



# Investing in Tomorrow's Innovators in Illinois

*A Comprehensive Assessment of Afterschool STEM Programs and the Need for Expanded Learning Opportunities for Youth*

By EMMA GIAMBERDINO  
ACT Now Policy and Communications Manager



## Contents

1	Introduction
2	What is Afterschool STEM?
4	Why is Afterschool STEM Important?
6	How is Afterschool STEM Funded?
8	The Landscape of Afterschool STEM in Illinois
12	STEM Clubs Initiative
16	The Need to Grow STEM OST in Illinois
18	Resources for Making the Case for Afterschool STEM
20	Appendix A: STEM Club Case Studies (2022-2023)
24	Endnotes

Afterschool Science, Technology, Engineering, and Mathematics (STEM) programming remains a key strategy across our nation in addressing inequity in students' learning. STEM programs supplement traditional school day opportunities and reinforce young people's development of integral life and employment skills. In Illinois, afterschool STEM programs work to support students living in urban, suburban, rural, and low-income communities by providing spaces to innovate, renew learning, make connections with peers, and build curiosity for future careers.

However, barriers in accessing high-quality STEM out-of-school time (OST) experiences remain for many due to geography, historic lack of investment in communities, cost of materials for programming, and difficulty in obtaining professional development for STEM facilitation in informal settings. Further, these challenges disproportionately impact students and families living in regions of the state that border major metropolitan areas and in counties that have high levels of child poverty.

In order to address these issues, Afterschool for Children and Teens Now (ACT Now) Coalition offered resources and materials, provided technical assistance and coaching, and developed programming to expand afterschool STEM to more locations in Illinois. ACT Now has worked hard to ensure that programming reflects student interest in both STEM and social-emotional learning (SEL) competencies as studies indicate that the core skills necessary for student academic success and well-being are linked.

This policy report is designed to provide information for why investments in the afterschool STEM field are critical to the academic success and career development of students in the State of Illinois. The document is directed towards a broad audience that includes, but is not limited to, afterschool and OST program administrators and frontline staff, elected officials, school district administrators and paraprofessionals, and state agency representatives that currently fund afterschool programs across Illinois. Ultimately, it is clear that investing in STEM in afterschool is an effective strategy to spark students' interest in STEM careers and build STEM skills, which will help to prepare them for career success. However, afterschool programs will struggle to implement STEM programming without the help of intermediaries to provide STEM specific content, training, and coaching.

# What is Afterschool STEM?

Science, Technology, Engineering, and Mathematics are disciplines collectively known as STEM.<sup>1</sup> STEM competencies encompass a wide range of skills including understanding information, gathering and analyzing evidence, problem solving, reviewing past success and failures, and working in teams.<sup>2</sup>

Research indicates that there are eight guiding principles that make up quality afterschool STEM.<sup>3</sup> These principles create supportive learning conditions for both participating youth and their facilitators. The eight principles are:

	<b>ENVIRONMENT:</b> the space, materials, time, and background knowledge available to successfully facilitate afterschool STEM programming
	<b>PARTICIPATION:</b> the opportunity for students to identify and foster their skills and attending to their diverse needs
	<b>OBJECTIVE:</b> the alignment of STEM curricula with the national Next Generation Science Standard (NGSS) and state level STEM competencies
	<b>REFLECTION:</b> the time and/or space for students to question why things went wrong and discover solutions
	<b>HANDS-ON OPPORTUNITIES:</b> the activities that allow students to lead experiments and learn from “doing”
	<b>CAREERS:</b> the relevance of programming to real social, economic, and environmental issues that students work towards addressing
	<b>RELATIONSHIPS:</b> the meaningful and sustained interactions to help youth build positive social skills with fellow peers and with instructors
	<b>CONNECTION:</b> the understanding of what is being taught and what youth are experiencing outside of the afterschool program

---

Although some STEM content might feel somewhat technical, afterschool providers do not need a STEM degree to expose youth to these skills and information.

As previously mentioned, out-of-school time (OST) experiences are helping students across the United States to develop critical life skills, while providing more access to spaces to learn from peers and bridge the gap in academic achievement.<sup>4</sup> Programs also work to engage students in on-going STEM activities to provide safe environments for young people to innovate and to explore diverse career fields.<sup>5</sup>

According to a 2021 study by the Afterschool Alliance, more than 5,740,000 kids have STEM learning experiences in their afterschool programs. However, afterschool STEM (used broadly to refer to before-school, afterschool, and summer STEM learning opportunities)<sup>6</sup> happens in a variety of environments with different types of resources and instructors. To further understand what afterschool STEM looks like it is helpful to briefly go over the three key categories into which entities facilitating STEM programming fall:

**i) Community-Based Organization(s)**

Across the country, community-based organizations (CBOs), or programs located within a community, are facilitating high-quality afterschool STEM opportunities for students that may otherwise not have access to them during the traditional school day. It should be noted that not all organizations that offer afterschool STEM work exclusively in this space and may provide comprehensive OST curriculum as well.

**ii) School-Based Afterschool STEM Programs**

Many school districts offer afterschool programming across the nation and oftentimes have STEM clubs or integrate STEM activities into their OST opportunities. Some schools focus entirely on STEM learning during the traditional academic hours. Finally, school-based programs may partner with afterschool programs and other STEM entities to provide more comprehensive programming for youth of different age ranges.

**iii) Museums and National STEM Institutions and Organizations**

There are several national STEM institutions, museums, and organizations that facilitate afterschool STEM programming opportunities or partner with the aforementioned entities to do so for youth. For instance, the U.S. Department of Education and the National Science Foundation (NSF) provide resources to partner organizations to support the expansion of afterschool STEM programming.

Nationally, afterschool programs have increased their STEM offerings. In 2014, only 69 percent of programs offered STEM opportunities while in 2020, 73 percent of OST providers indicated that they provide STEM programming.<sup>7</sup> There has also been an increase in the variety of afterschool STEM activities that are facilitated in the United States.



# Why is Afterschool STEM Important?

Year over year, STEM occupations remain to be one of the fastest growing sectors of employment.<sup>8</sup> The U.S. Bureau of Labor Statistics projects that STEM jobs will grow by 10.8% between 2021 and 2031, in comparison to non-STEM sector occupations (4.9%).<sup>9</sup> Further, data suggests that STEM occupations compensate individuals at a higher rate, with the median annual salary being \$95,420, as opposed to \$40,120 for non-STEM sector jobs.<sup>10</sup>

Percent of projected job growth (2021-2031)		Median annual salary	
STEM	10.8%	STEM	\$95,420
Non-STEM	4.9%	Non-STEM	\$40,120

