Enabling Both Youth and Pollinators to Thrive

Youth Development in a High School STEM Afterschool Program

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"I would never have thought that I could go into beekeeping as a full-time commitment. It was after learning about the large impacts (good and bad) that insects have on agriculture and the environment that I could fully comprehend the scope a job with bees could cover. Though I do not know exactly what I want to be, I know that I want to pursue a career where I can work with bees and plants. I have been drawn to help others learn about the importance of pollinators and develop a passion for the environment like myself. I am now an active member of the Association of Southern Maryland Beekeepers, and have been involved in many projects teaching others about the importance of pollinators through this program."

"Susie" (all names are pseudonyms), age 15, developed the awareness of and passion for bees expressed in this quotation through her participation in a high-quality afterschool STEM program designed specifically for teens. Teens who participate in such programs reap tremendous benefits. They demonstrate increased academic achievement and life skill development (Holstead et al., 2015). Their enhanced STEM interest, attitudes, and behaviors fuel STEM-related college and career choices (Meschede et al., 2022). Teens thrive when they have opportunities to pursue their passions in safe, inclusive youth development settings with strong leaders. Thriving teens have a growth mindset, are open to challenge and discovery, are optimistic about their ability to make a difference in their communities, are able to connect with others, and successfully set and achieve goals (Arnold & Gagnon, 2018). Like Susie, they become more aware of their place in society and of

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their power to make that society better. In short, they develop the skills needed to become happy, hopeful, effectively engaged adult citizens.

Out-of-school time (OST) programs centered around STEM provide benefits above and beyond the general benefits of afterschool programming by creating opportunities for authentic active learning. STEM programs expose young people to current science and research, enabling them to see both society's need for scientific exploration and the possibility that they themselves might become scientists (Meschede et al., 2022; Riedinger & Taylor, 2016). The ability of STEM programs to inspire young people to pursue science careers is particularly beneficial in light of the STEM-related job market. According to the May 2021 U.S. Bureau of Labor Statistics Occupational Employment and Wage Statistics report, STEM workers earned an annual mean of $100,900 compared to $55,260 for non-STEM workers. Growth in STEM careers between 2021 and 2030 was estimated at 13 percent, compared to 7.5 percent growth for non-STEM occupations (U.S. BLS, 2021). Further, research indicates that OST experiences can be especially significant in addressing the science identity gap in adolescent girls, helping girls see themselves as scientists and researchers (Christidou et al., 2021; Riedinger & Taylor, 2016).

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Furthermore, OST programs can offer healthy alternatives to self-care for high school youth. Just over half of all high school students are left to self-care after school (Afterschool Alliance, 2022). The common perception is that older youth are capable of managing their time after school. However, data indicate that teens left on their own after school are vulnerable to troubling situations. The rate of juvenile crime triples between 3 p.m. and 6 p.m. Self-care and boredom have been shown to increase the likelihood of experimentation with drugs and alcohol by as much as 50 percent (Afterschool Alliance, 2004). The likelihood of having sex for the first time increases with the number of hours teens spend with no supervision (Afterschool Alliance, 2004).

In light of the proven benefits of high-quality afterschool STEM programming for teens, I worked with colleagues at University of Maryland Extension to institute the Pollinator Ambassador program. The program was launched through a county-based 4-H program at a partner site in a community outside Washington, DC. Following the 4-H Thriving Model and other research-based best practices, the program introduced participants to the vital importance of bees and other pollinators through hands-on activities. Its success in engaging participants and building their awareness of science careers can make it a model for other STEM-based youth development programs.

The 4-H Thriving Model

The Pollinator Ambassador program described in this article was designed to offer a high-quality developmental context, in keeping with the 4-H Thriving Model developed by Mary Arnold at Oregon State University (Arnold & Gagnon, 2018). This model synthesizes foundational positive youth development frameworks including Kress's essential elements of positive youth development (2005), the Search Institute's developmental relationships framework (2020), Geldhof and colleagues' five Cs model (2015), and Hendricks's life skills model (1998). Through this synthesis, Arnold has developed a logic model that outlines the critical components of high-quality youth development programs and explains how those programs contribute to positive outcomes and enable young people to thrive.

