An Analysis of STEAM Funding Impact
May – December 2018
NATIONAL TREND

Living in the “digital age” means that the disciplines of science, technology, engineering, and math (STEM) increasingly intersect and saturate the fabric of American life. With each technological advance, STEM becomes more central to our lives and to our economy. Thus, it is not surprising that growth in STEM jobs is outpacing our nation’s overall job growth—by 2027, the number of STEM jobs is projected to grow by 13% (Source: 1).

Yet, a closer look into the nation’s capacity to satisfy demand for STEM jobs reveals an educational system that struggles to support youth in the acquisition of STEM skills. In the most recent cross-national test conducted by the Program for International Student Assessment (PISA), the United States placed 38th out of 71 countries in math and 24th in science (Source: 2). Moreover, less than half of the public considers STEM education in the U.S. to be at least above average when compared with other developed nations (Source: 3). Given STEM’s omnipresence in the global workforce, significant investments are needed to support American youths’ development of STEM skills and eventual success in STEM careers.

LOCAL IMPLICATIONS

Student achievement data in Nashville tells a similar story. From 2012 to 2017, the number of technology-based jobs in Middle Tennessee increased by 30 percent, superseding overall job growth by 10 percent and the national growth by 15 percent. (Source: 4). According to the Tennessee Department of Education State Report Card, just over a third of Metro Nashville Public Schools (MNPS) high school students are scoring proficient or advanced in math and science on the state’s achievement test (Source: 5). From a workforce development perspective, Nashville is not on track to graduate enough high school students with the necessary STEM skills needed to meet the city’s demand for STEM talent.

Despite the statistics, there are bright spots—ongoing efforts, such as MNPS’ Investing in Innovation (i3) initiative and NAZA’s STEAM Initiative, that have been working to support change on this very issue.
NAZA STEAM INITIATIVE OVERVIEW

Since 2016, the Nashville After Zone Alliance (NAZA) has pioneered ways to inspire youths’ interest, engagement, and motivation in science, technology, engineering, arts, and math (STEAM) and connect in-school and out-of-school time learning by offering select funded partners additional funding and resources to test out innovative learning strategies with youth. NAZA has supported partners in its STEAM Initiative by:

- Facilitating partnerships between school teachers and afterschool educators;
- Offering professional development focused on best practices in facilitating high-quality STEAM learning;
- Offering funding to offset the costs of educator time, STEAM supplies, program enrichments, and field trips;
- Providing best-in-class evaluations both of STEAM program quality and youths’ perceptions about their experiences; and
- Facilitating a learning community through which the partners could share their experiences and expertise.

In turn, these partners have increased youths’ access to high-quality STEAM learning experiences and led the nation in exploring STEAM best practices for out-of-school time (OST).

FULL STEAM AHEAD

NAZA’s 2018 STEAM Initiative kicked off in May and culminated in December. During that time NAZA enabled 13 afterschool programs in Nashville to provide highly engaging STEAM-based activities and experiences to middle school youth. Partner programs benefitted from a variety of professional and instructional resources including STEAM-focused trainings, a STEAM coach to help program directors and their staff plan meaningful OST activities, access to STEAM equipment, and funding to enhance youth access to STEAM programming and experiences.
614 youth from Metro Nashville Public Schools were exposed to 68 hours of STEAM-based activities at 13 program sites across Davidson county.

STEAM PARTNERS

Aspiring Youth Enrichment Services
Backfield In Motion.
Beech Creek Ministries
Bethlehem Centers of Nashville
Boys & Girls Club
Coleman Community Center
Conexion Americas.
DYMON in the Rough
In Full Motion

Martha O' Bryan Center.
Moves & Grooves
Old Hickory Community Center
YMCA
Youth engaged in STEAM-based educational experiences such as learning how to code robots, creating hydroponic gardens, building models of human biology, and designing simple circuits.

Activities were aligned with the Next Generation Science Standards (NGSS) and reinforced what youth learned in the classroom. Furthermore, activities enhanced 21st Century Skills such as teamwork and collaboration.

