

**Changes Experienced by Secondary Agriculture Teachers After a STEM-Focused
Professional Development Experience**

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Changes Experienced by Secondary Agriculture Teachers After a STEM-Focused Professional Development Experience

Introduction and Statement of the Problem

Secondary agriculture teachers in Louisiana have historically lacked the curriculum resources and training to improve the science, technology, engineering, and mathematics (STEM) literacy of their students [Author Blinded, 2019, 2020]. Inadequate curriculum resources have been found to contribute to teacher turnover (Solomonson, 2017) and hinder student recruitment efforts (Dyer & Breja, 2003). In response, Louisiana State University designed and delivered a three-day professional development opportunity in which 10 agriculture teachers, called Agritech Ambassadors, learned to incorporate STEM concepts into the agriculture curriculum. Topics included: biotechnology, bottle biology, coastal loss, engineering, environmental science, mathematics in agriculture, technology integration, and more. Over the next year, the Agritech Ambassadors will facilitate 10 similar professional development sessions for approximately 100 agriculture teachers in Louisiana. Despite these efforts, little was known about the changes experienced by the Agritech Ambassadors after completing the STEM-focused professional development experience.

Conceptual Framework

Guskey's (2002) model of teacher change served as the conceptual framework for this study. Through this lens, teachers' attitudes and beliefs mature as a result of professional development activities. For example, as teachers reflect on their professional growth, they begin to understand how their new knowledge and skills can be used to improve student learning. Guskey (2002) opined that teacher change occurs through a linear process by which the professional development experience leads to changes in (a) classroom practices, (b) student learning outcomes, and (c) teachers' beliefs and attitudes. As such, this model was appropriate to examine the phenomenon under investigation.

Purpose

The purpose of this study was to understand the changes experienced by the Agritech Ambassadors after a STEM-focused professional development experience facilitated by Louisiana State University. Therefore, the study aligned with the American Association for Agricultural Education's National Research Priority 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016).

Methodology

Stake's (1995) instrumental case study approach grounded this inquiry. To uphold rigor and trustworthiness, we also embedded Lincoln's and Guba's (1985) standards for qualitative quality in this study: (a) dependability, (b) confirmability, (c) credibility, (d) and transferability. Our primary source of data was a focus group interview with five Agritech Ambassadors, four females and one male, who were purposefully selected through a rigorous application process. We selected these individuals to ensure maximal variation in regard to their (a) age, (b) career stage, and (c) region in the state. The interview was transcribed verbatim for analysis. We also

collected additional data sources through daily journals, observations, and relevant documents to triangulate our findings (Stake, 1995). Finally, to analyze the data sources, we employed first cycle coding approaches advanced by Saldaña (2015): (1) in vivo, (2) descriptive, and (3) structured. Next, we reduced the data to categories using axial coding (Saldaña, 2015). Finally, we used the axial codes to interpret our data through Guskey's (2002) model of teacher change. As a result of this process, our findings emerged through four themes.

Findings

Four themes emerged in our analysis, which represented the perceived changes experienced by the Agritech Ambassadors as a result of the STEM-focused professional development: (1) teacher beliefs, (2) classroom practices, (3) approach to ensuring student success, and (4) barriers to change. In the first theme, the Agritech Ambassadors expressed that their beliefs and attitudes began to evolve after the professional development experience. In particular, they revealed they had a more positive outlook on integrating STEM into their courses and setting more robust expectations for their students. On this point, Participant #5 revealed: “[This professional development] was progressive not only [regarding] the curriculum, but I think as far as the teachers also being able to improve their teaching [and student expectations].” In the second theme, classroom practices, the Agritech Ambassadors articulated how the professional development experience helped them rethink how they could integrate STEM concepts throughout their courses as well as how they recruited and retained students. For example, Participant #3 shared: “[these concepts] will serve as a really good recruiting tool...I mean [its] like [the] little things they are going to remember and what's going to make them come back.”

In the third theme, approach to ensuring student success, the Agritech Ambassadors illuminated that the professional development experience would help them better prepare students to succeed in other courses, college preparation, as well as on industry-based credential (IBC) examinations. Participant #1 explained: “[For IBCs]...a lot of teachers do not give their students enough [exposure to STEM]. This [professional development experience] will help them raise their standards higher. If teachers' standards are higher there will rise to them.” In the final theme, barriers to change, the Agritech Ambassadors revealed the hurdles they perceived existed to incorporating STEM concepts into the agriculture curriculum, especially as a result of the COVID-19 global pandemic. Participant #1 expanded on this notion: “With COVID, it's been a very big learning curve, even as easy as these labs are...panic can set in. So I think that fear... [and just] breaking them in to [incorporate STEM concepts]” will be the biggest challenge.

Conclusions/Implications/Recommendations/Impact on the Profession

When viewed through the lens of Guskey (2002), our findings demonstrated the perceived changes the Agritech Ambassadors experienced as a result of participation in a STEM-focused professional development experience. However, our final theme, barriers to change, did not align with Guskey's (2002) model. Moving forward, we recommend that future research explore the role of reflection in helping agriculture teachers make meaning of their professional development experiences and begin to understand how they better support their students' learning. We also recommend that teacher educators create professional development experiences in ways that explicitly help agriculture teachers to incorporate STEM-related concepts in powerful and transformative ways.

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