Critical Program Components

Figure 1 illustrates the 4-H Thriving Model. At the bottom are the four components critical to high-quality youth development programs: sparks, belonging, relationships, and engagement (Arnold & Gagnon, 2018).

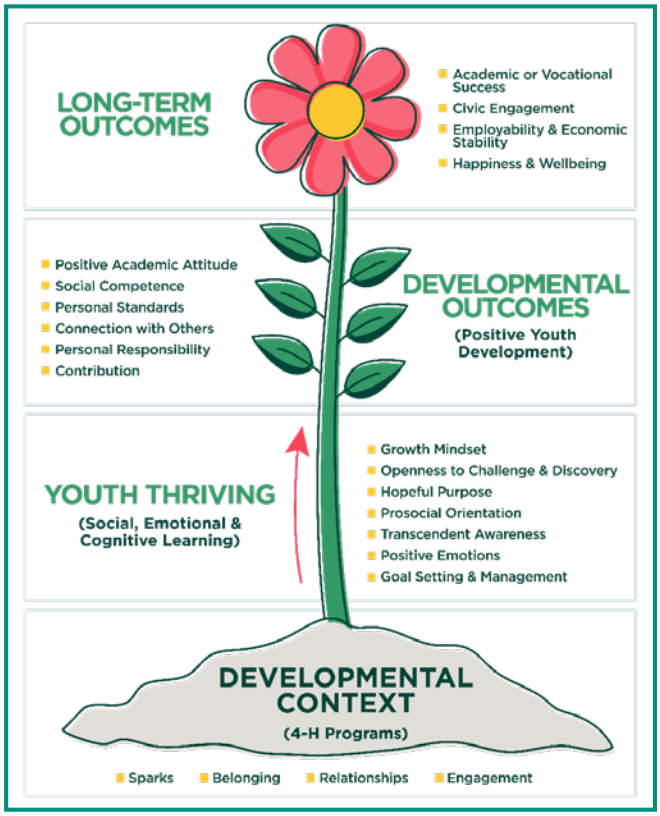
Sparks are topics of interest that light a fire in youth—passions that ignite action and energy. In order to explore their sparks, young people need to experience **belonging.** They must feel welcome, safe, and supported by leaders and peers; they must also have a strong sense that they are valuable. Belonging can be

fostered by intentional investment in developmental **relationships** in which caring adults take an interest and invest time in young participants, expecting that these young people can and will do great things. Caring adults partner with youth, listen to their ideas, challenge them to stretch and grow, encourage them to imagine positive futures, and empower them to set goals and take action steps toward those goals. Intentional incorporation of these three elements leads to **engagement**. Active engagement is a vital component of any high-quality youth development program, whose benefits can be realized only if young people attend consistently and are fully involved in program activities.

Outcome: Thriving Youth

In Arnold's model (Figure 1), indicators that youth are thriving include a growth mindset, openness to challenge and discovery, hopeful purpose, prosocial orientation, transcendent awareness, positive emotionality, and goal setting and management. When young people are thriving, they are eager, enthusiastic participants who understand that they are part of something larger than themselves; they believe they can contribute to a better society as they grow and learn. Thriving youth embrace challenges and persevere to discover new experiences. They are capable of working with others and using positivity to overcome social challenges. They set goals and develop action steps to move toward those goals. Figure 1 illustrates how these indicators of youth thriving lead toward positive developmental outcomes and then to long-term outcomes as participants develop skills for a successful journey into adulthood (Arnold & Gagnon, 2019).

Figure 1. 4-H Thriving Model



Source: 4-H Standing Committee on Positive Youth Development. Used with permission. https://helping-youth-thrive.extension.org/wp-content/uploads/2022/11/2022-4H-Thriving-Model-Flower-Graphic.png

The Pollinator Ambassador Program

I used the principles of the 4-H Thriving Model to develop and implement the Pollinator Ambassador program, with the aim of providing a replicable model for teen afterschool programming. University colleagues with expertise in pollinators and a local master gardener facilitated the sessions. After spending eight weeks learning about the role of pollinators in the food supply, participating teens served as pollinator ambassadors, traveling to classrooms and community events to teach the same ideas to younger children and their families. The program was implemented from January to August 2022 in a suburban area outside Washington, DC.