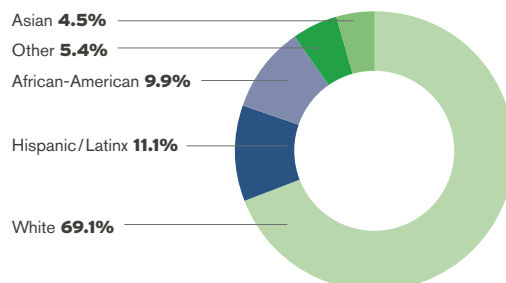
Exposure to STEM programming at an earlier point in a young person's lifetime provides opportunity to develop key skills that will be leveraged not only personally but professionally—linking informal STEM experiences, such as afterschool STEM, to college and career opportunities. Research indicates that interest in STEM fields is connected to the success of a young person in their STEM educational pursuit.<sup>11</sup> Afterschool is the perfect environment for STEM learning as it is structured to allow students to be creative and develop understanding of new concepts while also connecting STEM principles to their everyday lives and experiences. Leveraging this engagement, students who participate in STEM experiences are more likely to pursue STEM careers. Moreover, it is imperative that these STEM learning opportunities are not ad hoc but rather, consistent experiences to ensure that young people are equipped with the knowledge and skills necessary to fulfill the demand for STEM jobs and economic prosperity.<sup>12</sup>

## EQUITY AND ACCESS

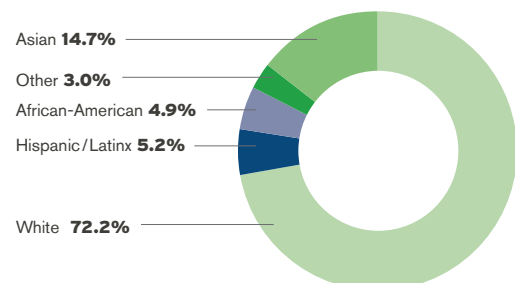
STEM opportunities oftentimes differ for youth as they are dependent upon location and school system, with research highlighting inequities between students from families in low-income situations with those with families from higher-income brackets.<sup>13</sup>

Afterschool STEM experiences are a strategy for educational equity as they oftentimes provide key instruction to students that are overlooked in, or excluded from, opportunities in the traditional school day. Due to investments in afterschool STEM programs and the expansion of offerings, more Black and Hispanic/Latinx youth are accessing critical information and skills necessary to pursue further education and STEM careers. The Afterschool Alliance noted that in 2020, “parents of Black and Hispanic/Latinx students shared higher rates of STEM programming in their child's afterschool program than the national average.”<sup>14</sup> Similarly, family members of Black and Hispanic/Latinx students shared that there are higher rates of STEM learning opportunities when broken down by gender (ie. more opportunities for girls and boys to participate in STEM learning).

Percent of overall workforce share in Illinois (2017)



Percent of STEM workforce share in Illinois (2017)



Afterschool STEM programs are also decreasing barriers to learning opportunities for students across the United States by providing a unique setting for hands-on and engaging STEM projects. OST programs allow students to iterate and challenge themselves without the fear of failure in safe and supportive environments, which may not be reflected in a formal classroom setting. Afterschool STEM programs also are more likely able to tailor activities towards the interests of students and therefore sustain youths' STEM education over time—with evidence suggesting that continued engagement in STEM activities helps to decrease the opportunity gap for students from low-income and historically marginalized communities.

Finally, many programs that offer robust STEM experiences for youth are also engaging families in their child's learning. This is another strong strategy for attaining equitable education as research indicates family engagement as a predictor of whether students complete their education and pursue careers.<sup>15</sup>

## ASSESSING HIGH-QUALITY AFTERSCHOOL STEM

As STEM programming becomes more popular and integrated into both school-day and OST experiences, it is integral to ensure that these activities are of high-quality and facilitated in ways that build upon one another. Further, developing the systems of support to help program providers access high-quality STEM curriculum, resources, and professional development, is of the upmost importance. In 2012, a national study indicated that technical assistance and coaching to programs facilitating afterschool STEM programming helps to increase the quality of programs and support positive student outcomes. In order to assess this relationship further, another survey looked to 1) examine levels of change in STEM-related outcomes among youth in programs receiving resources and training support; (2) inform on national trends related to STEM learning, such as gender or grade differences in STEM interest; and (3) link program quality with student outcomes and facilitator attitudes and self-assessments.<sup>16</sup>

Data from this study suggests that afterschool STEM programming increases STEM career knowledge, STEM skills, students' STEM identity and builds 21st Century skills such as perseverance and critical thinking.

This study also articulated the importance of afterschool STEM in the lives of OST professionals and the field at large. More than 88 percent of program providers reported improvements in their own interest, confidence, and ability to lead STEM programs after their sessions ended. Further, more than 90 percent of respondents noted that their students' proficiency in science, math, and social skills increased after participating in afterschool STEM.

Ultimately, findings from both studies confirmed the importance of having a centralized entity to build capacity in program providers. With private and public funding, since 2016, ACT Now has held this role in Illinois with the goal to support expanded learning programs, including afterschool STEM organizations. Our Coalition engages key partners to create a vision of quality STEM in afterschool as well as map the existing landscape of afterschool and STEM efforts. Moreover, ACT Now prioritizes strategies and acts to expand awareness of supply and quality of afterschool STEM through communication, policy, and professional development.<sup>17</sup>

CHALLENGES →	Organization
	Materials
	Space Utilization
	Relationships
	STEM Content Learning
	Inquiry
	Reflection
	Relevance
	Youth Voice

# How is Afterschool STEM Funded?

---

Afterschool STEM programs leverage diverse funding lines to support their work. Funding comes both from the federal and state governments as well as private foundations, industry partners, and collaborative networks.<sup>18</sup> This section will highlight the federal and national funding used for afterschool STEM.

## i) Federal

(1) The **U.S. Department of Education** funds afterschool STEM programming through two key programs, both of which are re-granted out to programs at the state level by the state education agency. The **21st Century Community Learning Centers (21st Century)** grant serves students kindergarten through 12th grade. Oftentimes, these students are enrolled in high-poverty and low-performing schools.<sup>19</sup> 21st Century is the largest source of afterschool, before-school and summer learning programs in the nation, with over 1.5 million youth and families served.<sup>20</sup> The funding line includes a Career and Technology Education requirement in programming, which programs use to include STEM activities in their traditional OST offerings.<sup>21</sup> The second grant that funds afterschool STEM programs is the **Perkins V Career Technical Education (CTE)** line. Congress consistently funds the CTE grant program at \$1.3 billion, and the funding is disseminated to state education agencies via the Title I Formula. In many states like Illinois, CTE funding is leveraged by community-based organizations and schools to provide academic opportunities related to workforce readiness and STEM fields.<sup>22</sup> In Illinois, most after-school STEM programs braid both 21st Century, CTE, and other funds to support their STEM experiences; and some schools and CBOs leverage CTE funding specifically for afterschool STEM programming.

