Following Up – Supporting Teachers After Professional Development

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Introduction

In order to be prepared for the workforce upon graduation, today's students need to be well versed in science, technology, engineering, and math (STEM) (Carnevale et al., 2014; Honey et al., 2014; National Academies Press, 2000; National Academies Press, 2011). The horticulture/floriculture industries, while facing a shortage of skilled professionals overall, specifically lack individuals trained in STEM skills (Shepherd, 2011). School-based agricultural education (SBAE) programs have the unique opportunity to teach STEM concepts by providing opportunity for cross-curricular engagement and hands-on application of skills learned in core science and math classes when teaching the science of agriculture naturally embedded in the curricula. Teachers need content-specific knowledge in order to adequately prepare the up and coming workforce for college and careers. Ramey-Gassert and Shroyer (1992) indicated time spent teaching a specific content area is correlated to the teacher's felt self-efficacy and knowledge in that area. The less comfortable, knowledgeable, and confident a teacher feels about a topic, especially science, the less time they will spend teaching the content (Ramey-Gassert & Shroyer, 1992). Professional development, which is intentional, ongoing, and systematic can help to overcome the self-efficacy barrier and improve teacher knowledge and skill (Guskey & Huberman, 1995; Guskey & Sparks, 2000). The STEM-it Up: Everything You Need to Know to Get Your Floriculture Curriculum In Bloom (STEM-it Up) program was launched in June of 2019 to provide in-depth knowledge needed to teach STEM in plant systems classes, with continual support and communication provided through the fall of 2019. This research addresses the American Association for Agricultural Education (AAAE) Research Priority 3, *"Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century"* (Stripling & Ricketts, 2016, p.29).

Theoretical Framework

Teacher self-efficacy is an important factor in the content shared with students (Ramey-Gassert & Shroyer, 1992). Self-efficacy is defined as "personal beliefs concerning one's capabilities to organize and implement actions necessary to learn or perform behaviors at a designated level" (Schunk, 2014, p. 504). Specific professional development where teachers can examine their self-efficacy and are provided with opportunities to learn and apply new material can increase self-efficacy. Self-efficacy made up of personal performance, observations of models (vicarious experiences), forms of social persuasion, and physiological indexes are related to personal mastery and perceived competence. Mirroring Ramey-Gassert and Shroyer (1992), Maddux (2016) noted people are more likely to engage in activities in which they are familiar, such as teaching a specific topic or curriculum. A professional development program was thus designed utilizing the factors of high-quality professional development, (a) content focus, (b) active learning, (c) coherence, (d) duration, and (e) collective participation, as recommended by Desimone (2009).

Methodology

The purpose of this study was to further explore SBAE teachers' self-efficacy after participating in STEM-it Up, a professional development program focused on STEM concepts and content in the plant systems curriculum. The population was agriscience teachers who participated in three days of intensive professional development four months prior, in the summer of 2019. A convenience sample was utilized. All teachers from the program were invited to participate with five teachers agreeing, resulting in two separate focus groups. A deductive, qualitative approach was utilized to further explore teachers' self-efficacy to teach the science of agriculture in their curriculum. Data were collected through one-hour focus groups of two and three participants. Focus groups were audio-taped, semi-structured interviews in which the researcher asked open-ended, non-leading questions (Creswell, 1998). The interview guide was created in part by results and questions from a previous pre- and post-survey on self-efficacy beliefs of teaching the science of agriculture, which was part of a larger study. The interview questions focused on skills and information needed to teach the science of agriculture, how teachers planned to get their students excited about the science of agriculture, the steps taken to teach the science of agriculture, support needed, and curricula created since completion of the professional development program. Harding (2013) indicated a deductive approach is appropriate when codes are to be derived from previous information. *A priori* codes from previous elements of the larger study were utilized to guide primary coding. During second-cycle coding, some codes were adjusted and split to better highlight the data presented (Harding, 2013).

Findings and Conclusions

The data generated nine individual categories and twenty-one codes. Main categories included agriscience fair, difficulties with content, lab and classroom activities, self-efficacy, skills to teach the science of agriculture, space and classrooms, support, and turning students on to the science of agriculture. Overall, participants reported positive and efficacious behaviors which included multiple instructional changes after returning to their classrooms. All participants indicated they had utilized at least some content from the program in their classroom such as utilizing provided labs, micro-green propagation, and asking “why?” questions. Two participants noted they felt they were more prepared with more skills necessary to teach the science concepts. Increased student engagement through labs and application of abstract concepts were reported as benefits to helping students understand the science of agriculture. Greater student engagement was also observed with students taking more control over their learning and applying principles and concepts to the labs themselves. Many teachers reported barriers which prevented them from being efficacious in teaching the science of agriculture. There was an overwhelming lack of support noted, both from administration as well as in the form of materials and supplies. The sentiment that agriscience teachers were not seen as science teachers by administration or other teachers was prominent. This was further exacerbated by a lack of supplies and funding for lab materials. Those who did have good relationships with science teachers noted their help, in the form of information as well as materials, and this collaboration was reported to be invaluable to their efforts in teaching the science of agriculture.

Implications/Recommendations/Impact on Profession

Based on our findings, the factors of high-quality professional development, (a) content focus, (b) active learning, (c) coherence, (d) duration, and (e) collective participation (Desimone, 2009) were essential to the success of this program and the teachers’ ability and interest in applying the content they learned. Follow-up communication, engagement, and sharing of resources after professional development are recommended to help build teacher self-efficacy to teach and apply what they learn from their experience as a student. It was found that follow-up communication not only positively impacted self-efficacy to teach the science of agriculture in their curricula, but also impacted the teacher’s overall appreciation of the program and hopefully future engagement in other professional development experiences they may participate in throughout their careers.

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