Of the 18 participants between the ages of 13 and 18, 75 percent were female. The program thus addressed the well-documented science identity gap (Davila Dos Santos et al., 2022; Tan et al., 2013) by giving these young women the opportunity to develop science skills and learn about career opportunities. The group was equally divided racially: 50 percent identified as white and the other 50 percent as African American, in a fairly good representation of the county demographics. There was significant homeschool representation, at 33 percent.

Recruitment and Retention Strategies

Recruitment efforts incorporated research-based practices that address the challenges of teen participation in high school OST programs and increase retention rates (e.g., Holstead et al., 2015; Hynes et al., 2012). For example, research has shown that teens gravitate to opportunities that invite the expression of their voices and choices (Afterschool Alliance, 2021; Holstead et al., 2015). They are interested in avenues for leadership

such as community service, youth councils, and opportunities to design or lead activities for younger children (Hynes et al., 2012). They are also eager to participate in activities they see as personally beneficial, such as opportunities to meet community service requirements (Afterschool Alliance, 2021; Holstead et al., 2015). Programs that enable teens to make a difference while learning new skills tend to have high retention rates (Hynes et al., 2012). Furthermore, teenagers demand flexible enrollment and participation options to accommodate their busy schedules (Afterschool Alliance, 2004, 2021). They seem to prefer programs that offer a menu of topic selections offered in shorter blocks of time, such as sessions of six to eight weeks (Holstead et al., 2015).

I designed recruitment and retention strategies in line with these principles. To reach young people where they are, we used multiple social media tools and word of mouth to reach potential participants. The messages tapped into teens' enthusiasm for opportunities to lead and make a difference (Afterschool Alliance, 2021), inviting young people to participate in a community service club in which they would learn about pollination and address that issue through community service and education.

In keeping with research showing that youth are motivated by personal interests and benefits (Afterschool Alliance, n.d.; Holstead et al., 2015), promotional messaging reminded recipients that community service is a graduation requirement in Maryland and that many colleges and scholarship providers use community service efforts to differentiate among applicants. The messages also emphasized that program participants would interact with and learn from University of Maryland professors and researchers. In reflective interview sessions, many participants indicated that this interaction was one of the most valuable components of the program.

To follow research-based recommendations on listening to teen voices and maintaining flexible scheduling (e.g., Afterschool Alliance, 2021; Holstead et al., 2015), we invited youth and families to speak to the program schedule through an electronic survey. The survey identified Monday evenings at 7 p.m. as the best meeting time to minimize conflicts with other responsibilities. We developed a program calendar with weekend service opportunities so participants could choose when and where to engage. Throughout the program, we invited participants to share ideas and make choices about roles and levels of engagement.

In short, we created a framework that provided structure for learning and growth but gave participants flexibility to pursue their interests and passions. Of the 18 teens who joined the program, all 18 completed it. This level of retention is a strong indicator that the program successfully addressed the participants' needs.

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Program Methods

The Pollinator Ambassador program incorporated the key components of the 4-H Thriving Model, in which sparks, belonging, and relationships built participant engagement in a research-based developmental context.

Sparks

The program design tapped into common sparks in order to empower and energize teen participants, inspiring and equipping them to lead efforts to support pollinators in their community.

Research guided the selection of the educational content of the program. Studies show that young people are not only concerned about environmental issues but also willing to take action (United Nations, n.d.). We chose to highlight the vital role of pollinators as an environmental issue because it is easily relatable for both teens and younger children. Everyone can appreciate food. Learning how pollinators help produce food is a powerful spark to help young people see the importance of supporting these insects. In Pollinator Ambassadors, teens participated in a "pack your lunch" activity that highlighted foods requiring pollination in order to illustrate the vital role pollinators play in sustaining the world's food supply.