(2) The **National Science Foundation (NSF)** provides grants on an annual basis to support STEM research and expand STEM opportunities for students across the nation. NSF funding is oftentimes given to schools and higher education institutions for STEM learning.<sup>23</sup> However, community-based organizations are able to access NSF funding via smaller competitive grants as well as partnerships with schools and entities such as museums.<sup>24</sup> Finally, NSF funding is allocated for partnerships as well as integrative activities and interagency STEM initiatives.<sup>25</sup>

(3) The **National Aeronautics and Space Administration (NASA)** is a long-time partner of the afterschool field in that it provides funding opportunities, professional development for OST providers, and high-quality curricula and resources for programs. NASA also has its own Out-of-School Learning Network that leverages three NASA centers, which operate regionally to ensure that afterschool STEM programming continues to be expanded. NASA partners directly with diverse formal and informal education entities for afterschool STEM experiences.<sup>26</sup>





## ii) Foundations and Collaborative Networks

(1) The **Wallace Foundation** aims to foster equity and improvements in learning and enrichment for young people and does so by providing grants for youth-serving organizations. While there is an emphasis on the arts, afterschool STEM programming may be a component of a grantee's project.<sup>27</sup>

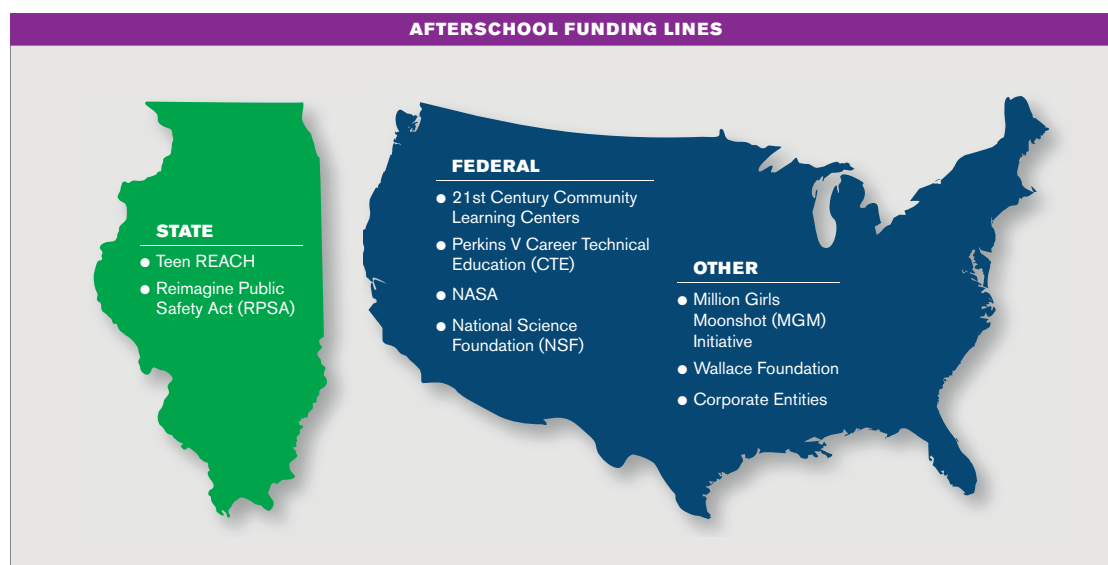
(2) The **Million Girls Moonshot (MGM) Initiative** is national collaborative funded by the Mott Foundation, STEM Next Opportunity Fund, and the 50 State Afterschool Network. MGM aims to inspire and prepare more girls in afterschool and summer STEM learning opportunities.<sup>28</sup> This initiative provides curriculum, funding, technical assistance and training, as well as other resources to program providers in the United States.

(3) **Corporate Entities** such as IBM, Intel, Lockheed Martin, and Boeing provide expertise in the STEM sectors, volunteers, and funding for afterschool programs across the nation, and, within Illinois. Industry partners see the benefit of supporting OST STEM programs with resources, curriculum, and grants to grow the future workforce and invest in diverse communities.

# The Landscape of Afterschool STEM in Illinois

## WHAT FUNDING SUPPORTS AFTERSCHOOL STEM IN ILLINOIS?

In Illinois, afterschool STEM programs are located across the state and program providers braid a variety of funding sources to facilitate high-quality STEM experiences. According to ACT Now's Map and Database, 1,209 programs currently offer STEM learning opportunities for Illinois youth.<sup>29</sup>



This number has grown over the years as more programs are working to support students in all corners of the state and decrease barriers to STEM education. Afterschool STEM programs leverage the following state-based funding lines alongside the aforementioned national funding streams to provide programming to students:

### i) **Teen REACH**

The Teen REACH (Responsibility, Education, Achievement, Caring, and Hope) is a comprehensive youth development program administered by the Illinois Department of Human Services (IDHS). Teen REACH provides afterschool program services to high-risk youth between the ages of 6 and 17. Notably in 2019, IDHS made STEM programming a requirement of the Teen REACH grant line, ensuring that over 13,000 youth in the state received consistent, quality STEM education in the afterschool setting. Teen REACH programs continue to foster STEM learning opportunities for youth regardless of location in the state.

### ii) **Reimagine Public Safety Act (RPSA)**

This grant program provides funding for community-based organizations (CBOs) in specific areas of the City of Chicago and across the state to provide youth development and afterschool programming. For this grant, grantees chose specific focus areas, one of which is STEM.

### iii) **21st Century Community Learning Centers (21st Century) & Career Technical Education (CTE) Funding**

As previously mentioned, the U.S. Department of Education allocates federal funding for afterschool programming through formulas to each state. The State Education Agency (SEA), the Illinois State Board of Education (ISBE) then re-allocates funding to community-based organizations and school districts to provide programs.

---

## PARTNERSHIPS FOR AFTERSCHOOL STEM

Some education leaders and school districts in Illinois have recognized the power of afterschool STEM and invested in programming to further this work. Even when the expertise or capacity for this work was not available internally to districts, community partnerships allowed school districts to leverage existing resources and bring them in-house to their students. For instance, Illinois recently required Computer Science (CS) literacy for graduation beginning in the 2022-2023 school year. This change mandated school districts in different regions of Illinois to work to support and expand STEM learning opportunities for youth. Further, the School Science, Technology, Engineering, Arts, and Mathematics (STEAM) Grant Program was initiated in 2021 and aims to support school-day STEAM programming across the state. The Illinois State Board of Education (ISBE) administers this funding to school districts to ensure that students access high-quality STEM activities. While community-based organizations are currently ineligible for this funding, there are programs that partner with local school districts (including private and charter schools, vocational centers, and laboratory schools) to access funding and leverage resources for afterschool STEM.

School districts in Illinois have also recognized that STEM in OST is a critical part of students becoming prepared for STEM careers and mastering STEM skills. The following examples illustrate a variety of partnerships where OST supports school day STEM learning and further deepens STEM interest in a way that school day STEM learning could not do alone.



### **Springfield School District 186**

Over the past two years, Springfield School District 186 leveraged federal COVID-19 relief funding to expand its STEAM opportunities offered to students. These STEAM experiences took place both during the traditional school year and the summertime. These increased opportunities for students included:

- a one-to-two-week school residency program for 2nd grade students to learn and explore at the Kidzeum Children's Museum
- afterschool programming sponsored by Kidzeum
- summer programming co-sponsored by the school district and Kidzeum

Increasing these opportunities has ensured that more students have access to high-quality programs that teach and support science, technology, engineering, art, and math learning. Springfield School District 186 is excited to continue

its partnership with the Kidzeum for summer 2023 and the following school year. In addition to its partnership with Kidzeum, the district also has offered summer camps like Camp Invention to support additional learning in STEAM for our elementary students. As the STEAM/STEM field continues to grow, school district administrators will seek additional opportunities for their students at all levels. Springfield School District 186's partnership with the local children's museum underscores the importance of partnerships with community-based organizations in providing high-quality afterschool STEM learning opportunities.



