AgroBox: A STEM-Based Innovation to Promote Interest in Agricultural Science Careers

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Introduction / Need for Innovation or Idea

Most states in the United States are struggling to attract students interested in pursuing a degree beyond high school and recognize the need to improve strategies to address this challenge (Offenstein & Schulock, 2010). Today, offering high-quality programs in agricultural sciences alone is no longer sufficient; what is most important is recruiting and retaining students in these programs (Francis, 2017). Promoting university-level agricultural science programs can be particularly difficult, as they are often associated only with agricultural production, hard labor with low wages, and there is generally limited awareness of the wide range of careers available in agriculture (Baker et al., 2013). This trend, along with the lack of agricultural literacy in society, continues to perpetuate stereotypes and limit the development of future professionals in agricultural fields (Henry, 2012). Given the clear need for professionals in agricultural sciences, the declining pool of future candidates who will aspire to be admitted into these programs, and the needs and expectations of this generation (Powell, 2019), it is essential to examine recruitment efforts and promote, through innovative programs, the opportunity to pursue careers in agricultural sciences. Many universities have developed outreach strategies, including pre-college programs designed to expose students to professional careers and encourage them to enroll in specific fields of study with the goal of earning a college degree (Edwards, 2010). One of the alternatives universities have adopted is to expand their pre-college program offerings during the summer, taking advantage of the fact that a large portion of their student population is off campus, which also serves as an alternative source of revenue (Edwards, 2010). Universities such as Michigan State University, North Carolina State University, Penn State University, and Purdue University, among many others, are examples of institutions that offer these programs. With this in mind, the AgroBox strategy was developed as part of the Agriculture Week Challenge Program as an alternative for student recruitment.

How It Works / Methodology / Program Phases / Steps

In response, as part of the educational Program, a virtual educational strategy was implemented between 2023 and 2025, complemented by AgroBox: a practical educational kit with interactive physical materials designed to promote agricultural careers among high school students. This initiative aims to expose participants, through experiential and technological approaches, to the variety of programs and academic opportunities offered by the College of Agricultural Sciences. The program was conducted virtually via the Microsoft Teams platform for three consecutive days, and in person for two days with synchronous sessions from 8:00 a.m. to 2:00 p.m. Participants received the Agrobox kit on the first day of the synchronous experience. These participants were high school students interested in scientific and agricultural careers. A total of 137 participants from across Puerto Rico has participated in the program over the past three years.

Twelve virtual educational modules and ten in-person modules were developed, each focused on one of the educational programs in agricultural sciences, including but not limited to agronomy,

horticulture, animal science, agricultural economics, and agricultural education. Each module lasted 60 minutes and included: Guided presentations and interactive videos, hands-on activities with the materials included in AgroBox, a 30 x 30 x 30 cm educational kit box containing substrates, seeds, seedlings, insects, botanical presses, laboratory materials, printed guides, among other materials. The activities included, but were not limited to, growing lights on germination trays, preservation of vegetative species, insect mounting, and experiments on citric acid in fruits. The curriculum design was validated by faculty members with demonstrated expertise in the respective disciplines, all of whom hold master's and doctoral degrees in their fields.

Results to Date / Implications

Participants demonstrated a significant change in knowledge in pre- and post-program assessment. A significant increase in agricultural literacy and student interest in exploring careers in agricultural sciences was observed. The methodology effectively combined virtual education with experiential learning, fostering active participation, and an emotional connection with agriculture. The AgroBox initiative proved to be an effective recruitment tool, offering an immersive and technologically optimized experience aligned with the interests of digital generations. Furthermore, it helped connect academic institutions with prospective students. Overall, students have demonstrated high satisfaction with the methodology, educational resources, staff guidance, and perceived value. Of the participants in the first two cohorts, 27 students have been accepted into academic programs in agricultural sciences at the Faculty of Agricultural Sciences.

Future Plans / Recommendations for Others

The results demonstrate that the Agriculture Week Challenge was highly effective in increasing participants' knowledge, strengthening their understanding of agricultural sciences, and achieving high levels of satisfaction across all program components. This confirms that well-planned and innovative pre-university initiatives can successfully motivate students to consider careers in agricultural sciences and better understand their importance for Puerto Rico's sustainable development. Future efforts should focus on expanding and replicating the program to reach a larger and more diverse student population, including those from schools without agricultural programs. Additional longitudinal evaluation, mentoring, and follow-up with participants should be implemented to measure skills development, career decisions, and the transition to university studies. Strengthening outreach strategies, such as school visits, family and counselor engagement, and targeted digital communication, will further enhance recruitment, awareness, and long-term impact.

Costs / Required Resources

The program requires an initial investment for curriculum development, printing of materials, and assembly of AgroBox. Each box costs approximately $90, depending on the components included. Faculty personnel and technical support staff in agricultural education contributed to its implementation over a period of approximately six months. The use of institutional platforms minimizes operating costs and improved technological accessibility.

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