, MD

The MDBio Foundation is a non-profit organization that offers innovative and effective bioscience education for middle and high school students during and out of school time. MDBio Foundation is dedicated to providing bioscience awareness, education, and workforce development for students across Maryland through a variety of programs including MDBioLab, and the new game-based learning platform, MDBioSphere. The MDBioLab is a mobile laboratory that visits high schools throughout Maryland, and supports student experience with lab concepts and equipment. Since its inception in 2003, the MDBioLab has served over 100,000 students. MDBioSphere is a gamebased learning tool aligned with the Next Generation Science Standards for high school students to explore biology and cross-curricular topics such as mathematics. Both tools are cost-effective opportunities that provide handson experiences for youth to engage in STEM.

Maryland Agricultural Education Foundation www.maefonline.com

403 Oakington Road, Havre de Grace, MD 21078

The Maryland Agricultural Education Foundation (MAEF) delivers handson agricultural science lessons tailored to Common Core & State Standards for grades K-12. MAEF offers a mobile science lab and agricultural literacy programs for elementary students, and environmental stewardship programs, such as Ag and the Bay, for middle school students. MAEF's high school programming includes scholarships and professional development for students interested in agricultural education. MAEF is found in about 40 Maryland high schools, and has partnered with the University of Maryland – College Park and University of Maryland – Eastern Shore. In Baltimore City, MAEF programs can be found at Francis Scott Key Elementary/Middle School.

The Maryland Out of School Time (MOST) Network www.mdoutofschooltime.org

2 E. Read St., Third Floor, Baltimore, MD 21202

The MOST Network is one of 47 statewide afterschool networks (SANs) that promotes - through policy advocacy and network building - more and better opportunities for Maryland's youth in the out of school time hours. MOST is advancing STEM in the out of school time space through a statewide sySTEM Learning Community, coordinating the Technovation Challenge and Zero Robotics, and building awareness and matching out of school time program providers with best-practice STEM curricula. This year, the MOST Network coordinated out of school time STEM opportunitiesthrough the sySTEM Learning Community, Technovation, and Zero Robotics-at Armistead Gardens Elementary/Middle School, Lakeland Elementary/Middle School, John Ruhrah Elementary/Middle School, Tench Tilghman Elementary/Middle School, Collington Square School of the Arts, Commodore John Rodgers Elementary/Middle School, Dr. Rayner Brown Elementary/Middle School, Fallstaff Elementary/Middle School, Baltimore Polytechnic Institute, Mt. Royal Elementary/Middle School, Patterson Park Public Charter School, and Green Street Academy.

Maryland Science Center www.mdsci.org

601 Light St., Baltimore, MD 21230

The science center welcomes educators and their classes to its Inner Harbor location throughout the school year with a variety of options for in-depth exploration and enrichment experiences. The Maryland Science Center's Traveling Science Program serves the Mid-Atlantic region daily at schools, libraries, camps, and other gatherings. The Science Center has partnered with the following Baltimore City Public Schools: Johnston Square Elementary School, William Paca Elementary School, and Medfield Heights Elementary. The Science Center also hosts "Camp-Ins" open to all Baltimore City youth throughout the school year.

Maryland Science Olympiad www.marylandscienceolympiad.org/

7500 Prospect Dr., Frederick, MD 21702

The Maryland Science Olympiad (MSO) provides students in grades K-12 with rigorous interscholastic academic tournaments. Students participate in over 40 Olympic style tournament events that draw from the STEM fields of biology, earth science, chemistry, physics, and technology. Olympiad events are staffed by scientists and engineers from local STEM companies and universities. Competition is statewide, and student competition season runs through the winter and spring. Baltimore City Public Schools that participate in MSO are: Barclay Elementary/Middle School, Falstaff Elementary/Middle School, Lakeland Elementary/Middle School, Monarch Academy Public Charter School, and Southwest Baltimore Charter School.

The Maryland Zoo in Baltimore

www.marylandzoo.org

1876 Mansion House Drive, Baltimore, MD 21217

The Maryland Zoo in Baltimore offers camps for students entering grades 2-8 throughout the year. Students gain hands-on experience working with animals and zookeepers, and are engaged in biology, life science, animal care, and husbandry. The Maryland Zoo in Baltimore also engages students through in school STEM outreach via its ZOOmobile presentations. ZOOmobile presentations serve students K-12.

Medical Education Resources Initiative for Teens (MERIT) www.meritbaltimore.org

leadership@meritbaltimore.org

The Medical Education Resources Initiative for Teens (MERIT) aims to promote a diverse healthcare workforce that will ensure access to highquality healthcare for all communities. MERIT provides a holistic support system including Saturday sessions focused on academic enrichment, paid summer internships in hospitals and laboratories, and longitudinal mentoring. The admissions process is rigorous, and scholars are selected during their sophomore year of high school. Participation continues until

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high school graduation, at which point scholars become MERIT alumni, and receive continued guidance. As of 2014, there are 13 junior and senior scholars from Baltimore Polytechnic Institute, Western High School, P.L Dunbar High School, Friendship Academy of Science and Technology, Vivien T. Thomas Medical Arts Academy, and Digital Harbor High School.

National Aquarium

www.aqua.org

501 E. Pratt St., Baltimore, MD 21202

The National Aquarium in Baltimore offers a variety of STEM programs for students of all ages. For high school students, the Aquarium offers Behind the Scenes Tours that pair high school-aged students with aquarium staff, and offers insight into real-world application of STEM careers in marine biology. Middle and high school students can take part in the Animal Rescue Program, which is offered at the aquarium, and students learn handson lessons in animal rescue and rehabilitation. Available to elementary through high school students, the Wetland Nursery Program is a yearround environmental stewardship program where students build a nursery pond on their school grounds to raise their own native wetland. Teacher professional development is offered through the aquarium's Maryland Center for Career and Technology Education Studies program (MCCTES).

Parks and People Foundation www.parksandpeople.org

800 Wyman Park Drive, Suite 010, Baltimore, MD 21211

The Parks and People Foundation offers environmental education programming for Baltimore City Public School students through the Green Career Ladder. Students take part in age appropriate learning opportunities in environmental stewardship, literacy, and hands-on activities. From elementary to secondary school, students climb the Green Career Ladder, and find full-time employment with a "green" job. Parks and People has partnered with: Calverton Elementary/ Middle School, Robert W. Coleman Elementary, Armistead Gardens Elementary/Middle School, Dickey Hill Elementary, A.C.C.E Academy, Franklin Square Elementary/Middle School, Bluford Drew Jemison STEM Academy, and Baltimore Montessori Public Charter Elementary.