### **East St. Louis School District 189**

The East St. Louis School District 189 is working to expand its afterschool STEM opportunities to students in the region, utilizing the 21st Century Community Learning Center (21st Century) grant. Notably, the school district is serving students of color, split evenly between males and females. The school district's 21st Century program currently has a STEM focus but does include traditional OST enrichment activities. Middle school students are also participating in STEAM programming due to a new Illinois State Board of Education (ISBE) grant program. This STEAM grant allows the school district to facilitate STEM exploration opportunities for its fifth-grade population. Finally, East St. Louis School District 189 plans to launch small group math tutoring for secondary students from January 2023 to May 2023. East St. Louis School District's afterschool STEM programs are rooted in 21st Century funding and expanded upon via new state investments in STEM learning.

This continued priority for integrated and collaborative afterschool STEM in Illinois is necessary to reach more students across the state.

### **Valley View School District 365**

Valley View School District 365 developed a strong partnership with Bolingbrook STEM Association to provide afterschool STEM opportunities for students. Together, the entities that leverage 21st Century funding offer LEGO engineering, robotics, drone technology, and coding classes for students aged five through 18. The Bolingbrook STEM Association takes the lead on facilitating the programming on this diverse curriculum. The school district primarily serves middle school aged youth but is working to engage more audiences in STEM programming. Valley View School District 265 hosts a variety of larger events to ensure that family members and caregivers have a greater role in their children's STEM learning and opportunities themselves. Again, bringing in a partner organization to facilitate programming is a proven strategy for high-quality STEM learning not only in Valley View School District 365 but also throughout the state.



While Illinois continues to support STEM education in the traditional school day and OST spaces, more can be done to support the growing needs of students. School districts must consider afterschool STEM as a crucial part of a young person's learning experience and identify ways to integrate afterschool STEM into their annual spending plans.

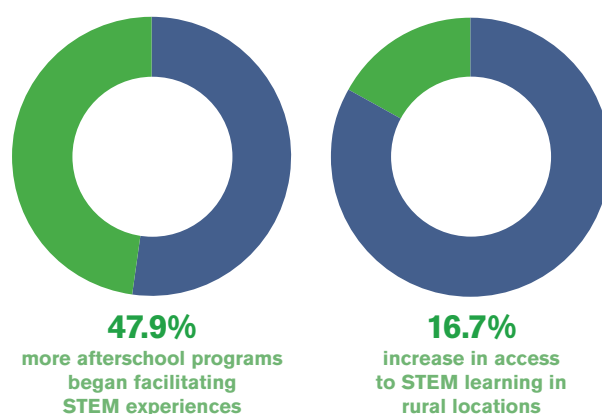
Similarly, to their school district counterparts, many community-based organizations are leveraging these funding streams in Illinois to provide students with STEM programming during the before-, after-, and weekend hours.



## RESOURCE SURVEY DATA (2020, 2021, 2022, 2023)

As mentioned previously, ACT Now has had a concentrated focus on STEM since 2016. Annually ACT Now would assess the needs of the field and deliver resources and trainings to address these needs. Over the past four years, ACT Now has conducted an annual resource survey to the OST field to understand the needs of the community as well as to gather data on STEM programming.

### BETWEEN 2020 AND 2023



ACT Now's support of STEM in OST through resources and trainings led 47.9% more afterschool programs to begin facilitating STEM experiences during their traditional programmatic time.<sup>30</sup> The STEM topics that programs engage with range from computer science, robotics, and coding to agricultural education, biology, and space exploration.

Unfortunately, there remain several barriers to expanding afterschool STEM programming in Illinois. Firstly, lack of access to affordable materials

and high-quality curriculum is a key reason why programs cannot facilitate STEM experiences. Most recently, in Spring 2023, 42.6% of programs noted that the cost of curriculum oftentimes means that they are unable to offer STEM programming.<sup>31</sup> In addition, almost 37% of programs stated that access to resources and the ongoing labor shortage has impacted their ability to facilitate afterschool STEM for youth.<sup>32</sup> Finally, programs noted that technical assistance for afterschool STEM was a missing key component to providing high-quality STEM opportunities for youth.

### BARRIERS TO EXPANDING AFTERSCHOOL STEM PROGRAMMING

COST OF CURRICULUM	42.6%
WORKFORCE SHORTAGE	37.0%

## HOW ACT NOW ADDRESSES BARRIERS TO AFTERSCHOOL STEM IN ILLINOIS

In 2020, ACT Now sought to deepen its efforts in STEM to address the ongoing need for specialized training, curricula, and supplies. In 2020 and 2021, ACT Now worked with external partners to ship STEM curriculum and materials to select programs around the state and provided an initial training on these materials. During these years, ACT Now struggled to determine the effectiveness of these programs, and programs still struggled with the capacity and technical knowledge to deliver the curriculum. In 2022, ACT Now expanded its internal capacity to include the Afterschool STEM Specialist who has greatly increased the Coalition's ability provide high-quality technical assistance and address these issues.



# STEM Clubs Initiative

---



The STEM Clubs Initiative aims to expand access to high-quality STEM programming in OST settings and provide technical assistance for program participants. ACT Now developed an application process to select 10 sites across the state, with priority given to programs in rural regions, as well as curriculum for the school year-long experience. The Afterschool STEM Specialist also provided materials for club participants, facilitated curriculum trainings, and gave access to coaching throughout the school year for programs that wanted additional assistance in elevating their afterschool STEM opportunities. In both the fall and spring semesters, the Afterschool STEM Specialist traveled to sites to conduct observations, give feedback and encouragement, and collect data on the impact of the project. This data is instrumental to understanding the state of afterschool STEM in Illinois.

In the most recent iteration of the STEM Clubs initiative, ACT Now leveraged increased organizational capacity and brought the curriculum development, the technical assistance, and the coaching opportunities in-house. Ever since the Coalition took lead on these support services, both students' and facilitators' learning outcomes have increased.

## **DATA SUPPORTING STEM CLUB AND NETWORK EFFECTIVENESS**

ACT Now conducted two site visits for each STEM Club and administered student and teacher surveys to the clubs. The data we collected sought to determine if we adequately prepared and supported programs and if these supports led to the intended positive youth outcomes. ACT Now used the Common Instrument Survey from Partnerships in Education and Resilience (PEAR) to measure student and instructor outcomes.

Across all programs surveyed in 2023, there were 172 responses. For STEM Clubs, the majority of participants were female and the programs focused on the middle school grades. Almost 75 percent of all participating programs were fully in person for one to three hours per week. Fifty-seven percent of programs spanned for a minimum of eight weeks, while 23 percent of programs lasted between four to seven weeks.