A strong body of research indicates that teen interest is sparked by opportunities to serve as leaders and to make a positive difference in their communities (Afterschool Alliance, n.d.; Holstead et al., 2015). The program was designed with these sparks in mind,

seeking to empower youth to take leadership roles in their community. Throughout the program's eight sessions, emerging pollinator ambassadors were empowered to take on leadership roles by learning strategies to educate younger children about the vital role of pollinators. First participants experienced the activities themselves. Then they began to take on leadership roles by suggesting revisions or alternatives to the activities. Through this input, the teens began to take ownership of the lessons and activities they would soon lead with younger children and their families.

We also designed the learning experiences to be active and engaging. For example, an early icebreaker was "Pollinator Who Knew?" in which participants chose a pollinator fact and circulated around the room to chat with peers and agree on which pollinator fact was the most interesting. In another activity, teens discovered the wide variety of pollinators as they worked in groups to analyze a pictorial illustration of pollinators at work. A third activity engaged participants in physically acting out the lives of worker bees flying from hive to flower; in the process, the teens discovered the detrimental impacts of challenges such as pesticides, viruses, and mites on bee colonies. In another session, participants moved from station to station to follow the migration journey of monarch butterflies, encountering weather and predator dangers along the way. Participants explored the anatomical features of flowers involved in the pollination process as they dissected flowers and apples. Throughout, the program showcased a variety of methods to support pollinators, highlighting reduced use of pesticides, efforts to increase pollinator habitats by planting native plants that provide food and shelter, and additional supports such as building bee hotels. During each session, teens learned the content and then used this knowledge to develop teaching kits for younger children.

In addition, teens took part in planning and installing a demonstration pollinator habitat. Master gardeners led the teens through the process of garden design and plant selection based on goals and environmental factors. Af-

Sparks at Work

An extension of the Pollinator Ambassador program provided a deep dive into environmental issues and solutions. Program participants were invited to attend a national 4-H agri-science summit. Three female ambassadors accepted the invitation. At the summit, they were inspired by female professionals who spoke about their personal and career experiences and by peers from across the nation who shared an interest in food and environmental sustainability.

These young women not only brought back a number of pollinator activity ideas, but also eagerly undertook a conference challenge to expand their impact beyond the pollinator project to include other environmental concerns. This challenge proved to be a tremendous spark for all three. They worked with local agencies to develop a project idea, settling on a program that would inspire the installation of more native plants in the community. Their project was awarded $2,000 for implementation. With these funds, they created a guide booklet they called *Nurture Natives* (Bonney et al., 2022) and paid to print 47 copies, which they distributed to local nurseries to use when customers come in seeking ornamental trees.

They used the remaining funds to purchase 150 native saplings, which they gave to local residents in a giveaway event they planned and implemented themselves. Passionate about youth education on community environmental issues, they coordinated with their pollinator ambassador peers, master gardeners, and a local farmer to provide fun educational activities and games during the giveaway event to raise awareness of native plants and pollinators.

The event was a huge success, but the girls were not satisfied. Their passion had been ignited. They applied for and received a $5,000 capacity-building grant, which plan to use to replicate their county efforts statewide, coordinate wider distribution of *Nurture Natives*, and facilitate an educational native tree giveaway at the local university's Maryland Day event. Caring adult mentors have provided support and guidance along the way by facilitating introductions to community stakeholders and assisting with logistical plans for tree distribution and educational events.

ter selecting the plants, participants first learned about winter seed sowing and then proceeded to start the selected seeds in upcycled empty milk jugs. The master gardeners led the teens through a lesson on seed sprouts and winter hardening; then they helped the teens transfer the seedlings from the milk jugs to grow bags. Participants hauled soil, watered the new plants, and monitored progress. Once the plants were ready, teens helped install the pollinator habitats at two elementary schools, establishing container-based pollinator habitats to be used for teaching demonstrations.

Belonging

Instructional sessions were designed to facilitate the sense of belonging that is vital to youth development. Icebreakers and group activities to facilitate peer interaction were incorporated into each session. Facilitators continually reminded teens that their voices were essential and appreciated by, for example, inviting feedback and suggestions. The teens developed their own program logo (Figure 2), which was used on Pollinator Ambassador t-shirts and on welcome signs at the elementary schools where they planted gardens.

In preparation for community teaching events, teens selected the activities that resonated most with them and helped to identify local settings where they would like to teach children. They engaged in practice sessions in which they taught their peers and then received their feedback. These opportunities to exercise choice and leadership helped teens feel welcome, included, and valued in the Pollinator Ambassador program.