Patterson Park Audubon Center http://pattersonpark.audubon.org/

2901 E. Baltimore St., Baltimore, MD 21224

The Patterson Park Audubon Center offers in and out of school time programs for PK-3rd and high school students. Audubon programs offer students the opportunity to explore the natural world around them. In partnership with NOAA, the Chesapeake Bay Trust, and the Waterfowl Festival, Audubon has created an Audubon Watershed Experience (AWE) which introduces students to fishing and bird-watching activities within the Chesapeake Bay. City Springs Elementary/Middle School, Patterson Park Public Charter School, City Neighbors Hamilton, Green Street Academy, and A.C.C.E Academy have participated in Audubon programs.

Port Discovery Children's Museum

www.portdiscovery.org

35 Market Pl., Baltimore, MD 21202

Port Discovery Children's Museum offers STEM programs for students in grades PK-8 that include in school, afterschool, and summer camp STEM enrichment. Through the STEM Ventures program, Baltimore City Public School students participate in a five week, classroom style series of experiential learning opportunities aligned to Common Core and Next Generation Science Standards. STEM Ventures programming is offered in 2 distinct courses: Nanoscale Science and Technology Programming, and Engineered by Design. Both programs are designed to promote self-confidence and interest in STEM fields. Port Discovery also offers numerous Museum on the Road classroom visit STEM sessions throughout the school year where in school science is supplemented with hands-on, intentional STEM.

Sharing Science www.sharingscience.org

1100 Wicomico St., Suite 700, Baltimore, MD 21230

Sharing Science promotes equity and access to Baltimore City students through a tool library, which connects students to resources that will enable them to explore STEM content. The tool library also offers practical tips for low-cost, effective, and interesting science fair projects. Along with providing tools, Sharing Science offers technical assistance to students for proper tool use and discussion around theory, outcomes, and mechanical issues.

Space Telescope Science Institute www.stsci.edu/portal/

3700 San Martin Dr., Baltimore, MD 21218

Located on the campus of Johns Hopkins University, and operated by NASA's Association of Universities for Research in Astronomy (AURA), the Space Telescope Science Institute (STScI) provides robust STEM outreach to Baltimore City Public Schools as well as a Space Astronomy Summer Program. STScI's outreach efforts include astronomy festivals, STEM career fairs, Space Day events, and a Public Lecture Series through hubblesite. org. Through the Office of Public Outreach's (OPO) Education branch, images and data from the Hubble Telescope are used to create an exciting curriculum with supporting tools and materials. OPO's education program is aligned to the NASA Education Strategic Coordination Framework, and partners with school districts and education organizations to emphasize diversity and reach traditionally underserved populations.

STEMaction, Inc.

http://www.stemaction.org/

3000 Route 97, Suite 203, Glenwood, MD 21738

STEMaction, Inc. is a non-profit organization that supports STEM activities for Maryland students in grades K-12, and is the affiliate partner for Maryland FIRST Tech Challenge. STEMaction supports Maryland FIRST robotics programs for all grades across the state. STEM programs – particularly the FIRST robotics programming – is offered as standalone afterschool STEM throughout the year. STEMaction supports the annual Battle O'Baltimore: a FIRST Robotics Competition event. In 2014, over 20 schools in Baltimore City hosted FIRST Lego League teams, and 2 high schools–Western and P.L. Dunbar–hosted FIRST Robotics Challenge teams.

STEMulus Educational Consulting, LLC www.stemulusconsulting.com

Baltimore, MD 21215

STEMulus Educational Consulting, LLC is a minority female-owned and operated training and consulting firm. STEMulus specializes in training educators and educational leaders to implement best-practice STEM education from Pre K to grade 12. STEMulus offers training workshops, professional development, and curriculum design sessions aligned to Common Core standards. STEM providers can choose from different consulting packages tailored to their experience and the ages of students served.

Veterans in Partnership http://www.veteransinpartnership.com/

1115 W. 37th St., Baltimore, MD 21211

Veterans in Partnership (VIP) is an initiative that promotes quality out of school time STEM programs for middle school students with returning veterans as teachers. The VIP program has piloted at James McHenry Elementary/Middle School during the 2013-2014 school year. Founding sponsors for VIP include the University of Maryland BioPark – located just blocks away from James McHenry – and Becton-Dickinson Diagnostics. The VIP program also partners with the nearby Baltimore Robotics Center, which provides materials and know-how for James McHenry's middle school VEX robotics team.

The Walters Art Museum

www.thewalters.org

600 N. Charles St., Baltimore, MD 21201

Available to students in grades 4-8, the Walters Art Museum offers Conservation Secrets, which leads students through STEM and critical thinking activities in the art museum. Conservation Secrets teaches students about art conservation and repair, how to use critical thinking and forensic skills to determine if a work is counterfeit, and how science and museum objects intersect. Participating schools include Highlandtown Elementary Middle #215 and Roots and Branches School. The Walters also offers professional development for teachers that wish to incorporate arts in STEM through their STEM to STEAM Teacher Workshop.

The Webb Group, Inc. Educational Learning Center www.thewebbgroupinc.org

5510 Cedella Avenue, Baltimore, MD 21206

Founded in 2007 and located in northeast Baltimore City, the Webb Group, Inc. Educational Learning Center offers a stable support system in which

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parents and children have a comfortable environment to learn and develop career and life skills. The Webb Group is dedicated to providing educational opportunities for students to gain meaningful employment, and break the cycle of poverty. Programs offered by the Webb Group include full day summer camps, afterschool clubs, computer skills training, and a new Math and Science Institute, which offers tutoring and enrichment for students in the tested grades (3, 5, 6, and 8) to meet state and local standards.

Wide Angle Youth Media www.wideanglemedia.org

2601 N. Howard St., Suite 160, Baltimore, MD 21218

Wide Angle Youth Media offers middle and high school-aged youth extended learning opportunities in media education for self-expression and community involvement. Available as summer programs, or after-school programs at a number of venues, Wide Angle's programming for high school students includes an Attendance and Design team, a Mentoring Video project, and a Traveling Photography exhibit. Middle school students can take part in the Baltimore Speaks Out program, which is an introductory program in partnership with the Enoch Pratt Free Library. Wide Angle students also host workshops, and can be hired for events.

The Y of Central Maryland www.ymaryland.org

303 W. Chesapeake Ave., Baltimore, MD 21204

Located in several counties in Central Maryland and with three branches in Baltimore City, the Y of Central Maryland offers STEM in schools at Before and After School Enrichment sites, as well as at Y sites. Y-STEM programs were designed based on research and input from the Y community, and are flexible, loosely structured program choices for children. Y sites offer summer robotics camps for students in grades 3-6 and Y Science camps for students in grades 1-5. The Y of Central Maryland implements NASA's BEST engineering curriculum at drop in sites throughout their network. The Y has partnered with the following Baltimore City Public Schools with afterschool programs: Dr. Rayner Brown Elementary, Patterson High School, Afya Public Charter School, East Baltimore Community School, Cecil Elementary, Robert Coleman Elementary, and Booker T. Washington Middle School.