Special emphasis was placed on making real-world connections relevant to youth who are currently underrepresented in the STEAM workforce.

Program partners participated in seven hours of Community of Practice meetings that were facilitated by youth professionals to discuss best practices in social and emotional skill building, ways to increase youth voice, and how to improve instructional relevance for their youth.

Program partners engaged in 25 hours of planning with formal educators to co-plan their program’s STEAM activities.
MEASURING IMPACT

YOUTH EXPERIENCES

The Common Instrument Suite (CIS) is a self-report survey developed by Harvard University’s PEAR Institute that measures a variety of youths’ STEM-related attitudes, including STEM interest and engagement, STEM career knowledge, and STEM identity. This tool was specifically developed with out-of-school time (OST) STEM programs in mind.

Partners in NAZA’s STEAM Initiative in both the summer and fall of 2018 administered the CIS to their youth, allowing the partners and NAZA to better understand youths’ experiences in NAZA’s STEAM Initiative.

![A snapshot of the demographics of youth surveyed in the fall of 2018](image)
MEASURING IMPACT

STEM ENGAGEMENT & STEM IDENTITY

The CIS survey measures whether youths’ attitudes about STEM engagement (i.e. interest and excitement in participating in STEM activities) and STEM identity (i.e. the degree to which youth see themselves as inventors, scientists, engineers, or mathematicians) changed as a result of participating in their program.

69% of youth respondents from NAZA’s STEAM Initiative reported an increase in STEM Engagement during summer programming; 78% of youth reported an increase in STEM Engagement during fall programming. The national average for increased STEM Engagement was 86%.

51% of youth respondents from NAZA’s STEAM Initiative reported an increase in STEM identity during summer programming; 63% percent of youth report an increase in STEM identity during fall programming. The national average for increased STEAM Identity was 59%.
MEASURING IMPACT

21ST CENTURY SKILLS

The CIS survey measures whether youth reported increases in four 21st Century Skills including: critical thinking, perseverance, relationships with adults, and relationships with peers.

- 72% of youth respondents from NAZA’s STEAM Initiative reported gains in critical thinking skills during summer programming; 79% of NAZA youth reported gains in critical thinking skills during fall programming. The national average for increased critical thinking skills was 73%.

- 77% of youth respondents reported gains in perseverance during summer programming; 76% of NAZA youth reported gains in perseverance skills during fall programming. The national average for increased perseverance skills was 66%.

- 71% of youth respondents reported gains in relationships with adults during the summer; 75% of NAZA youth reported gains in relationships with adults during fall programming. The national average for increased relationships with adults skills was 61%.

- 77% of youth respondents reported gains in relationships with peers during summer programming; 78% of NAZA youth reported gains in relationships with peers. The national average for increased relationships with peers was 67%.
A recent national report, From Niche to Necessary: Scale and Sustainability Lessons from the Frontiers in Urban Science Education (FUSE) Initiative highlighted NAZA’s efforts related to inspiring youths’ interest and engagement in STEM in the after school and summer space over the course of the 2016-2017 school year, 2017 summer, and fall of 2017.

The Aspen Institute released a comprehensive Policy Agenda, Practice Agenda, Research Agenda and a Recommendations Report on how and where learning happens. “From Nation at Risk to A Nation at Hope” featured MNPS and NAZA as an exemplary partnership in the Policy Agenda document.

Education Week’s "After-School Programs Keep Learning Going with Student-Data" featured NAZA’s longstanding partnership with MNPS in sharing student data to support youth success in school and out-of-school.
REFERENCES

Source 1

Source 2

Source 3

Source 4

Source 5

NAZA IN THE NEWS

https://static1.squarespace.com/static/5b199ed585ede1153ef29e8a/t/5be5ae97575d1fddbc6d04f6/1541779110858/Every+Hour+Counts+From+Niche+to+Necessary+Report.pdf