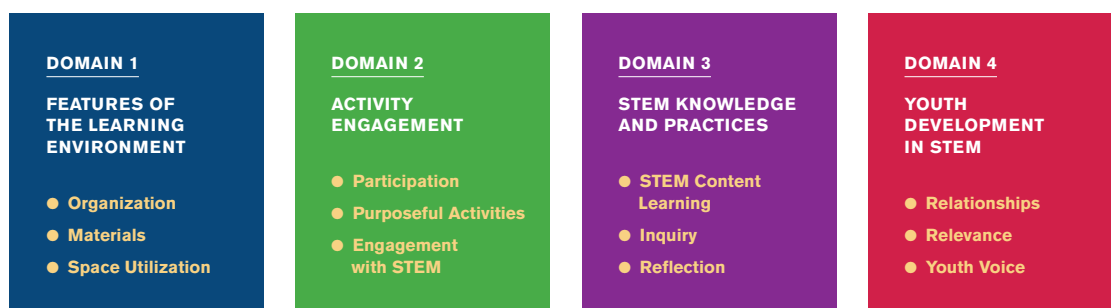
Youth participating in STEM programming felt there was significant positive change in their relationships with peers (76 percent), critical thinking (80 percent) and career interest (73 percent). Further, STEM engagement (77 percent), and perseverance (77 percent) saw the highest change. Students also reported high levels of curiosity in Science (57 percent) and Tech (62 percent), with small increases from the previous years.

Percent of youth reporting significant positive change	Percent of providers reporting negative change in programmatic areas
Critical thinking <b>80%</b>	Engaging and age-appropriate STEM activities <b>43%</b>
Relationships with peers <b>76%</b>	STEM career knowledge <b>34%</b>
Career interest <b>73%</b>	STEM identity <b>28%</b>

Negative changes indicate areas that programs may need to focus on and strengthen. The biggest challenges for programs related to facilitating engaging and age-appropriate STEM activities (43 percent), students' STEM Career Knowledge (34 percent), and young people's STEM Identity (28 percent). These results were a clear indication of areas that programs must continue to address to ensure youth are getting the most out of their afterschool STEM programming.

Notably, even though eight out of the 10 programs had not implemented STEM before, 73 percent of youth participants increased their interest in STEM careers. Programs were prepared with high-quality materials that were also appealing and appropriate for participants' learning goals. Moreover, 76 percent of students reported after completing one semester of STEM Clubs curriculum that they had better relationships with their peers, indicating the connection between afterschool STEM and supporting students' social-emotional learning competencies. Evidence also suggests that while youth engaged in STEM programming, there was opportunity for more training for facilitators to help connect the STEM learning objectives with the broader STEM field. Further, data indicates that programming must be centered more on the everyday experiences of youth and come from participants' identified interests.

As previously mentioned, the Afterschool STEM Specialist also collected information on the quality of STEM OST programming being facilitated via Dimensions of Success (DoS) observations. This tool has four main domains that cover 12 different dimensions (see below). Each domain is rated out of four.



Between October 2022 and May 2023, ACT Now facilitated 20 DoS observations (10 each semester) and found that programs were eager to heighten their STEM facilitation skills to deepen understanding of STEM concept for their students.

ITEM	MEAN		CHANGE
	Fall 2022	Spring 2023	
Organization	3.50	3.33	-0.17
Materials	3.90	4.00	+0.10
Space Utilization	3.80	3.89	+0.09

**Domain 1—Features of the Learning Environment** had the highest average score at 3.74 out of 4. Within this domain, the dimension with the highest rating was materials, and closely followed by space utilization. These ratings indicate that programs, in general, are investing time to plan and prepare meaningful and age-appropriate STEM activities for youth.

ITEM	MEAN		CHANGE
	Fall 2022	Spring 2023	
Participation	3.40	3.11	-0.29
Purposeful Activities	2.50	2.89	+0.39
Engagement with STEM	2.80	3.33	+0.53

**Domain 2—Activity Engagement** scored an average of 3.11 out of 4. Generally, youth were willing to participate in all the activities and took advantage of opportunities to engage in hands-on and minds-on programming. The increase in rating for purposeful activities highlights that facilitators worked to ensure that activities were linked to scientific concepts and students made connections between the activity and the larger

STEM purpose. Further, the increases across the dimensions in the spring semester show that with youth were using more Science and Engineering practices in their engagement in STEM.

ITEM	MEAN		CHANGE
	Fall 2022	Spring 2023	
STEM Learning Content	2.30	2.78	+0.48
Inquiry	2.70	2.89	+0.19
Reflection	2.22	2.89	+0.67

**Domain 3—STEM Knowledge & Practices** scored the lowest of the four domains with an average of 2.85 out of 4, but there were increases in all dimensions when observed in the spring. The data suggests that programs provided greater opportunity for student reflection. There was also higher use of purposeful questions to guide students' comprehension of STEM concepts. Finally, it should be noted that this is an area

in which greater professional development may help to increase facilitators' comfort in presenting STEM topics.

ITEM	MEAN		CHANGE
	Fall 2022	Spring 2023	
Relationships	3.80	3.78	-0.02
Relevance	2.20	2.56	+0.36
Youth Voice	2.30	2.30	—

**Domain 4—Youth Development in STEM** has the largest variance in average score, with youth voice being the lowest score. Data suggests that while there are positive relationships between facilitators and their students, there remains few student leadership experiences. Also, many programs experienced staff turnover which affected strong connections between

youth and staff. Ultimately, while relevance to the lives of youth increased, there still needs to be greater links to why activities were done.



---

ACT Now leveraged this information from programs to plan for the 2023-2024 STEM Clubs initiative which will feature a unit on engineering. This year, participants will also receive professional development on how to connect students' interest with curricula and programming. For instance, data suggested that students were curious about planets, robotics, and space exploration. As a result, one of ACT Now's projects will involve NASA's Artemis program—modeling how programs can assess students' needs and interests and find tailored resources for facilitation. Further, ACT Now successfully secured additional funding to continue technical assistance for the 2022-2023 STEM Clubs for another year and to include Chicago-based programs, as well as new sites across the state.

To learn more about each of the programs that participated in the STEM Clubs Initiative and their individual journey, please see **Appendix A**.

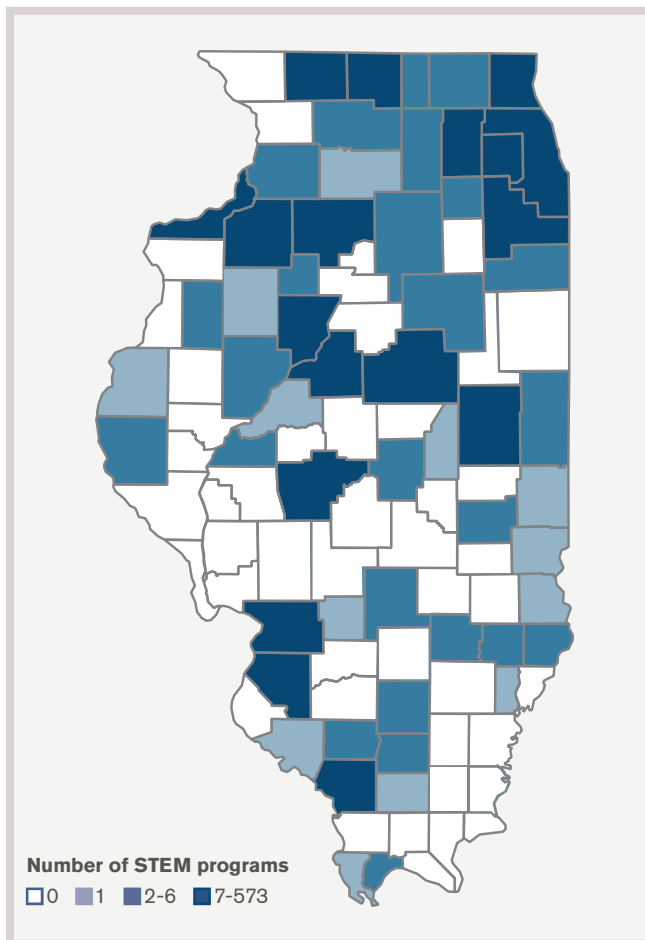


# The Need to Grow STEM OST in Illinois

Although ACT Now has been successful in growing STEM programming and improving STEM outcomes in Illinois, data shows that there are many areas of Illinois that still need these supports.