Figure 2. Participant-Designed Pollinator Ambassador Logo

Source: Pollinator Ambassadors. Used with permission.

Developmental Relationships

Pollinator ambassadors benefited from the guidance and mentorship of various adult facilitators. They were exposed to a wide variety of community agencies and stakeholders. Master gardeners, entomologists, and extension professionals from the university provided instruction on pollinators; school administrators, camp and scout leaders, and staff of various community agencies allowed the ambassadors to install container habitats and teach pollinator lessons at their sites. These adults invested their time with the clear expectation that these teens would use their new knowledge to teach others. Each teen was challenged to reach at least 25 younger children with their pollinator message. These developmental relationships helped the ambassadors stretch and grow into empowered leaders who helped other community members to support pollinators and strengthen a sustainable food system.

Program Outcomes

The pollinator ambassadors eagerly embraced community leadership roles through this project. Their enthusiastic concern for the environment has been contagious. Through the voices of these 18 teen ambassadors, 452 youth and 224 adults—a total of 676 community residents—heard about the importance of pollinators in sustaining the food supply.

The ambassadors' leadership led to the planting of pollinator habitats at two elementary schools, where children in green and garden clubs are maintaining the habitats and using them as outdoor living classrooms. Science teachers are excited to have these new teaching spaces. County public school science coordinators are hoping to see pollinator habitats installed at schools across the county.

In addition, the teens raised awareness about pollinators among community members. One adult they reached is so eager to see the work continue that they committed to donate $5,000 per year to pollinator education efforts and habitat planting—not just in our county, but across Maryland. These outcomes demonstrate that the pollinator ambassadors have had

tremendous impact on their community's interest in supporting pollinators.

Thriving Indicators and Positive Youth Development Outcomes

The 4-H Thriving Model (Arnold & Gagnon, 2019) outlines thriving indicators and positive youth development outcomes stemming from high-quality research-based programs. To examine the effectiveness of the Pollinator Ambassador program, we conducted an end-of-program survey that included both quantitative questions about students' attitudes and learning and open-ended questions for reflection. Table 1 summarizes results from the 13 teen ambassadors who completed the survey, as well as findings published in grant reports, categorized according to the indicators in the 4-H Thriving Model.

Table 1. Evidence of Thriving Indicators and Outcomes

Thriving Indicators and Outcomes	Evidence
Growth mindset	Teens demonstrated eagerness to learn about the role pollinators play in sustaining the food supply as they actively participated in educational activities and then designed teaching kits and lessons for use with younger children. On the post-program survey, 92 percent of respondents said they were interested in learning more about food production.
Openness to challenge and discovery	Teens, many of whom had never gardened before, helped design and plant a pollinator habitat at the local county extension office to support local pollinators and teach the community. The teens were willing to embrace the challenge of teaching others about pollinators. Two ambassadors began keeping bees during the program.
Personal responsibility	In the post-program survey, 85 percent of respondents reported feeling a responsibility to help their community; 93 percent reported that they would take action to create and protect pollinator habitats.
Hopeful purpose	The teens demonstrated hopeful purpose as they put their new pollinator knowledge to work, teaching and inspiring community members to support pollinators. They expressed the belief that their efforts could make a difference in their community.
Goal setting and management	Ambassadors were challenged to reach at least 25 younger children with their pollinator message and then developed action steps to accomplish that goal. They exceeded the goal by reaching 452 children and 224 adults.
Contribution	All respondents expressed an increased interest in helping pollinators; 100 percent of them agreed that they liked helping people and that the program inspired them to volunteer in their community. Additionally, 92 percent reported that they looked for ways to help their community when they learned of a problem.

Science Attitudes

Researchers were also curious about the impact of the program on science attitudes. Again, the findings indicate a positive impact: 100 percent of survey respondents reported that they learned new things about science and that they understood why protecting pollinators and increasing their habitat were important for the food supply. Furthermore, 85 percent of respondents reported having increased their interest in science generally and in advocacy for agri-science issues.