Appendix A: Definitions



The STEM Education Landscape uses the following definitions for important terms:

STEM

Intentional, hands-on exploration of science, technology, engineering, and mathematics in the formal and informal learning environment. STEM learning opportunities infuse the above content areas through project-based and real-world learning.

Out of School Time (OST)

Learning that occurs outside of school hours. OST offers students an informal environment to explore content that enriches their formal education. The OST environment is especially conducive for STEM programming as students are able to experiment and iterate with intentional projects.

Formal

For the purposes of this document the term formal refers to STEM instruction that happens during the school day and includes credit bearing coursework.

Informal

For the purposes of this document the term informal refers to STEM instruction that is provided by organizations and institutions that are not based in the school but have STEM expertise that is shared either in, or outside of the classroom. Examples of informal STEM would include museums or institutions of higher education that provide.

Stakeholders

STEM educators, district administrators, and principals within Baltimore City Public Schools were identified as key stakeholders for interviews given their experience in STEM or implementation of STEM programs.

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Appendix B: Competitions



For competitions to be expanded, it is important that locally-run programs recruit more schools. Competitions listed in alphabetical order:

BOTBall

http://www.botball.org/

Botball exposes middle and high school-aged students to STEM through engineering autonomous robots through a semester-long program.

CyberPatriot

https://www.uscyberpatriot.org/home

The US Air Force Association's CyberPatriot youth education program gives students hands-on programming experience in cybersecurity.

Destination Imagination http://www.idodi.org/

A nationwide organization that offers standards-aligned challenges in STEM, improv, visual arts, service learning, and early learning.

DOE NSB (Department of Energy National Sciences Bowl)

http://science.energy.gov/wdts/nsb/

This national competition is open to middle and high school students, and tests their knowledge of biology, chemistry, earth science, physics, energy, and math.

FLL (FIRST Lego League)

http://www.usfirst.org/roboticsprograms/fll

FLL uses LEGO Mindstorm robots and LEGO pieces where students in grades 4-8 solve real-world problems through robotics and teamwork.

FRC (FIRST Robotics Competition)

http://www.usfirst.org/roboticsprograms/frc

Similar to VEX in that it's a high school robotics challenge, however the robotics are much larger and use more sophisticated technology. Large fundraising efforts required for teams.

FTC (FIRST Tech Challenge)

<u>http://www.usfirst.org/roboticsprograms/ftc</u>

Competitor to VEX, similar sized robots, grades 7-12.

JrFLL (Junior FIRST LEGO League)

http://www.usfirst.org/roboticsprograms/jr.fll

JrFLL introduces students in grades K-4 to STEM and robotics through real-world science and teamwork with LEGO pieces.

MESA

http://www.jhuapl.edu/MESA/home/default.asp

Offered in grades 3-12, MESA (mathematics, engineering, and science achievement) identifies and supports by preparing them for higher education in STEM fields through STEM competitions.

MSO (Maryland Science Olympiad)

https://www.marylandscienceolympiad.org/

MSO offers students K-12 "hands-on" STEM programming through an Olympic model where participants compete in different and complementary STEM events.

NFTE (Network for Teaching Entrepreneurship)

http://www.nfte.com/

NFTE empowers high school students to develop entrepreneurial skills through Biz Camps and competitions.

NOSB (National Ocean Sciences Bowl) http://nosb.org/

Sponsored by the Consortium for Ocean Leadership, NOSB is a high school competition that provides a forum for talented students interested in the marine sciences.

SeaPERCH

http://www.seaperch.org/index

Funded by the Office of Naval Research: Science and Technology, SeaPERCH introduces STEM students to underwater robotics.

Skills USA

http://www.skillsusa.org

Skills USA is a nationwide non-profit organization that prepares students in high school and college for careers in trades, technical and skilled occupations, and health occupations.

Technovation

http://www.technovationchallenge.org/home/

A 12 week, intensive app-development challenge for middle and high school girls who create mobile applications that solve a community problem. Students also create a business plan and pitch around their application.

VEX

http://www.roboticseducation.org/vex-robotics-competitionvrc/

The largest and fastest growing robotics program available worldwide for middle and high school students.

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Appendix C: Interview Responses

Key stakeholders were identified within the Baltimore City Public School System, and interviews were performed using a standard question battery and a protocol that ensured confidentiality of quotes. In every interview the respondents were shown a diagram representing a draft "STEM Ecosystem" (Figure 1) and they were asked to identify the areas in which they were most involved and areas in which they would like to be more involved. A "heat map" of their responses is represented in Figure 2 and Figure 3 where the deeper orange indicates greater frequency of selection.



Teacher Recruitment Pipeline & Leadership	Integrated Curricular Resources; Performance Task Focus	Schools Equipped with Materials (Including Technology Tools)	Teacher Knowledge (i.e. Content & Pedagogy Expertise; Certification)	Technology Integration in Learning Experiences	Student Opportunities for Increased Time Practicing STEM (i.e. Formal/Informal)	Defined Instructional Model & Teachers Trained	Clear Structures for Feedback from Schools	Opportunities for Students to Explore STEM Careers
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Figure 1: The following is a draft of a STEM Ecosystem from a Baltimore City Public School System administrator. All of the stakeholders interviewed were asked which of the areas in the ecosystem they were the most involved.

Figure 2: The following shows a Heat Map of responses from stakeholders regarding the areas of the Ecosystem in which they were asked to pick three of the areas where they were most involved. Each participant was asked to pick three.

Teacher Recruitment Pipeline & Leadership	Integrated Curricular Resources; Performance Task Focus	Schools Equipped with Materials (Including Technology Tools)	Teacher Knowledge (i.e. Content & Pedagogy Expertise; Certification)	Technology Integration in Learning Experiences	Student Opportunities for Increased Time Practicing STEM (i.e. Formal/Informal)	Defined Instructional Model & Teachers Trained	Clear Structures for Feedback from Schools	Opportunities for Students to Explore STEM Careers
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Figure 3: The following shows a Heat Map of responses from stakeholders regarding the areas of the Ecosystem in which they would like to be more involved. Each participant was asked to pick one.



Appendix D: Schools with no Identified STEM

This GIS map contains all of the Baltimore City Public Schools which have been identified as not currently having a STEM program.

Based on 2013-14 data

Map provided by the Family League of Baltimore.





