Project PLANTS: Planting Middle School Leaders in Agriscience

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Introduction/Need for Idea

Enrollments in agriculture majors have decreased in the last 20 years, despite the employment opportunities that continue to abound for college graduates in food, fiber and natural resource sectors (Darnell & Cheek, 2005; Goecker, Smith, Fernandez, Ali, & Theller, 2015; McAllister, Lee, & Mason, 2005). A 2009 report of the Association of Public and Land Grant Universities also noted a widening gap between the number of agricultural job vacancies and the number of graduates needed to fill them. Compounding the need for a skilled agricultural workforce, reports suggest American youth lack agricultural knowledge and literacy while holding misconceptions about agriculture (Fields, Hoiberg, & Othman, 2003; Myers, Breja, & Dyer, 2004; Overbay & Broyles, 2008). While research has shown that students are making decisions about their careers as early as middle school (Tai, Liu, Maltese, & Fan, 2006), students at this age may lack exposure to the agricultural career possibilities in the STEM fields, thus they may be making decisions about career choices without accurate information. By the time students reach high school, attitudes and interests in science fields, including agriculture, have already declined (George, 2000). Caleon and Subramaniam (2008) concluded there is great potential in intervening with middle school students because many of them are undecided in their attitudes toward science as a career preference.

With interest in science declining during middle school years (Potvin & Hasni, 2014), positive experiences are needed at this critical time in science, since these experiences create a higher likelihood that students will succeed in science subject areas and pursue upper level science courses (Fraze, Rutherford, Wingenbach, & Wolfskill, 2011). In addition, middle school students who engaged in group STEM activities demonstrate more self-efficacy in STEM fields (Brown, 2016). Formal and nonformal education can benefit from hands-on, experiential learning during the middle school years to cultivate interest and aspiration in agricultural sciences later in career and academic choices. Stemming from this idea, *Project PLANTS* was created to increase students' excitement for the sciences, elevate students' image of agriculture from gardening to the dynamic scientific field it truly is, and connect middle school students to higher level education and industry opportunities in [State].

How It Works

Project PLANTS (Planting Leaders in Agriculture and Nature Through Science) was created through a collaboration between [Land-Grant] University and the [Named] Arboretum. *Project PLANTS* is a two-part program that immerses students in an intensive one-week summer camp program broadening their knowledge of agricultural sciences followed by a monthly *Science Saturday* program that extends their exploration through the school year. The camp provides a broad and engaging introduction to relevant and meaningful topics in agriculture. Each day unfolded with a different conceptual theme in STEM and uses an agricultural lens to strengthen science understanding for youth. The camp includes a series of field trips that presented *Project PLANTS* youth to various community leaders in agriculture as well as sessions led by [Land-Grant] faculty and graduate students. Instructional materials for the camp are a complementary blend of newly developed materials related to the current interests of youth and program staff as well as existing 4-H curricula. Leveraging middle school youth's desire to learn socially, *Project PLANTS* members were challenged to work together as teams and draw from their camp experiences to design projects that solved problems critical to conserving our natural resources. In addition to improving attitude toward sciences, *Project PLANTS* aims to foster

connections between participants and both universities and the agricultural industry. Students participate in hands-on learning that weaves life skills development into sciences and research.

Results to Date/Implications

To-date, over 50 participants completed the *Project PLANTS* program. Participants were divided into three cohort years. The first *Project PLANTS* cohort began in summer of 2015, with 11 participants attending a fully-funded camp and six to seven attending the monthly after-school club. In 2016, 19 participants attended the summer camp and 12-15 attended the weekly after-school club. In 2017, 19 participants attended the summer camp and 12-19 attended the monthly Science Saturday program. In 2018, 18 participants attended the summer camp. Participants originate from more than 20 different middle schools in [] County. Project coordinators recruited participants by contacting science teachers in local schools and asking for students to participate. After the first year, word-of-mouth helped with recruitment along with on-going contact with the schools. Participants completed an application that required a teacher or other adult mentor recommendation. Throughout *Project PLANTS*, and the four different cohorts who finished the program, project coordinators have observed a growing interest in horticulture and agriculture. Perhaps more interestingly is how these participants invested in each other and created an environment excitement for learning. Now at the end of four camps and three school years, project coordinators continue to be encouraged by the program and the relationships they are building with middle school participants. Participants are sharing their experiences, bringing friends for *Science Saturdays* and returning—39% of the 2017 participants returned for 2018.

Future Plans/Advice to Others

Project PLANTS has strengthened the programming capacity of [State] 4-H to deliver engaging, high-quality agricultural content to middle school youth. For the [] Arboretum, *Project PLANTS* launched an experiential, place-based program offering for middle school youth. *Project PLANTS* allowed project coordinators to be innovative, try new ideas, build and improve programming, and plan for sustainability. *Project PLANTS* experiential learning activities are being turned into a 4-H curriculum aligned to [State] Essential Standards to be available for formal and nonformal educator use, and those activities will be used for future *Project PLANTS*.

Clearly, middle grades students desire social interactions with one another. A critical component of *Project PLANTS* is social interactions. When implementing a program for middle school participants to build their confidence and interest in science, program planners should create social opportunities where participants can realize their potential as leaders and spread the seeds for lifelong engagement in agriculture.

Costs/Resources Needed

The Burroughs Wellcome Fund selected *Project PLANTS* as a recipient of the Student Science Enrichment Program grant with $179,884 total across three years to fund supplies, staff, transportation, marketing, and any other necessary costs. Now, the [] Arboretum has committed to continue *Project PLANTS* as one of its permanent program offerings. Using the experiences, activities and field trips, the [] Arboretum will be able to sustain *Project PLANTS* for the foreseeable future with an affordable cost to participants—$300 per student for the summer camp and $10 per *Science Saturday* to cover supply costs, food, marketing, transportation, field trip fees, t-shirts, and other costs.

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