The need for sustainable funding for afterschool STEM programs has never been greater. There remain pockets of the state where access to afterschool programming with high-quality STEM curricula is low, or nonexistent.

Our Map and Database indicates that of the 102 counties in Illinois, 38 have zero programs that offer STEM programming. Further, the highest concentration of gaps to accessing STEM programs are located outside of the metropolitan areas of the state, and more specifically in the central, southwest, and southern regions of Illinois.



Many studies have mapped the correlation between social injustices, academic achievement, and implications for quality of life for young people of color in the United States (*Darling-Hammond, 2013; Pearman, 2019; Sirin, 2005*). In response, research suggests that families and communities of color “have on occasion mitigated educational inequities through effective use of community-based programs. These out-of-school spaces have been used as a mechanism to promote more equitable practices for youth of color.”<sup>33</sup>

It is imperative that the state invest in communities and support the initiation of afterschool STEM programs in regions that have historically been overlooked. As noted, afterschool STEM programs aim to meet the holistic needs of participants and allow youth to grow necessary life and employment skills—bolstering community relationships and local and state-wide economic development.

## STRATEGIC SOLUTIONS FOR GROWING STEM OST IN ILLINOIS

Nationwide, the STEM workforce is growing, and students’ must be prepared to think critically, work collaboratively, and innovate. Afterschool STEM programs work to build these critical life and employability skills, and spark curiosity in diverse careers. Afterschool STEM programs in school and community-based settings are

also closing the opportunity gap for students across the State of Illinois and addressing the academic interests of youth. ACT Now’s technical assistance has successfully supported students’ STEM learning in Illinois.

Unfortunately, data shows that there remain barriers to expanding Afterschool STEM to regions of the state.



---

School districts and community-based organizations (CBOs) must continue to focus on providing high-quality afterschool STEM experiences to students. Simply investing in traditional school-day STEM programming will not move the needle. Further, funding for out-of-school time (OST) STEM learning must be paired with targeted supports and services for programs to ensure that students meet these life and career outcomes.

As a result, the following are a set of recommendations for the Illinois' state agencies, the Illinois General Assembly and the federal government:

### **State**

---

- ACT Now encourages the Illinois State Board of Education (ISBE) to require After School Programs' grantees to facilitate STEM programming with the goal of establishing a STEM priority in the grant requirements. This could closely resemble the STEM facilitation requirement within the Teen REACH grant.
- ACT Now recommends that the state agencies, which distribute current OST grant lines, expand STEM programming by increasing the grant funding available for programming. Specifically, we support increased funding to the After School Programs grant program, the Teen REACH grant program, and the Reimagine Public Safety Act grant program.
  - (a) Further, we encourage state agencies to allocate specific funds within Notices of Funding Opportunities (NOFOs) and/or Requests for Proposals (RFPS) for the purchasing of STEM curriculum, resources, and materials.
- ACT Now asks the state legislature to invest in the afterschool workforce by providing flexibility in grant requirements to allow for funds to be leveraged to support staff wages. This flexibility will help program providers to pay their traditional afterschool and STEM experts livable wages as employees.
  - (a) ACT Now also recognizes the importance of investing in greater professional development opportunities for afterschool STEM facilitators. We ask that funding available for OST and STEM programming also include allocations for professional development for program providers.

### **Federal**

---

- ACT Now encourages U.S. Congress to increase investments to the 21st Century Community Learning Centers (21st Century) grant program. This funding helps to support OST and after-school STEM across the nation and within Illinois.
- ACT Now asks that U.S. Congress also increase in funding for Title I schools specifically to support collaboration among community-based organizations and school districts in the development and facilitation of afterschool STEM programming.
- ACT Now urges national STEM entities such as the National Science Foundation, philanthropic organizations, and industry partners to expand partnerships with community-based organizations and OST providers. Further, we urge these partners to provide more funding, STEM education resources, professional development, and workforce development opportunities for afterschool STEM facilitators.

---

## RESOURCES FOR MAKING THE CASE FOR AFTERSCHOOL STEM

- i) **The Afterschool Alliance's STEM Hub** is an online resource that provides OST programs with national policy updates, advocacy materials, research and data on afterschool STEM, and more. There are STEM policy blog posts and even an advocacy toolkit that can be leveraged in conversation with different audiences to make the case for STEM learning experiences.
- ii) **ACT Now's STEM Guidebook** hosts a variety of resources on how to fund your program, gain professional development opportunities, build a curriculum with activity recommendations, and ways in which you can advocate for policy change for STEM in afterschool.

---

## THANK YOU

ACT Now deeply appreciates your interest in supporting and expanding afterschool STEM programs in Illinois. We hope that the state invests in these programs as they are a key strategy in addressing inequity in students' learning, supplementing traditional school day opportunities and reinforcing young people's development of integral life and employment skills. If you have questions regarding STEM programming in afterschool or summer programs or have feedback regarding this policy report, please contact a member of the ACT Now team.

Susan Stanton, *Network Lead*  
stantons@actnowillinois.org

Emma Giamberdino, *Policy and Communications Manager*  
spencere@actnowillinois.org


Kim Turnbull, *Afterschool STEM Specialist*  
turnbullk@actnowillinois.org

Lesley Rivers, *Program Coordinator*  
riversl@actnowillinois.org

Nikki Gillani, *Afterschool Resources & Support Specialist (School Partnerships)*  
gillanin@actnowillinois.org

Tiffany Ellison, *Policy, Communications, and Operations Associate*  
ellisont@actnowillinois.org

Michael Guilmette, *Policy and Advocacy Fellow (2023-2024)*  
guilmettem@actnowillinois.org



Investing in STEM in  
afterschool is an effective  
strategy to spark students'  
interest in STEM careers  
and build STEM skills,  
which will help to prepare  
them for career success.



## Appendix A: STEM Club Case Studies (2022-2023)

*Below are profiles about each of the STEM Clubs detailed in the report and more individualized information about their programs' journey.*

### Beyond the Bell (Flora)

**Location:** located in Flora, a rural town in central Illinois

**Youth served:** approximately 80 students in grades 5-12

**Demographics:** majority of the youth come from White, middle-class families where English is the primary language with 60 percent of youth attending the program identify as female

**Funding source:** Teen REACH

**Barriers:** quality curriculum and staff training in STEM

**Outcomes and successes:** Prior to becoming involved in ACT Now's STEM Club Initiative, the program tried to create in-house curriculum and utilize ad-hoc activities that were not connected in a meaningful manner. It is a long-term goal of the program to grow its STEM program to provide meaningful activities for all youth in the area. Since participating in the STEM Club initiative, Beyond the Bell has attended several other STEM trainings and has participated in an SEL and STEM pilot program.