Appendix E: Comprehensive List of Programs



The following spreadsheets contain each school in BCPS and all STEM programs offered to Baltimore City students. If a school offeres more than one type of program, the sheets can be cross referenced. The spreadsheets are broken down by program type:

- In School Opportunities
- Out of School Time (OST) Opportunities
- Competitions

STEM Baltimere

MOST NETWOR	K								ourism	al Resources				Inology			y Schools (SABES						ARE)				grams	itial Programs				
In School Opportunities						ion	Finance	nt	ity, and T	and Natur				and Tech		ment	lementar		ig (WISE)		Course		rience (S/				r Day Pro	r Residen			e	
Based on 2013-14 Data		nuity Project	/: Gateway to Technology	/: Biomedical Science	/: Engineering	Arts, Media and Communicat	Business, Management, and I	Construction and Developme	Consumer Sciences, Hospitali	Environmental, Agriculture a	Health and Biosciences	Human Resource Services	Information Technology	Manufacturing, Engineering,	Transportation Technologies	Career Research and Develop	Achievement in Baltimore El	neering Innovation	ien in Science and Engineerin	m City Science League (CSSL)	neering Design Intersession (nce Communications Course	mer Academic Research Exper	ng Neuroscience Fun (MNF)	ect BioEYES	Watershed, Your Backyard	er for Talented Youth Summe	er for Talented Youth Summe	atters in Maryland	lemy of Health Professions	imore Area STEM Collaborativ	lS
School	Grades Serv	red	PLTW	PLTW	PLTW	Ë	Ë	Ë	Ë	E	Ë	Ë	Ë	Ë	Ë	Ë	STEM	Engi	Wom	Charl	Engi	Scien	Sumi	Maki	Proje	Your	Cento	Cento	CS M	Acad	Balti	TOTA
Abbottston Elementary	PK - 5																															1
Academy for College and Career Exploration	6 - 12																															3
Achievement Academy @ Harbor City High	9 - 12																															1
Afya Public Charter School	6 - 8																															0
Alexander Hamilton Elementary	PK - 5																															0
Artemative clementary School	PK - 8																															2
Armistead Gardens Elementary/Middle	PK - 8																															3
Arundel Elementary/Middle	PK - 8																															0
Augusta Fells Savage Institute of Visual Arts	9 - 12																															3
Baltimore Antioch Diploma Plus High School (Closed '14)	9 - 12																															1
Baltimore City College	9 - 12																				Í											0
Baltimore Civitas (Closed '14)	6 - 12																															1
Baltimore Community High School	8 - 12																															2
Baltimore Design School	6 - 9																															0
Baltimore I.T. Academy	6 - 8																															1
Baltimore International Academy	K - 8																															0
Baltimore Leadership School for Young Women	6 - 12																															0
Baltimore Liberation Diploma Plus High School (Closed '14)	9 - 12 DK 5																															1
Baltimore Montessori Public Charter	PK - 5																															0
Baltimore Montessori Public Charter Mudie School	0-0																															5
Baltimore School for the Arts	9 - 12																															1
Baltimore Talent Development (Closed '14)	9 - 12																															2
Barclay Elementary/Middle	PK - 8																															2
Bay-Brook Elementary/Middle	PK - 8																															0
Beechfield Elementary/Middle	PK - 8																															1
Belmont Elementary	PK - 5																															0
Benjamin Franklin High School at Masonville Cove	9 - 12																															2
Bluford Drew Jemison STEM Academy Middle (Closed '14)	6 - 8																															3
Bluford Drew Jemison STEM Academy West	6 - 12																															6
Booker T. Washington Middle	6 - 8																															2
Brehms Lane Elementary	PK - 5																															0
Callaway Elementary	PK - 5																															0
Calverton Elementary/Middle	PK - 8																															2
Carvor Academy	PK - 5																															0
Career Academy	9 - 17																															7
Cecil Elementary	PK - 5																															0
Charles Carroll Barrister Elementary	PK - 5																															0
Cherry Hill Elementary/Middle	PK - 8																															1
City Neighbors Charter School	K - 8																															0
City Neighbors Hamilton	K - 7																															0
City Neighbors High School	9 - 12																															0
City Springs Elementary/Middle	PK - 8																															1
Claremont School	9 - 12																															0
Coldstream Park Elementary/Middle	PK - 8																															1
Collington Square Elementary/Middle	PK - 8																															2
Commodore John Rodgers Elementary/Middle	PK - 8																															1
Connexions: A Community Based Arts School	6 - 12																															0
Coppin Academy	9-12																															0
Creative City Public Charter School	K - Z																															0
Curtis Ray Flementary/Middle	PK - 8																															2
Dallas F. Nicholas Sr. Elementary	PK - 5																															1
Dickey Hill Elementary/Middle	PK - 8																															0
Digital Harbor High School	9 - 12																															5
Dr. Bernard Harris, Sr. Elementary	PK - 5																															0
Dr. Carter Godwin Woodson	PK - 8																															0
Dr. Martin Luther King, Jr. Elementary/Middle	PK - 8																															1
Dr. Nathan A. Pitts-Ashburton Elementary/Middle	PK - 8																															0
Dr. Rayner Browne Elementary/Middle	PK - 8																															0
Eager Street Academy	6 - 12																															0
Edgecombe Circle Elementary/Middle	PK - 8																															0
Edgewood Elementary	PK - 5																															0
Edmondson-Westside High	9 - 1Z																															11