Participant Voices

In addition to the survey, we gathered participants' reflections in a post-program narrative report about how the program affected them. Their responses add depth to our exploration of program outcomes.

Erica, age 15, wrote:

> Through this program, I have become aware of the remarkable difference youth can make. In the last year, I have become passionate about advocating for positive change in my community. This project has inspired me to pursue a career in environmental law. I am passionate about protecting our natural resources and supporting U.S. farmers. I hope to eventually work with the Environmental Protection Agency or Department of Agriculture.

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Erica's comments show evidence of several thriving indicators and outcomes, including growth mindset, openness to challenge and discovery, hopeful purpose, personal responsibility, and contribution.

The reflections of Abigail, 16, reveal evidence of the same thriving model indicators and outcomes, as well as a sixth indicator: connection to others.

> As someone who has a deep fondness for the culinary arts, I'm always looking for something new to discover in the field of food science. In the future, I hope to own my own farm-to-table business that provides people with great food and more knowledge about agriculture. This project has inspired me to further engage in my community. I am now involved with a homeschool co-op and am in charge of a year-long program, educating kids on where our food comes from, how to support local farmers and, of course, how to make great food. I regularly talk with a local farmer, who—I am proud to say—my family now supports by purchasing a large portion of our produce from them.

Responses of Children Taught by Pollinator Ambassadors

The pollinator ambassadors taught younger children in multiple settings. One of these was summer camps, where they provided six hours of pollinator education to 70 children. These 70 were invited to complete surveys about their experience with the pollinator ambassadors. Of those who completed the survey, 73 percent indicated that they felt they could explain how people rely on pollinators for food, and 81 percent said they would like to learn more about pollinators. A full 93 percent agreed that they believed they could do things to help nature after participating in the program. Here are a few of their comments on the pollinator lessons:

- It was fun. I really liked to learn about flowers.
- Can you visit us again?
- I liked all of the activities we did, but my favorite was when we got to explore a flower and see all the parts of a flower.
- I liked when we played games in the gym, and the flower.
- I like when we cut open apple seeds and flowers.
- I had so much fun learning about pollinators and plants.
- I really loved being in the gardening and pollinating program.

The positive responses of the surveyed children suggest that the teen ambassadors were enthusiastic and effective teachers.

The Power of Thriving Youth

This study supports the use of research-based practices in afterschool STEM programs. The Pollinator Ambassador program successfully nurtured high school participants' interest in science and in local environmental activism. The success of the program

is shown by the fact that every teen who started the program finished it. In addition, the group members met and exceeded their goal for educational outreach. The pollinator ambassadors thrived through being empowered as leaders working for meaningful change in their community.

The Pollinator Ambassador program provides a promising model for successful afterschool programming for teens. It demonstrated tremendous success in recruiting, retaining, and empowering its target audience. However, the sample size of 18 teens is relatively small and is not fully representative, since 75 percent were female. In addition, 16 of the 18 participants learned of the program through a partnering community agency that offers a year-round service learning program. They may have been predisposed to engage in service. The fact that the program did not take place on school grounds immediately after school may have limited participation by a more representative sample of the high school population. Taking these limiting factors into account, further studies are warranted to explore the impact of best practice models in more diverse settings and to more explicitly tease out specific elements of the 4-H Thriving Model related to engagement and belonging.

References

Afterschool Alliance. (2004, October). *Older youth need afterschool programs.* Issue Brief 20. https://www.afterschoolalliance.org/issue_briefs/issue_older_youth_20.pdf

Afterschool Alliance. (2021, November). *Credit for learning: Making learning outside of school count.* Issue Brief 79. https://afterschoolalliance.org/documents/issue_briefs/issue_credit_for_learning_79.pdf

Afterschool Alliance. (2022). *America after 3pm: The most in-depth study of how America's children spend their afternoons* (4th ed.). http://www.afterschoolalliance.org/aa3pm.cfm

Afterschool Alliance. (n.d.). Older youth and afterschool: Partnering to improve results. https://www.afterschoolalliance.org/policyolderyouth.cfm

Arnold, M. E., & Gagnon, R. J. (2018, November). *4-H Thriving Model program evaluation instruments: Information and scoring guide.* https://helping-youth-thrive.extension.org/wp-content/uploads/2021/04/Program-Evaluation-Instrument-Scoring-Guide.pdf