**Participant in STEM Club [FY23](#) & [FY24](#)**



### Boys & Girls Clubs of Chicago (Ford Heights)

**Location:** located in Ford Heights, a far southern suburb of Chicago

**Youth served:** approximately 30 youth in grades K-10

**Demographics:** 100 percent of the youth are Black with 40 percent being female, and 90 percent of youth come from low-income and single-family homes.

**Funding source:** Teen REACH, 21st CCLC grant

**Barriers:** locating and purchasing appropriate supplies to utilize in a specific curriculum and trained staff

**Outcomes and successes:** Prior to participating as a STEM Club, the program relied on premade STEM kits and one-off field trips. The program is motivated to include STEM activities and want the program youth to become more engaged in STEM in hopes that they can succeed in school and later become more interested in careers involving STEM. Youth in the program did indicate an increase interest in STEM Careers and STEM Engagement after the program as well as growth in 21st Century skills of perseverance, critical thinking and relationships with peers and adults.

**Participant in STEM Club [FY23](#)**





Boys & Girls Club of Chicago (Ford Heights)

### Boys & Girls Club of Greater Peoria

**Location:** located in Peoria, a small city in central Illinois

**Youth served:** approximately 60 students in grades K-12

**Demographics:** majority of the youth come from Black, low-income households; 60 percent of participants identify as female

**Funding source:** Teen REACH, United Way and small private donations

**Barriers:** quality curriculum and staff training in STEM

**Outcomes and successes:** Before participating in the STEM Club Initiative, the program relied upon ad-hoc activities, field trips, and outside speakers to meet the STEM requirement of Teen REACH. With a priority being placed on STEM, the program wants to have the staff to gain facilitation and content experience from STEM trainings and to have a STEM expert on site in the future. In terms of DoS outcomes and successes, the program made gains in the areas of Purpose of Activities, STEM Content Learning, Reflection, Relationships, Relevance and Youth Voice. Growth in these areas indicate the movement toward increased STEM identity of the facilitator as well as an increased awareness of what a quality STEM activity entails.

**Participant in STEM Club [FY23](#) & [FY24](#)**

### Boys & Girls Clubs of Lake County (Waukegan)

**Location:** located in Waukegan, a small city in northern Illinois, near a military base

**Youth served:** approximately 100 students in grades K-12 in multiple program sites

**Demographics:** 88 percent of the youth come from a low-income household with 96 percent being youth of color; 60 percent being Latino and 33 percent Black

**Funding source:** 21st CCLC grant, RPSA grant, and small private donations

**Barriers:** technology capacity of the staff in STEM to create impactful programming in the area

**Outcomes and successes:** The Boys & Girls Club of Lake County has expanded their participation in the STEM Club Initiative to include all the programming sites. All STEM staff members have participated in trainings focused on the facilitation of STEM curriculum. The large-scale use of the curriculum has greatly expanded their impact on youth in the area.

**Participant in STEM Club [FY23](#) & [FY24](#)**



---

### Boys & Girls Clubs of Livingston County (Pontiac)

**Location:** located in rural Illinois, 98 miles southwest of Chicago

**Youth served:** the program has eight total sites throughout the county serving approximately 4,201 youth in both programming and outreach

**Demographics:** 88 percent of the youth are White, 3 percent Black, 2 percent Hispanic and 7 percent multi-race. Over half of the youth served come from low-income households

**Funding source:** 21st CCLC grant, Teen REACH grant, Child Care Assistance Program, Parent Pay, United Way, School District Funding, and other foundation funds

**Barriers:** Past STEM programming consisted of purchased kits and ad-hoc activities. The lack of staff, lack of training for staff and funding makes continuing to provide STEM programming a struggle. Keeping youth interested and motivated has hindered programming for high school aged youth in STEM.

**Outcomes and successes:** By implementing a structured program in the younger grades, the program aims to increase attrition into a robotics team in high school. The program aims to have a dedicated “Makers Space” that would house all STEM based programming including the Robotics Program. The program believes that by exposing rural area youth to STEM related subjects, will provide them with opportunities to possibly pursue those subjects as careers.

**Participant in STEM Club [FY23](#)**

---

### Boys & Girls Clubs of Southern Illinois (Carbondale)

**Location:** located in southern Illinois, university town

**Youth served:** serves 50 youth in grades K-12

**Demographics:** The population is racially and ethnically diverse with 50 percent Black, 22 percent White, 6 percent Hispanic/Latino, 6 percent Native Hawaiian/Pacific Islander, 3 percent Middle Eastern/North African, and 11 percent calling themselves Multiple Races. 91 percent of the club members received free or reduced lunch and 62 percent are from single parent or alternative parent households.

**Funding source:** 21st CCLC grant, Teen REACH grant, and individual or business

**Barriers:** the cost of supplies and technology equipment is a barrier to expanding STEM offerings

**Outcomes and successes:** The program realizes the importance of partnerships and desires to build lasting partnerships with the post-secondary institutions in the area to increase awareness of the workforce needs and to connect youth to programming that develops career pathways.

**Participant in STEM Club [FY23](#)**

---

### Lessie Bates Davis Neighborhood House

**Location:** located in East St Louis

**Youth served:** The program serves grades K-12. Fewer youth participate in the program once they enter middle and high school with only 15 youth in that grade range.

**Demographics:** 100 percent of the youth are Black and speak English at home

**Funding source:** Teen REACH grant

**Barriers:** the cost of supplies, lack of STEM programming ideas and lack of STEM resources in the area, staff turnover

**Outcomes and successes:** Prior to participation in the STEM Clubs, the program purchased pre-packaged kits and approached STEM in an ad hoc fashion without making connections between activities and between real life experiences with STEM. The program hopes to provide consistent, fun and engaging STEM curriculum for all youth.

**Participant in STEM Club [FY23](#)**

---

### Project Success Of Vermillion County

**Location:** located in a small, rural town in central Illinois

**Youth served:** approximately 20 youth in grades 6-8

**Demographics:** 75 percent of youth come from White, low-income households

**Funding source:** 21st CCLC grant and Teen REACH

**Barriers:** small size of the program, limited programming ideas and lack of STEM resources in the area

**Outcomes and successes:** STEM facilitators have attended trainings focused on implementation of STEM and have increased STEM related content in the program. Pre-packaged kits used to be the norm, but the program is now using engineering design challenges to promote critical thinking and collaboration among the youth in the program. The program wants youth to have fun, leave educated and be excited about STEM.

**Participant in STEM Club [FY23](#) & [FY24](#)**



YMCA 21st CCLC (Rock Falls)

### YMCA 21st CCLC (Rock Falls)

**Location:** located in the north, central part of the state in a rural area

**Youth served:** this 21st CCLC is housed in a school building and services 40 students in grades 3-5

**Demographics:** The program is 86 percent free/reduced lunch with youth in the program coming from households that mainly speak English. 60 percent of the youth participating are female and identify as coming from White and Hispanic populations.

