

Immersive Professional Development for Agriscience Teachers to Explore the Floriculture Industry

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Introduction

Barriers to the successful implementation of science, technology, engineering and mathematics (STEM) integration remain a significant concern in all secondary education classrooms in the United States and have been well-researched (Carnevale et al., 2011; Dancy & Henderson, 2008; Eck et al., 2023; Ejiwale, 2013; Merayo & Ayuso, 2022). To address this issue, professional development (PD) opportunities must be designed to facilitate teacher learning and support STEM integration in secondary classrooms (Salo, 2024). The number of PD opportunities has increased dramatically over the past decade due to the availability of online meeting tools, which provide both challenges and successes for extended learning and collaboration (Meyer et al., 2023; Turan & Karabey, 2023). Regardless of the delivery method, high-quality PD is critical for STEM integration in agriculture classrooms (Eck et al., 2023). Desimone's (2009) recommendations for PD need to be utilized to ensure that high-quality and meaningful PD is created.

Program Phases

The *STEM it Up*² (SIU²) program was a professional development initiative designed for secondary agriscience teachers (grades 7–12). The program included three distinct phases aimed at enhancing teacher knowledge of STEM concepts within the plant science pathway of school-based agricultural education (SBAE) programs. An additional objective was to promote career readiness, expand career opportunities, and prepare a STEM-fluent workforce. Agriscience teachers from around the United States applied and interviewed, and sixteen were chosen to participate in the high-quality PD delivered in person and virtually, where they connected their SBAE plant science curricula to concepts in STEM and career exploration in plant science and floriculture. In the future, the teacher participants will participate in peer PD training, facilitating PD to additional agriscience teachers, potentially impacting 160 more agriscience teachers and upwards of 14,000 students nationwide.

To offer a high-quality PD for STEM in floriculture, we used Desimone's (2009) recommendations. These include i) focus on content, ii) active learning, iii) clear path of integration (coherence), iv) duration of time, and v) collaboration and collective participation. The SIU² was divided into three phases, concentrated on the in-person immersive experience, also known as phase II. Participants were provided with a fully immersive, 10-day experience, accommodations, and stipends for each phase of the SIU² PD.

Phase I - Pre-immersion: Teachers engaged in 90-minute virtual PD over six months, learning about numerous topics on the floral distribution channel and preparing for the immersive experience. These sessions represented the iv) duration of time and v) collaboration and collective participation elements of Desimone (2009).

Phase II – Immersion: The agriculture educators were immersed in nine locations across three states in 10 days. The experiences included university research labs, industry research facilities, working flower farms, floral receiving and distribution facilities, flower distributors, and corporate plant growers. The participants gathered a collective of images, videos, and informatics to create innovative curricula modules that connect STEM learning to the plant science pathways they teach. These sessions represented the i) focus on content, ii) active learning, and v) collaboration and collective participation elements of Desimone (2009).

Results to Date

The participants had several opportunities to provide feedback on Phases I and II of the SIU². For Phase I, the virtual PD, all 16 participants provided feedback and noted all sessions except for one extremely satisfactory. For one session, 14 participants stated they were extremely satisfied, and two stated they were somewhat satisfied. Similar results were noted for Phase II, the in-person immersive experience, with only one instance of neither a satisfied nor dissatisfied experience for the [State] Botanical Garden visit out of nine total individual experiences/program events.

Future Plans

Phase III – Post-Immersion: Teachers are currently in Phase III of SIU², designing curricula that uniquely look at the floriculture distribution channel based on previous immersive experiences. Working in pairs, participants are designing eight innovative instructional modules to integrate floriculture and plant science with STEM concepts. These modules are aligned with AFNR standards, NGSS standards, and career readiness skills and are intended for use in SBAE programs, adult education, extension programs, and plant science courses. Phase III will also engage teacher participants in the review of the pilot curriculum, implementation of the curriculum, and teacher training of PD. The future portions of the program represent the i) focus on content, ii) active learning, iv) duration of time, and v) collaboration and collective participation elements of Desimone (2009).

The goals of the SIU² are to address the need for STEM integration, education, and fluency in the areas of plant science and floriculture, to broaden the STEM workforce, integrate science education learning, and support interdisciplinary research (Wang & Knobloch, 2018).

Resources Needed

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