MOST NETWOR	ме								1 Tourism	ural Resources				chnology			ary Schools (SAB		E)				(SARE)				rograms	ential Programs				
In School Opportunities						ion	Finance	ut	ity, anc	and Nat				and Te		ment	lement		g (WIS		Course		rience (r Day P	r Resid			e	
Based on 2013-14 Data		enuity Project	W: Gateway to Technology	W: Biomedical Science	W: Engineering	: Arts, Media and Communicat	: Business, Management, and	: Construction and Developme	: Consumer Sciences, Hospital	: Environmental, Agriculture a	: Health and Biosciences	: Human Resource Services	: Information Technology	: Manufacturing, Engineering,	: Transportation Technologies	: Career Research and Develop	M Achievement in Baltimore El	ineering Innovation	nen in Science and Engineerin	rm City Science League (CSSL)	ineering Design Intersession (ence Communications Course	ımer Academic Research Expe	cing Neuroscience Fun (MNF)	ject BioEYES	r Watershed, Your Backyard	ter for Talented Youth Summe	ter for Talented Youth Summe	Aatters in Maryland	demy of Health Professions	timore Area STEM Collaborativ	ALS
School	Grades Served	Ing	ЫЛ	ЫЛ	ЫЛ	Ë	Ë	Ë	Ë	Ë	Ë	Ë	Ë	Ë	Ë	Ë	STEI	Eng	Wor	Cha	Eng	Scie	Surr	Mak	Proj	You	Cen	Cen	ŝ	Aca	Bali	1
Elmer A. Henderson: A Johns Hopkins Partnership School	K - 8																															0
Empowerment Academy	PK - 8																															0
Excel Academy @ Francis M. Wood High	9 - 12																															1
Fallstaff Elementary/Middle	PK - 8																															0
Federal Hill Preparatory	PK - 5																															1
Forest Park High	9 - 12																															2
Fort Worthington Elementary	1-5																															0
Francis Scott Key Elementary/Middle	РК - 8																															1
Franklin Square Elementary/Middle	PK - 8																															0
Frederick Douglass High	9 - 12 DK 5																															3
Frederick Elementary	PK - 5																															2
Friendship Academy of Science and Technology (Closed '14)	6 - 12																															6
Furley Elementary	PK - 5																															0
Furman Templeton Preparatory Academy	PK - 5																															0
Gardenville Elementary	K - 5																															1
Garrett Heights Elementary/Middle	PK - 8																															0
George W. F. McMechen	9 - 12																															0
George Washington Elementary	PK - 5																															0
Gilmor Elementary	PK - 5																															0
Gevans Elementary	PK - 8																															1
Graceland Park/O'Donnell Heights Elementary/Middle	PK - 8																															0
Green Street Academy	6 - 9																															0
Grove Park Elementary/Middle	PK - 8																															0
Guilford Elementary/Middle	PK - 8																															2
Gwynns Falls Elementary	РК - 5																															0
Hamilton Elementary/Middle	РК - 8																															3
Hampden	PK - 8																															2
Hampstead Hill Academy	PK - 8																															2
Harlord Heights Elementary	PK - 5 DK - 8																															1
Hazelwood Elementary/Middle	K - 8																															0
Heritage High School	PK, 9 - 12																															2
Highlandtown Elementary/Middle #215	PK - 8																															1
Highlandtown Elementary/Middle #237	PK - 8																															2
Hilton Elementary	PK - 5																															1
Holabird Elementary/Middle	РК - 8																															1
Home and Hospital Program	K - 12																															0
Independence School Local I	9 - 12 DK 0																															0
Inner Harbor East Academy	PK - 8																															0
James Mosher Elementary	PK - 5																															0
John Eager Howard Elementary	PK - 5																															0
John Ruhrah Elementary/Middle	PK - 8																															2
Johnston Square Elementary	PK - 5																															0
K.I.P.P. Harmony Academy	K - 4																															1
K.I.P.P. Ujima Village Academy (Closed '14)	5 - 8																															2
KASA (Knowledge and Success Academy)	6 - 12 DV 0																															1
Lakeland Elementary/Middle	PK - 8																															0
Langston Hughes Elementary	PK - K																															1
Leith Walk Elementary/Middle	PK - 6																															0
Liberty Elementary	PK - 5																															0
Lockerman Bundy Elementary	PK - 5																															0
Lois T. Murray Elementary/Middle	PK - 8																															0
Lyndhurst Elementary	PK - 5																															1
Maree G. Farring Elementary/Middle	PK - 8																															0
Margaret Brent Elementary/Middle	PK - 8																															4
mariline industries Academy Mary Ann Winterling Flomentary at Rentalou	9 - 12 PK - 5																															2
Mary E. Rodman Elementary	PK - 5																															0
Maryland Academy of Technology and Health Sciences	6 - 12																															4
Matthew A. Henson Elementary	PK - 5																															0
Medfield Heights Elementary	PK - 5																															1

MOST NETWORK	E						ince		and Tourism	Natural Resources				d Technology		at	entary Schools (SABES)		(ISE)		se		ce (SARE)				ıy Programs	sidential Programs				
In School Opportunities Based on 2013-14 Data		uity Project	Gateway to Technology	Biomedical Science	Engineering	rts, Media and Communication	usiness, Management, and Fina	onstruction and Development	onsumer Sciences, Hospitality,	nvironmental, Agriculture and	ealth and Biosciences	uman Resource Services	ıformation Technology	anufacturing, Engineering, an	ransportation Technologies	areer Research and Developme	\chievement in Baltimore Elem	eering Innovation	n in Science and Engineering ('	City Science League (CSSL)	eering Design Intersession Cour	e Communications Course	er Academic Research Experien	g Neuroscience Fun (MNF)	t BioEYES	Vatershed, Your Backyard	for Talented Youth Summer Da	for Talented Youth Summer Re	ters in Maryland.	my of Health Professions	iore Area STEM Collaborative	
School	Grades Served	Ingen	PLTW:	PLTW:	PLTW:	CTE: A	CTE: B	CTE: C	CTE: C	CTE: E	CTE: H	CTE: H	CTE: II	CTE: M	CTE: T	CTE: C	STEM /	Engine	Wome	Charm	Engine	Scienc	Summ	Makin	Projec	Your V	Centei	Centei	CS Mat	Acade	Baltin	TOTALS
Mergenthaler Vocational-Technical High	9 - 12																															11
Middle Alternative Program @ Lombard	6 - 8																															0
Midtown Academy	K - 8																															0
Monarch Academy Public Charter School	K - 6																															1
Montebello Elementary/Middle	PK - 8																															0
Morrell Park Elementary/Middle	PK - 5																															0
Mount Royal Elementary/Middle	K - 8																															1
N.A.C.A. Freedom and Democracy Academy II	6 - 12																															0
National Academy Foundation	6 - 12																															8
New Era Academy	6 - 12																															3
New Hope Academy	6 - 12																															0
New Song Academy	РК - 8																															0
North Bend Elementary/Middle	PK - 8																															1
Northwestern Hinh	0 - 8 9 - 17																															
Northwood Appold Community Academy	K-5																															0
Northwood Elementary	PK - 5																															0
Patterson High	9 - 12																															1
Patterson Park Public Charter School	K - 8																															1
Paul Laurence Dunbar High	9 - 12																															2
Pimlico Elementary/Middle	PK - 8																															0
Reginald F. Lewis High School	9 - 12																															2
Renaissance Academy	9-12 DK 5																															0
Robert W. Coleman clementary	PK - 5																															0
Roland Park Elementary/Middle	PK - 8																															5
Roots and Branches School	K - 5																															0
Rosemont Elementary/Middle	PK - 8																															0
Samuel F. B. Morse Elementary	PK - 5																															0
Sarah M. Roach Elementary	PK - 5																															0
Sharp-Leadenhall Elementary	K - 5																															0
Sinclair Lane Elementary	PK - 5																															0
Southwest Baltimore Charter School	K-8																															0
Steurart Hill Academic Academy	0-0 PK-5																															0
Success Academy	9 - 12																															0
Tench Tilghman Elementary/Middle	PK - 8																															0
The Crossroads School	6 - 8																															0
The Green School	K - 5																															0
The Historic Samuel Coleridge-Taylor Elementary	PK - 5																															0
The Mount Washington School	K-8																															0
The Reach: Partnership School Thomas lefferson Elementary/Middle	0 - 12 PK - 8																															2
Thomas Johnson Elementary/Middle	PK - 8																															0
Tunbridge Public Charter School	PK - 6																															0
Vanguard Collegiate Middle School	6 - 8																															0
Violetville Elementary/Middle	PK - 8																															0
Vivien T. Thomas Medical Arts Academy	9 - 12																															3
W.E.B. DuBois High	9 - 12																															3
Walter P. Carter Elementary/Middle	PK - 8																															1
Waveriy clementary/moule	PK - 0 9 - 17																															8
Westport Academy	PK - 8																															1
Westside Elementary	PK - 5																															0
William Paca Elementary	PK - 5																															1
William Pinderhughes Elementary/Middle	PK - 8																															0
William S. Baer School	PK - 12																															0
Windsor Hills Elementary/Middle	PK - 8																															1
Woolfe Street Academy	PK - 5																															1
wooanome tiementary/Middle Yorkwood Flementary	PK - 8 PK - 5																															0
Youth Opportunity	9 - 12																															2
		4	15	5	9	10	8	4	6	2	10	13	15	9	2	8	9	3	1	1	1	1	2	5	42	1	3	6	2	4	1	



