Catering Teacher Professional Development to Plant Propagation in Horticulture

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Introduction

To improve student performance, change in teaching practice is required (Guskey, 2010) and professional development (PD) is an important aspect to assure teachers are provided with occasions to learn new approaches to teach rigorous standards (Alexander, Heaviside, & Farris, 1998). Discovery of innovative methods to teach standards while enhancing the science, technology, engineering and mathematics (STEM) concepts in the content has become paramount to increase student engagement. Two departments in the College of Agriculture, Forestry and Life Sciences at Clemson University collaborated to create a PD experience for agriscience teachers using microgreens in a sterile laboratory. Microgreens are clean, bite size, tender, ready to eat raw or cook very quickly. Microgreens are a commodity for the restaurant industry, being added to salads and as garnishes for entrees (Treadwell, Hochmuth, Landrum & Laughlin, 2010). Ease of production, rapid growth rate, and a desirable shelf-life all make microgreen production a novel crop due to many factors. The brevity of time from sowing to harvest and how microgreens are utilized after harvest make them an efficient and nutritious food. "Harvesting at the first true leaf stage" results in a very young and tender plant (Treadwell, et al., 2010). Ease of production factors allow microgreens to be an innovative method to teach sexual propagation in school-based agricultural education (SBAE) programs. Microgreens can be harvested as early as seven to twenty-one days after being sown, which aligns well with teaching plant propagation in a SBAE program.

Theoretical/Conceptual Framework

Despite the contractual requirements related to maintaining teaching certificates, teachers regularly choose to participate in PD to become more effective, increase their personal competence, and improve their own professional satisfaction (Fullan, 1991,1993; Huberman, 1995). Realistically teachers who engage in PD do so to learn strategies and obtain tangible ideas to apply to their daily lessons (Fullan & Miles, 1992). The model of teacher change (Guskey, 2010) provided the theoretical framework applied to the research we conducted. The goal of PD has been, to elicit change in teachers' classroom practices, second to evoke change in teachers beliefs and attitudes, and third to prompt change in student learning outcomes (Guskey, 2010).

Methodology

Agriscience teachers (N = 15) were invited to attend a three-day professional development conference, supported by the American Floral Endowment; focused on STEM concepts related to the horticultural/floricultural industry. Fifteen participants from ten states were selected to attend. A pre-workshop evaluation was administered on the first day. The evaluation asked why the teachers decided to participate in the conference, the career pathways they taught, how they taught sexual plant propagation, what resources they utilized, and how many instructional days were dedicated to teaching the subject. Participants were asked to define microgreens, use a Likert scale to rate their current knowledge of microgreens, and report if they currently incorporated microgreens into classroom instruction. On the last day of the conference, the post evaluation required participants to rate their new knowledge of microgreens and provide a new definition. They were also asked to rate their likelihood to incorporate microgreens into their unit of instruction using the supplemental resources they received at the end of the conference.

Results/Findings

Career pathways primarily taught by the participants were floriculture, horticulture, and plant systems. Prior participant knowledge on microgreens revealed they had little to no knowledge of microgreens. When asked how they currently taught sexual plant propagation, frequent responses included lecturing and using visual aids such as PowerPoints and videos. Other methods used were described as "hands on" laboratory activities such as flower dissection, seed propagation, and specific propagation techniques. The minimum amount of time spent teaching sexual plant reproduction was two days while the maximum time spent was two weeks. After participating in the conference, 75% rated their personal knowledge of microgreens to be at a moderate level compared to no previous knowledge. Participants' definitions of microgreens expanded, and they explained how the seeds were cultivated. Specific responses to how their knowledge developed included being able to "grow and harvest" microgreens as well as feeling "confident" they could apply this process in the classroom with their own students. After the conference, participants received a microgreens laboratory investigation kit that included resources that would help them teach this content to their students. Of the responses, 91% of educators agreed that it was very likely they would incorporate these resources into their curriculum. When asked to explain why they wanted to participate in this conference, frequent responses revealed the teachers wanted to learn new and engaging ways to teach plant science concepts. Participants felt this experience would help them grow as an educator and incorporate STEM teaching methods into their curriculum. Furthermore, two participants indicated excitement because the PD content was catered specifically to plant science and was a "very rare opportunity".

Conclusions

Microgreens are an innovative way to engage students' attention while teaching sexual plant propagation. Educators can incorporate this crop into their curriculum with ease and allow their students to have an inquiry-based experience by sowing and harvesting microgreens. An added benefit to working with microgreens is the average harvest time of seven to twenty-one days which aligns with the average time spent on teaching sexual reproduction reported by these participants. Through this professional development, agriscience teachers were able to expand their knowledge and confidence in plant science to shift their instructional methods from lecture to integrate STEM techniques. The PD provided the opportunity for agriscience teachers to explore innovative methods for instruction and catered specifically to their content needs.

Impact on Profession

Agriscience teachers found this PD to be practical and refreshing. Comments reflected that topics and activities could easily integrate into their own curriculum to enhance their students learning experience. Guskey's (2010) model of teacher change reflects this notion by showcasing how interlaced teaching methods and student outcomes can be. These teachers indicated there may not be enough professional development catered to specific career pathways and subjects. To improve the impact of professional development specifically for agriscience teachers the content focus seems to be an important factor they consider before choosing to engage in the experience.

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