

Title: Georgia 4-H Computer Science Programming

Geographic Scope: State

Your Unit/Department/Group: 4-H Youth

Summary: Through the Growing a Computer Science Pathway for America's Youth, Georgia 4-H faculty, staff, and volunteers provided computer science programming over 100 youth during the grant's period of performance.

Situation: Computer science (CS) is a field of study that is concerned with theoretical and applied disciplines in the development and use of computers for information storage and processing, mathematics, logic, science, and many other areas, (Dodig-Crnkovic, 2002). According to the U.S. Bureau of Labor Statistics (2021), employment in computer and information technology occupations is projected to grow 13% from 2020 to 2030, faster than the average for all occupations. However, College Board (2021), estimated that only about 10% of K-12 schools teach true computer science. Many schools teach keyboarding, computer applications, etc., but true computer science is not included in the mainstream curricula. Exposing young people to engaging STEM-related opportunities, including computer science at younger ages can potentially increase their interest and influence their career choices. Additionally, CS also teaches young people many useful life skills, including patience, resilience, problem-solving, communication, and teamwork.

Response: Through a partnership with National 4-H Council and funded by Google, Georgia 4-H was awarded the Growing a Computer Science Pathway for America's Youth. The \$10,000 award supported CS programming for 4-H youth at select sites from May-September 2021. The grant's deliverables were met through four modes of delivery: (a) day camps led by STEM Ambassador Fellows, (b) 4-H/military partnership, (c) Georgia 4-H Technology Summit, and (d) an in-school partnership with the Southeast Georgia College and Career Academy.

In 2020, Georgia 4-H established a STEM Ambassador Fellow Program, recruiting, screening, and training college students (who are former 4-H'ers with strong science projects) to mentor current high schoolers interested in STEM. Georgia 4-H acknowledged these STEM Ambassador Fellows could help us fulfill these grant obligations without burdening county 4-H faculty/staff that likely do not have the confidence or capacity to begin new programs. Three STEM Ambassador Fellows worked in three different communities (Baldwin County, Cobb County, and Oconee County) to offer summer day camps for upper elementary and middle school youth. Youth learned computer science knowledge and skills by creating binary code bracelets, working Scratch to create animations, building computer systems with Raspberry Pis, programming Sphero minis, and programming Edisonbots. Nearly 35 youth were served through these programs. Due to the success seen in May and June, one STEM Fellow was able to offer an additional day camp opportunity for 4-H youth in his home community (Taylor County) while visiting his parents in July, reaching eight additional young people.



Camden County's 4-H program regularly partners with Kings Bay Naval Installation to provide quality youth development programming as part of the 4-H/military partnership. Realizing that STEM and workforce preparedness is a priority for the Navy Child and Youth Programs (CYP), Camden County 4-H trained CYP staff to implement CS programming as part of their summer day camps and afterschool 4-H clubs. COVID-19 operational protocols did not allow for 4-H faculty to visit the installation, but CYS staff were trained/supported virtually before implementing programming with youth. Thirty-five youth participated in programs offered through the 4-H/military partnership.

The Georgia 4-H Technology Summit Planning Team is comprised of eight middle and high school 4-H youth from across the state. They provide youth voice and leadership for the Technology Summit as well as overall input for technology-related programming throughout the state. During their fall retreat, youth learned various CS knowledge and skills while completing the national 4-H Junk Drawer Robotics lessons, operating 3D printers, and coding various robotics systems. Team members were challenged to return to their 4-H programs and share their new knowledge and skills with others.

Finally, a county 4-H faculty member was contacted by the Director of the Southeast Georgia College and Career Academy requesting assistance for a computer science/robotics project with a high school class. Students in the "Make It, Move It" class were being exposed to different technical and engineering careers in their communities. The Director knew of 4-H's strong presence in youth STEM programming and invited Georgia 4-H to be a partner. A group of 4-H state and county faculty members collaborated to create an 8-day lesson series introducing students to computer science vocabulary and allowing them to code multiple robotics systems. The team regularly met and communicated to create educational objectives, lesson outlines, and activity plans. Twenty youth participated in the project, and due to its success, this partnership is likely to continue for the 2021-22 school year.

Results/Impact: Georgia 4-H has offered strong science and STEM-related programming for decades. However, most of our computer science (CS) programs have traditionally been implemented by county-level 4-H clubs competing in organized robotics competitions coordinated by third-party entities such as FIRST or VEX. The Creating a CS Pathway for America's Future grant allowed Georgia 4-H to offer more CS programming by equipping faculty, staff, and volunteers with easy-to-implement and low-cost materials and supplies.

Seventy-three youth participated in 6+ hours of programming through this grant; an additional forty youth participated in <6 hours of programming through this grant. Eighteen adults (faculty, staff, and volunteers) supported the project. The grant served at-risk, minoritized, and/or historically excluded groups including: 20 female youth, 19 African American youth, 9 multi-racial youth, and 35 military-connected youth.

The 6+ hours of CS programming participants (n=53) completed a short program evaluation. Over 90% of youth indicated they learned how to follow design plans, over 96% of youth indicated they are more confident in their beginner coding skills, and 88% of youth indicated they are more knowledgeable about computer technology.

When asked about their experiences with the CS class, youth responded, “this activity helped me learn dependability. I can use communication that we used today also. I am able to lead and can be dependable, trusting, and communicative. It could help me realize I need to be more patient and think smarter while working.”

Program Function(s): Extension

Program Area(s): 4-H

Collaborators: Brennan Jackson, Becca Velaquez, Brittani Lee, Kennedy Deveaux, Kelle Ashley, Jodi Pandolfi, Christian Albritton, Shawnie Sahadeo, Cheryl Poppell, Megan Powell, Susannah Lanier, Jakyn Tyson, Jackie Nunn, Lisa Pollock, Jonathan Page, Jesse Scott