Out of School Time (OST) Opportunities

Based on 2013-14 Data

TWORK DF SCHOOL TIME OST) Opportunities	ity Science League	nity Robotics Club	ring Innovation	Đ	8	er Baltimore	J STEPS	ake Bay Foundation.	Achievem ent	lassrooms Foundation	d Agricultural Education Foundation	Education Resources for Teens (MERIT)	nd People Foundation	on Park Audubon Center	s in Partnership	ichievement of Central Maryland) Boys and Girls	Central Maryland	
School	Charm C	Commu	Enginee	NEXT ST	Club UM	Bluewat	Building	Chesape	Higher /	Living (Marylan	Medical	Parks aı	Patterso	Veteran	Junior /	LET'S G(The Y of	TOTALS
Abbottston Elementary															-			-	1
Academy for College and Career Exploration																			3
Achievement Academy @ Harbor City High																			0
Afya Public Charter School																			1
Alexander Hamilton Elementary																			1
Alternative Elementary School																			0
Arlington Elementary/Middle																			1
Armistead Gardens Elementary/Middle																			
Arunuer Elementary/muure																			1
Baltimore Antioch Diploma Plus High School (Closed '14)																			0
Baltimore City College																			0
Baltimore Civitas (Closed '14)																			0
Baltimore Community High School																			0
Baltimore Design School																			0
Baltimore I.T. Academy																			0
Baltimore International Academy																			0
Baltimore Leadership School for Young Women																			0
Baltimore Liberation Diploma Plus High School (Closed '14)																			0
Baltimore Montessori Public Charter																			1
Baltimore Montessori Public Charter Middle School																			0
Baltimore Polytechnic Institute																			2
Baltimore Talent Development (Closed '14)																			0
Barclay Elementary/Middle																			1
Bay-Brook Elementary/Middle																			1
Beechfield Elementary/Middle																			0
Belmont Elementary																			0
Benjamin Franklin High School at Masonville Cove																			1
Bluford Drew Jemison STEM Academy Middle (Closed '14)																			1
Bluford Drew Jemison STEM Academy West																			0
Booker T. Washington Middle																			2
Brehms Lane Elementary																			0
Callaway Elementary Calverton Elementary/Middle																			0
Calvin M. Rodwell Elementary																			2
Career Academy																			0
Carver Vocational-Technical High																			0
Cecil Elementary																			2
Charles Carroll Barrister Elementary																			0
Cherry Hill Elementary/Middle																			0
City Neighbors Charter School																			0
City Neighbors Hamilton																			1
City Neighbors High School																			0
City Springs Elementary/Middle																			1
Claremont School																			0
Colligaton Square Elementary/Middle																			1
Commodore John Rodgers Elementary/Middle																			2
ConneXions: A Community Based Arts School																			0
Coppin Academy																			0
Creative City Public Charter School																			0
Cross Country Elementary/Middle																			1
Curtis Bay Elementary/Middle																			0
Dallas F. Nicholas Sr. Elementary																			0
Dickey Hill Elementary/Middle																			2
Digital Harbor High School																			1
ur. Bernard Harris, Sr. Elementary																			0
ur. Larter GodWin WoodSón																			0
vi. martin Luther King, Jr. Elementary/Middle																			0
Dr. Ravner Browne Elementary/Middle																			U 7
Eager Street Academy																			0
Edgecombe Circle Elementary/Middle																			1
Edgewood Elementary																			0
Edmondson-Westside High																			0
Elmer A. Henderson: A Johns Hopkins Partnership School																			0
Empowerment Academy																			0



Out of School Time (C

Based on 2013-14 Data

ETWORK DF SCHOOL TIME OST) Opportunities	ce League	otics Club	ovation			nore		Foundation	ent	is Foundation	ltural Education Foundation	on Resources for Teens (MERIT)	e Foundation	udubon Center	nership	ent of Central Maryland	id Girls	Maryland	
	City Scien	unity Robo	eering Inno	STEP	MB	ater Baltin	ng STEPS	peake Bay	r Achievem	Classroom	and Agricu	al Educatio	and Peopl	son Park A	ins in Parti	r Achievem	GO Boys an	of Central	10
School	Charm	Comm	Engin	NEXT	Club U	Bluew	Buildi	Chesa	Highe	Living	Maryla	Medic	Parks	Patter	Vetera	Junio	LET'S	The Y	TOTAL
Eutaw-Marshburn Elementary																			0
Excel Academy @ Francis M. Wood High																			0
Fallstaff Elementary/Middle																			1
Federal Hill Preparatory																			0
Forest Park High																			0
Fort Worthington Elementary																			1
Francis Scott Key Elementary/Middle																			2
Franklin Square Elementary/Middle																			1
Frederick Douglass High																			0
Frederick Elementary																			0
Friendship Academy of Engineering and Technology																			0
Friendship Academy of Science and Technology (Closed '14)																			1
Furley Elementary																			0
Furman Templeton Preparatory Academy																			1
Gardenville Elementary																			0
Garrett Heights Elementary/Middle																			0
George W. F. McMechen																			0
George Washington Elementary																			0
Gilmor Elementary																			0
Glenmount Elementary/Middle																			0
Govans Elementary																			0
Graceland Park/O'Donnell Heights Elementary/Middle																			0
Green Street Academy																			1
Grove Park Elementary/Middle																			0
Guilford Elementary/Middle																			0
Gwynns Falls Elementary																			0
Hamilton Elementary/Middle																			0
Hampden																			1
Hampstead Hill Academy																			0
Harford Heights Elementary																			0
Harlem Park Elementary/Middle																			1
Hazelwood Elementary/Middle																			0
Heritage High School																			0
Highlandtown Elementary/Middle #215																			0
Highlandtown Elementary/Middle #237																			0
Hilton Elementary																			0
Holabird Elementary/Middle																			0
Home and Hospital Program																			0
Independence School Local I																			1
Inner Harbor East Academy																			0
James McHenry Elementary/Middle																			1
James Mosher Elementary																			0
John Eager Howard Elementary																			0
John Ruhrah Elementary/Middle																			0
Johnston Square Elementary																			0
K.I.P.P. Harmony Academy																			0
K.I.P.P. Ujima Village Academy (Closed '14)																			0
KASA (Knowledge and Success Academy)																			0
Lakeland Elementary/Middle									1										1

akewood Elementary										0
angston Hughes Elementary										0
eith Walk Elementary/Middle										0
iberty Elementary										0
ockerman Bundy Elementary										0
ois T. Murray Elementary/Middle										0
yndhurst Elementary										0
faree G. Farring Elementary/Middle										0
1argaret Brent Elementary/Middle										1
faritime Industries Academy										0
fary Ann Winterling Elementary at Bentalou										0
1ary E. Rodman Elementary										0
faryland Academy of Technology and Health Sciences										0
fatthew A. Henson Elementary										0
fedfield Heights Elementary										0
fergenthaler Vocational-Technical High										0
fiddle Alternative Program @ Lombard										0
fidtown Academy										0
fonarch Academy Public Charter School										0