Arnold, M. E., & Gagnon, R. J. (2019). Illuminating the process of youth development: The mediating effect of thriving on youth development program outcomes. *Journal of Human Sciences and Extension, 7*(3), 24–51. https://scholarsjunction.msstate.edu/jhse/vol7/iss3/2/

Bonney, A., Bonney, E., & Rutherford, S. (2022). *Nurture natives.* https://extension.umd.edu/sites/extension.umd.edu/files/2022-10/Nurture%20Natives%20Guide-Final.pdf

Christidou, D., Papavlasopoulou, S., & Giannakos, M. (2021). Using the lens of science capital to capture and explore children's attitudes toward science in an informal making-based space. *Information and Learning Sciences, 122*(5–6), 317–340. https://doi.org/10.1108/ILS-09-2020-0210

Davila Dos Santos, E., Albahari, A., Díaz, S., & De Freitas, E. C. (2022). 'Science and technology as feminine': Raising awareness about and reducing the gender gap in STEM careers. *Journal of Gender Studies, 31*(4), 505–518. https://doi.org/10.1080/09589236.2021.1922272

Geldhof, G. J., Bowers, E. P., Mueller, M. K., Napolitano, C. M., Callina, K. S., Walsh, K. J., Lerner, J. V., & Lerner, R. (2015). The five C's model of youth development. In E. P. Bowers, G. J. Geldhof, S. K. Johnson, L. J. Hilliard, R. M. Hershberg, J. V. Lerner, & R. M. Lerner (Eds.) *Promoting positive youth development: Lessons from the 4-H study* (pp. 161–186). Springer.

Hendricks, P. A. (1998). *Developing youth curriculum using the targeting life skills model: Incorporating developmentally appropriate learning opportunities to assess impact of life skill development.* Iowa State University.

Holstead, J., Hightower King, M., & Miller, A. (2015). Research-based practices in afterschool programs for high school youth. *Afterschool Matters, 21,* 38–45. https://www.niost.org/Afterschool-Matters-Spring-2015/research-based-practices-in-afterschool-programs-for-high-school-youth

Hynes, K., Greene, K., Constance, N. (2012). Helping youth prepare for careers: What can out-of-school time programs do? *Afterschool Matters, 16,* 21–30. https://www.niost.org/Afterschool-Matters-Fall-2012/helping-youth-prepare-for-careers-what-can-out-of-school-time-programs-do

Kress, C. (2005). Essential elements of positive youth development. In *Strengthening positive youth development environments* (pp. 20–23). University of Wisconsin Extension 4-H Program.

Meschede, T., Haque, Z., Warfield, M. E., Melchior, A., Burack, C., & Hoover, M. (2022). Transforming STEM outcomes: Results from a seven-year follow-up study of an after-school robotics program's impacts on freshman students. *School Science and Mathematics, 122*(7), 343–357. https://doi.org/10.1111/ssm.12552

Riedinger, K., & Taylor, A. (2016). "I could see myself as a scientist": The potential of out-of-school time programs to influence girls' identities in science. *Afterschool Matters, 23,* 1–7. https://www.niost.org/Afterschool-Matters-Spring-2016/i-could-see-myself-as-a-scientist-the-potential-of-out-of-school-time-programs-to-influence-girls-identities-in-science

Search Institute. (2020). *The developmental relationships framework*. https://6693290.fs1.hubspotusercontent-na1.net/hubfs/6693290/DevRelationships_framework_english01.pdf

Tan, E., Barton, A. C., Kang, H., & O'Neill, T. (2013). Desiring a career in STEM-related fields: How middle school girls articulate and negotiate identities-in-practice in science. *Journal of Research in Science Teaching, 50*(10), 1143–1179. https://doi.org/10.1002/tea.21123

United Nations. (n.d.). #YouthStats: Environment and climate change. https://www.un.org/youthenvoy/environment-climate-change

U.S. Bureau of Labor Statistics. (2021, May). Occupational employment and wage statistics. Retrieved on January 27, 2023, from https://www.bls.gov/news.release/pdf/ocwage.pdf