
Title: Mission Make-It: The Georgia 4-H Engineering Challenge

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Summary: Mission Make-It: The Georgia 4-H Engineering Challenge provides middle school 4-H members the opportunity to work together to complete engineering tasks in a non-competitive setting.

Situation: According to the Smithsonian Science Education Center (2019), Science, Technology, Engineering, and Mathematics (STEM)-related jobs grew at a rate that was three times higher than non-STEM jobs between 2000 and 2010. With STEM careers continuing to grow and expand, there is a need for young people to develop interest and skills in these areas. However, an estimated 2.4 million STEM job went unfilled last year. *Charting the Course for Success*, released by the National Science and Technology Council (December 2018), identified three goals for American STEM education should be to (a) build strong foundations for STEM literacy; (b) increase diversity, equity, and inclusion in STEM; and (c) prepare the STEM workforce for the future. Exposing young people to engaging STEM-related opportunities at younger ages can potentially increase their interest and influence their career choices.

Response: Mission Make-It: The Georgia 4-H Engineering Challenge was created in 2015 to expose middle school students to the engineering design process through non-competitive means. During the event, small teams of 4-H'ers work together to brainstorm, design, build, test, and modify engineering creations related to real-world problems. In addition to building STEM knowledge, youth develop important life skills, such as communication, cooperation, problem-solving, team building, and critical thinking. The event also features guest speakers that are experts within their given field, providing career exploration opportunities to participants. High school youth serving as teen leaders facilitate the lessons alongside adult leaders, giving them the ability to develop leadership skills and mentor younger 4-H members. Teen leaders also bring interactive exhibits, displaying information about their 4-H STEM projects.

Results/Impacts: The 2019 Mission Make-It event featured space-related challenges to celebrate the 50th anniversary of the Apollo 11 mission. Youth worked in small groups to build rockets and launch towards inflatable moons. They conducted modules that splashed down into small pools of water. UGA Physics and Astronomy Professor Dr. Loris Magnani, served as the opening speaker, inspiring youth about the future of space travel. Closing speaker Major Benjamin Calhoun, an executive officer for the 22nd Air Force, talked about astronomy and Global Positioning System (GPS). Maj Cahoon's previous responsibilities included providing leadership for the entire GPS operations worldwide.

One-hundred eighteen youth and eight teen leaders participated in 2019 the Mission Make-It event. Evaluation data collected from youth participants (n=115) suggested students developed engineering skills during the program. Over 90% of youth indicated they could identify potential solutions to a design problem, and 95% of youth indicated they could communicate a design solution to others. When asked what the best part of the event, one 4-H'er replied "learning that people can still agree to things." One adult leader commented, "I like that it [Mission Make-It] is hands-on, non-competitive, team-based, and a single day. We struggle to get families and 4-H'ers to commit to a team with weekly practices, so this is a great event to engage our middle schoolers. STEM is ALWAYS popular with our families."



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The University of Georgia 4-H program is the largest youth leadership organization in the state.

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