Out of School Time (O

Based on 2013-14 Data

TWORK	gue	lub	-					ation		ndation	Education Foundation	ources for Teens (MERIT)	Idation	on Center		Central Maryland	S	and	
JST) Opportunities	ience Lea	obotics C	nnovatio			timore	S	ay Found	ement	oms Fou	icultural	tion Res	ple Four	k Audube	artnershi	ement of	and Girl	al Maryl	
	n City Sc	nunity Re	leering l	STEP	UMB	vater Bal	ing STEP	ipeake B	er Achiev	g Classro	and Agri	cal Educa	and Peo	rson Par	ans in Pa	or Achiev	GO Boys	of Centr	S
School	Charr	Comr	Engir	NEXT	Club	Bluev	Build	Ches	High	Livin	Mary	Medi	Parks	Patte	Veter	Junio	LET'S	The Y	TOTA
Montebello Elementary/Middle																			0
Moravia Park Elementary																			0
Morrell Park Elementary/Middle																			0
Mount Royal Elementary/Middle																			0
N.A.C.A. Freedom and Democracy Academy II																			0
National Academy Foundation																			0
New Era Academy																			0
New Hope Academy																			0
New Song Academy																			0
North Bend Elementary/Middle																			0
Northeast Middle																			1
Northwestern High																			0
Northwood Appold Community Academy																			0
Northwood Elementary																			1
Patterson High																			2
Patterson Park Public Charter School																			3
Paul Laurence Dunbar High																			2
Pimlico Elementary/Middle																			1
Reginald F. Lewis High School																			0
Renaissance Academy																			0
Robert W. Coleman Elementary																			2
Rognel Heights Elementary/Middle																			0
Roland Park Elementary/Middle																			2
Roots and Branches School																			0
Rosemont Elementary/Middle																			0
Samuel F. B. Morse Elementary																			0
Sarah M. Roach Elementary																			0
Sharp-Leadenhall Elementary																			0
Sinclair Lane Elementary																			0
Southwest Baltimore Charter School																			2
Stadium School																			0
Steuart Hill Academic Academy																			0
Success Academy																			0
Tench Tilghman Elementary/Middle																			1
The Crossroads School																			2
The Green School																			2
The Historic Samuel Coleridge-Taylor Elementary																			0
The Mount Washington School																			0
The Reach! Partnership School																			0
Thomas Jefferson Elementary/Middle																			0
Thomas Johnson Elementary/Middle																			0
iunpridge Public Charter School																			0
vanguard Lollegiate Middle School																			0
violetville Elementary/Middle																			1
vivien T. Thomas Medical Arts Academy																			1
W.E.B. DUBOIS HIGH																			1
waiter P. Carter Elementary/Middle																			0
waverly Elementary/Middle																			0
western High																			2
westport Academy																			0

Westside Elementary																			0
William Paca Elementary																			1
William Pinderhughes Elementary/Middle																			0
William S. Baer School																			0
Windsor Hills Elementary/Middle																			0
Wolfe Street Academy																			0
Woodhome Elementary/Middle																			0
Yorkwood Elementary																			0
Youth Opportunity																			
	1	1	3	1	1	5	4	5	3	2	1	6	8	5	1	22	4	6	79



Competitions Based on 2013-14 Data

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School	(E)	Ä	FL	Ĕ	Ę	WE	MS	ŐŇ	Bot	ž	DO	Tec	NFI	Ski	4
Abbottston Elementary															
Academy for College and Career Exploration															
Achievement Academy @ Harbor City High															
Afya Public Charter School															
Alexander Hamilton Elementary															
Alternative Elementary School															
Arlington Elementary/Middle															
Armistead Gardens Elementary/Middle															
Arundel Elementary/Middle															
Augusta Fells Savage Institute of Visual Arts															
Baltimore Antioch Diploma Plus High School (Closed '14)															
Baltimore City College															
Baltimore Civitas (Closed '14)															
Baltimore Community High School															
Baltimore Design School															
Baltimore I.T. Academy															
Baltimore International Academy															
Baltimore Leadership School for Young Women															
Baltimore Liberation Diploma Plus High School (Closed '14)															
Baltimore Montessori Public Charter															
Baltimore Montessori Public Charter Middle School															
Baltimore Polytechnic Institute															
Baltimore School for the Arts															
Baltimore Talent Development (Closed '14)															
Barclay Elementary/Middle															
Bay-Brook Elementary/Middle															
Beechfield Elementary/Middle															
Belmont Elementary															
Benjamin Franklin High School at Masonville Cove															
Bluford Drew Jemison STEM Academy Middle (Closed '14)															
Bluford Drew Jemison STEM Academy West															
Booker T. Washington Middle															
Brehms Lane Elementary															
Callaway Elementary															
Calverton Elementary/Middle															
Calvin M. Rodwell Elementary															
Career Academy															
Carver Vocational-Technical High															
Cecil Elementary															
Charles Carroll Barrister Elementary															
Cherry Hill Elementary/Middle															
City Neighbors Charter School															
City Neighbors Hamilton															
City Neighbors High School															
City Springs Elementary/Middle															
Claremont School															
Coldstream Park Elementary/Middle															
Collington Square Elementary/Middle															
Commodore John Rodgers Elementary/Middle															
ConneXions: A Community Based Arts School															
Coppin Academy															

Creative City Public Charter School								0
Cross Country Elementary/Middle								2
Curtis Bay Elementary/Middle								1
Dallas F. Nicholas Sr. Elementary								0
Dickey Hill Elementary/Middle								0
Digital Harbor High School								3
Dr. Bernard Harris, Sr. Elementary								0
Dr. Carter Godwin Woodson								0
Dr. Martin Luther King, Jr. Elementary/Middle								0
Dr. Nathan A. Pitts-Ashburton Elementary/Middle								0
Dr. Rayner Browne Elementary/Middle								0
Eager Street Academy								0
Edgecombe Circle Elementary/Middle								0
Edgewood Elementary								0
Edmondson-Westside High								1
Elmer A. Henderson: A Johns Hopkins Partnership School								0
Empowerment Academy								0
Eutaw-Marshburn Elementary								0



