2021 Impact Statement

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

Geographic Scope: State

Your Unit/Department/Group: 4-H Youth

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 (2021), in the past two years, 90% of the world's data has been generated. STEM-related jobs grew at three times the rate of non-STEM jobs between 2000 and 2010, and it is projected that 2.4 million STEM jobs went unfilled in 2018. With STEM careers continuing to grow and expand, there is a need for young people to develop interest and skills in these areas. 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.

Results/Impact: The 2021 Mission Make-It event featured biomimicry-related challenges. Biomimicry is the design and production of materials, structures and systems that are modeled on biological entities and processes. Dragonflies, birds, geckos, and sharks are some of many animals that engineers have used for inspiration to design airplanes, wind turbines, Velcro, and helicopters. Throughout the event, the 4-H'ers worked in small groups to use the five-phase engineering design process: ask, imagine, plan, create and improve. Following the biomimicry theme, youth constructed airplanes and birds, focusing on flight and aerodynamics.

All participants experienced an educational opening session about birds of prey and got to see a hawk and an owl that are part of the Rock Eagle 4-H Environmental Education program. Additionally, a Vietnam-era

helicopter from the Army Aviation Heritage Foundation in Hampton, Georgia, served as the focus of the closing session. After a brief informational presentation, youth received personal tours provided by members of the foundation and had the opportunity to enter and explore the helicopter.

One-hundred eighty-three youth, teen leaders, and adults participated in 2021 the Mission Make-It event. Evaluation data collected from youth participants (n=113) suggested students developed engineering skills during the program. Over 89% of youth indicated they could identify potential solutions to a design problem, nearly 96% of youth indicated they could communicate a design solution to others, and over 97% of youth indicated they knew how to test their idea to see if it solved the engineering problem.

When asked what the best part of the event, one 4-H'er replied, "I really enjoyed the helicopter session. It didn't fly, but it looks really cool and I'm proud of it."

One adult leader commented, "Mission Make-It was an opportunity for the youth of Newton County to further their STEM education, teamwork, and communication skills. The attending 4-H'ers developed all of these skills without even realizing it because the event was so fun and engaging."

Program Function(s): Extension

Program Area(s): 4-H

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