**Funding source:** 21st CCLC grant

**Barriers:** difficulty locating STEM activities that are age appropriate and can be completed in the allotted time frame, finding materials that could be used in activities

**Outcomes and successes:** The youth in the program are excited to complete STEM activities and want more activities on a regular basis.

**Participant in STEM Club** [FY23](#)

### Youth & Opportunity United (Evanston)

**Location:** located in a northern suburb of Chicago

**Youth served:** this program is housed in a school building and serves 30 youth

**Demographics:** most of the participants are from low-income homes and are students of color with approximately 20 percent speaking Spanish

**Funding source:** 21st CCLC grant,

**Barriers:** lack of quality training for staff, a lack of quality curriculum and a lack of student interest have been struggles the program has faced

**Outcomes and successes:** Through staff training it was hoped that the program could expand its STEM capacity to include STEAM activities that include all students and all levels of the program. After participating in the STEM Clubs initiative for one year, Youth & Opportunity United has felt confident to pursue other STEM programming including NBA Math Hoops and Girls Who Code programming.

**Participant in STEM Club** [FY23](#)

- 1 U.S. Department of Education. (n.d.). *STEM education*. U.S. Department of Education. Retrieved from <https://www.ed.gov/stem>.
- 2 *Ibid.*
- 3 ACT Now Illinois. (2023). *STEM Guidebook*. Retrieved from <https://actnowillinois.org/wp-content/uploads/2023/07/STEM-Guidebook.pdf>.
- 4 Afterschool Alliance. (2020). National AfterSchool Association. *America After 3PM Fact Sheet*. Retrieved from <https://afterschoolalliance.org/documents/AA3PM-2020/National-AA3PM-2020-Fact-Sheet.pdf>.
- 5 The Wallace Foundation. (2017). *The Value of Out-of-School Time Programs*. Retrieved from <https://www.wallacefoundation.org/knowledge-center/Documents/The-Value-of-Out-of-School-Time-Programs.pdf>.
- 6 Krishnamurthi, A., Ballard, M., & Noam, G. G. (2014). *Examining the impact of afterschool STEM programs*. ERIC. Retrieved from <https://files.eric.ed.gov/fulltext/ED546628.pdf>.
- 7 After School Alliance. (2021). *America After 3PM STEM Report 2021*. Retrieved from <https://afterschoolalliance.org/documents/AA3PM/AA3PM-STEM-Report-2021.pdf>.
- 8 See endnote 3.
- 9 U.S. Bureau of Labor Statistics. (n.d.). *STEM Occupations: Employment and Wage Trends*. U.S. Bureau of Labor Statistics. Retrieved from <https://www.bls.gov/emp/tables/stem-employment.htm>.
- 10 *Ibid.*
- 11 See endnote 6.
- 12 See endnote 3.
- 13 *Ibid.*
- 14 *Ibid.*
- 15 Youth.gov. (n.d.). *Impact of Family Engagement*. Youth.gov. Retrieved from <https://youth.gov/youth-topics/impact-family-engagement#:~:text=In%20addition%20to%20avoiding%20health,higher%20grades%20and%20test%20scores>.
- 16 *Ibid.*
- 17 *Ibid.*
- 18 STEM Funding. (n.d.). Afterschool Alliance. Retrieved from <https://www.afterschoolalliance.org/stemfunding.cfm>.
- 19 Illinois State Board of Education. (2018). *21st Century Community Learning Centers (CCLC) FY17 Evaluation Report*. Illinois State Board of Education. Retrieved from <https://www.isbe.net/Documents/21-CCLC-FY17-Evaluation-Report.pdf>.
- 20 Afterschool Alliance. (n.d.). *21st Century Community Learning Centers (CCLC) Policy*. Afterschool Alliance. Retrieved from <https://www.afterschoolalliance.org/policy21stcclc.cfm>.
- 21 Afterschool Alliance. (2022). *21st Century Community Learning Centers (CCLC) Overview*. Afterschool Alliance. Retrieved from <http://afterschoolalliance.org/documents/21stCCLC-Overview-2022.pdf>.
- 22 U.S. Department of Education. (n.d.). *CTE School-Based Program*. U.S. Department of Education. Retrieved from <https://www2.ed.gov/programs/ctesbg/index.html>.
- 23 University Staff. (2022, April 1). *Inspiring STEM for Chicago high school students aim of \$1.3 million NSF grant*. Illinois State University News. Retrieved from <https://news.illinoisstate.edu/2022/04/inspiring-stem-for-chicago-high-school-students-aim-of-1-3-million-nsf-grant/>.
- 24 Museum of Science and Industry, Chicago. (n.d.). *Research Advisory Board*. Museum of Science and Industry, Chicago. Retrieved from <https://www.msichicago.org/education/research-and-education-strategy/developing-youth/>.
- 25 National Science Foundation. (n.d.). *Appropriations: Fiscal Year 2023*. National Science Foundation. Retrieved from <https://new.nsf.gov/about/budget/fy2023/appropriations>.
- 26 NASA. (2023, May 24.). *NASA, Department of Education Partnership Strengthens STEM Education*. NASA. Retrieved from <https://www.nasa.gov/news-release/nasa-department-of-education-partnership-strengthens-stem-education/>.
- 27 The Wallace Foundation. (n.d.). *Funding Guidelines*. The Wallace Foundation. Retrieved from <https://www.wallacefoundation.org/about-wallace/pages/funding-guidelines.aspx>.
- 28 Million Girls Moonshot. (n.d.). *Million Girls Moonshot*. Retrieved from <https://www.milliongirlsmoonshot.org/>.
- 29 ACT Now Illinois Map and Database. (n.d.) Retrieved from <https://map.actnowillinois.org/map>.
- 30 ACT Now staff collected data in the springs of 2020 and 2022 via surveys and email. For a full data set from this survey, please contact ACT Now Project Coordinator, Lesley Rivers, at [riversl@actnowillinois.org](mailto:riversl@actnowillinois.org). Please note that the number of survey respondents varies year over year.
- 31 ACT Now staff collected data in the spring of 2023 via surveys and email. For a full data set from this survey, please contact ACT Now Project Coordinator, Lesley Rivers, at [riversl@actnowillinois.org](mailto:riversl@actnowillinois.org). Please note that the number of survey respondents varies year over year.
- 32 *Ibid.*
- 33 King, N., Collier, Z., Johnson, B. G., Acosta, M., & Southwell, C. N. (2021). Determinants of Black families' access to a community-based STEM program: A latent class analysis. *Science Education*, 105, 1100–1125. Retrieved from <https://doi.org/10.1002/sce.21669>





**STEM programs are a key strategy in reinforcing development of integral life and employment skills for young people.**



Afterschool for Children & Teens

To learn more about  
Afterschool for Children  
and Teens Now (ACT Now)  
please contact:

**Susan Stanton**

*Network Lead*

ACT Now Illinois

101 North Wacker Drive

Suite 1700

Chicago, IL 60606

312.877.0725

stantons@actnowillinois.org

Visit our website

[www.actnowillinois.org](http://www.actnowillinois.org)

Follow us social media