Competitions Based on 2013-14 Data

										iot		ion			n Imagination	
School	VEX	FRC	EL	FIC	JrFLL	MESA	MSO	NOSB	BotBall	CyberPatr	DOE NSB	Technoval	NFTE	Skills USA	Destinatio	TOTALS
Excel Academy @ Francis M. Wood High					_							-				0
Fallstaff Elementary/Middle																1
Federal Hill Preparatory																1
Forest Park High																1
Fort Worthington Elementary																0
Francis Scott Key Elementary/Middle																3
Franklin Square Elementary/Middle																0
Frederick Douglass High																1
Frederick Elementary																0
Friendship Academy of Engineering and Technology																3
Friendship Academy of Science and Technology (Closed '14)																0
Furley Elementary																0
Furman Templeton Preparatory Academy																0
Gardenville Elementary																0
Garrett Heights Elementary/Middle																0
George W. F. McMechen																0
George Washington Elementary																1
Gilmor Elementary																0
Glenmount Elementary/Middle																2
ovans Elementary																0
raceland Park/O'Donnell Heights Elementary/Middle																0
ireen Street Academy																2
Grove Park Elementary/Middle																0
Suilford Elementary/Middle																0
Gwynns Falls Elementary																0
Hamilton Elementary/Middle																1
Hampden																0
Hampstead Hill Academy																0
Harford Heights Elementary																0
Harlem Park Elementary/Middle																0
Hazelwood Elementary/Middle																0
Heritage High School																1
Highlandtown Elementary/Middle #215																1
Highlandtown Elementary/Middle #237																1
Hilton Elementary																1
Holahird Elementary/Middle																1
Home and Hospital Program																
Independence School Local L																0
Inner Harbor East Academy																0
James McHenry Elementary/Middle																1
James Mosher Flementary																1
John Fager Howard Elementary																0
John Ruhrah Elementary/Middle																0
Johnston Square Elementary																0
K.I.P.P. Harmony Academy																0
K.I.P.P. Uilma Village Academy (Closed '14)																0
KASA (Knowledge and Sucross Arademu)																1
lakeland Elementary/Middle																z
Lakewood Elementary																0
Langton Hughes Flementary																0
Leith Walk Elementary/Middle																0
																v

Liberty Elementary								0
Lockerman Bundy Elementary								0
Lois T. Murray Elementary/Middle								0
Lyndhurst Elementary								0
Maree G. Farring Elementary/Middle								0
Margaret Brent Elementary/Middle								1
Maritime Industries Academy								1
Mary Ann Winterling Elementary at Bentalou								0
Mary E. Rodman Elementary								0
Maryland Academy of Technology and Health Sciences								2
Matthew A. Henson Elementary								0
Medfield Heights Elementary								1
Mergenthaler Vocational-Technical High								2
Middle Alternative Program @ Lombard								0
Midtown Academy								2
Monarch Academy Public Charter School								1
Montebello Elementary/Middle								0
Moravia Park Elementary								0



Competitions Based on 2013-14 Data

School Morrell Park Elementary/Middle Mount Royal Elementary/Middle N.A.C.A. Freedom and Democracy Academy II National Academy Foundation New Era Academy New Hope Academy New Hope Academy North Bend Elementary/Middle Northwestern High Northwood Elementary Patterson Park Public Charter School Paul Laurence Dunbar High	VEX	FRC	III	L	JIRIL	MESA	W20	NOSB	BotBall	CyberPatriot	DOE NSB	Technovation	NFTE	Skills USA
SchoolMorrell Park Elementary/MiddleMount Royal Elementary/MiddleN.A.C.A. Freedom and Democracy Academy IINational Academy FoundationNew Era AcademyNew Era AcademyNew Hope AcademyNorth Ope AcademyNorth Bend Elementary/MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High	VEX	FRC	EL	EIC	JFRL	MESA	WSO		BotBall	CyberPi	DOE NS	Techno	NFTE	Skills U
Morrell Park Elementary/MiddleMount Royal Elementary/MiddleN.A.C.A. Freedom and Democracy Academy IINational Academy FoundationNew Era AcademyNew Era AcademyNew Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
Mount Royal Elementary/MiddleN.A.C.A. Freedom and Democracy Academy IINational Academy FoundationNew Era AcademyNew Era AcademyNew Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
N.A.C.A. Freedom and Democracy Academy IINational Academy FoundationNew Era AcademyNew Hope AcademyNew Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
National Academy FoundationNew Era AcademyNew Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNortheast MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
New Era AcademyNew Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNortheast MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
New Hope AcademyNew Song AcademyNorth Bend Elementary/MiddleNortheast MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
New Song AcademyNorth Bend Elementary/MiddleNortheast MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
North Bend Elementary/Middle Northeast Middle Northwestern High Northwood Appold Community Academy Northwood Elementary Patterson High Patterson Park Public Charter School Paul Laurence Dunbar High														
Northeast MiddleNorthwestern HighNorthwood Appold Community AcademyNorthwood ElementaryPatterson HighPatterson Park Public Charter SchoolPaul Laurence Dunbar High														
Northwestern High Northwood Appold Community Academy Northwood Elementary Patterson High Patterson Park Public Charter School Paul Laurence Dunbar High														
Northwood Appold Community Academy Northwood Elementary Patterson High Patterson Park Public Charter School Paul Laurence Dunbar High														
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Patterson High Patterson Park Public Charter School Paul Laurence Dunbar High														
Patterson Park Public Charter School Paul Laurence Dunbar High														
Paul Laurence Dunbar High														
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Dimlico Flementary/Middle														
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Denzissansa Asadomy														
Rehart W. Colomon Flomentow														
Robert W. Coleman Elementary														
Rögnet Heignts Elementary/Middle														
Roland Park Elementary/Middle														
Roots and Branches School														
Rosemont Elementary/Middle														
Samuel F. B. Morse Elementary														
Sarah M. Koach Elementary														
Sharp-Leadenhall Elementary														
Sinclair Lane Elementary														
Southwest Baltimore Charter School														
Stadium School														
Steuart Hill Academic Academy														
Success Academy														
Tench Tilghman Elementary/Middle														
The Crossroads School														
The Green School														
The Historic Samuel Coleridge-Taylor Elementary														
The Mount Washington School														
The Reach! Partnership School														
Thomas Jefferson Elementary/Middle														
Thomas Johnson Elementary/Middle														
Tunbridge Public Charter School														
Vanguard Collegiate Middle School														
Violetville Elementary/Middle														
Vivien T. Thomas Medical Arts Academy														
W.E.B. DuBois High														
Walter P. Carter Elementary/Middle														
Waverly Elementary/Middle														
Western High														
Westport Academy														
Westside Elementary														
William Paca Elementary														

	36	2	23	0	0	8	5	0	0	0	0	5	15	8	2	104
Youth Opportunity																1
Yorkwood Elementary																0
Woodhome Elementary/Middle																0
Wolfe Street Academy																2
Windsor Hills Elementary/Middle																1
William S. Baer School																0



Landscaping Baltimore's STEM Ecosystem

www.mdoutofschooltime.org