Exploring the Pedagogical Content Knowledge and Professional Development Needs of School-Based Agricultural Education Teachers by Career Stage

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Introduction/Need for Research

The increasing complexity of agricultural education and the evolving demands of the agricultural industry necessitates a deeper understanding of the pedagogical content knowledge (PCK) and professional development needs of School-Based Agricultural Education (SBAE) teachers at different career stages. Research has highlighted significant variations in teaching strategies, subject matter expertise, and professional development requirements among early-career, mid-career, and veteran teachers (Stair et al., 2019; Smalley et al., 2019). Voges et al. (2020) revealed that early-career teachers often struggle with classroom management, while mid-career teachers require more advanced technical training. Thornton et al. (2020) also highlighted the importance of tailored professional development based on career stages. Understanding the needs of SBAE teachers is crucial for designing effective professional development programs that enhance teacher efficacy, improve student outcomes, and promote teacher retention in agricultural education. This research aims to fill a critical gap in the literature by providing a comprehensive analysis of the PCK and professional development needs of SBAE teachers across various career stages and regions in the United States, ultimately advancing the field of agricultural education.

Theoretical Framework and Literature Review

This research is grounded in two primary theoretical frameworks: Fessler and Christensen's (1992) teacher career cycle model and Shulman's (1986) concept of Pedagogical Content Knowledge (PCK). Fessler and Christensen's model highlights the career stages of teachers, influenced by personal and organizational ecologies. This model is particularly relevant to understanding the factors affecting teacher retention and turnover (Tippens et al., 2013). Furthermore, Shulman's PCK framework emphasizes integrating subject matter knowledge and pedagogical skills, which is crucial for effective teaching. This study builds on these frameworks by examining how PCK and professional development needs evolve across different career stages of SBAE teachers. Prior research by Stair et al. (2019) and Smalley et al. (2019) has highlighted the distinct professional development needs of traditionally and alternatively certified agriculture teachers, while Thornton et al. (2020) emphasized the importance of tailored professional development programs. Identifying the PCK and professional development needs of SBAE teachers by career stage will provide insights into effective strategies to implement, aiming to address and reduce teacher attrition issues in agricultural education.

Methodology

This study aimed to describe the PCK and professional development needs of SBAE teachers across the United States by career stage. As part of a larger study, this research focused on SBAE teachers teaching courses during the 2023-2024 academic year. Cluster sampling was employed to determine participation, categorizing teachers by NAAE region, followed by random sampling to select states or groups of states within each cluster. All teachers within the selected states were invited to participate. In October 2023, an online survey instrument (Qualtrics) was administered. The survey consisted of eighteen statements adapted from Tonnessen (2021), assessing the PCK of SBAE teachers, with each statement aligned to one of the six PCK construct areas outlined by Hill et al. (2008). These construct areas included Common Content Knowledge, Horizon Content

Knowledge, Specialized Content Knowledge, Knowledge of Content and Curriculum, Knowledge of Content and Students, and Knowledge of Content and Teaching.

Participants ranked each statement using a five-point Likert-type scale and listed their preferred professional development need areas. For this study, all six PCK construct areas were combined to create the PCK variable. Professional development responses were downloaded and thematically coded by topic area. A total of 398 teachers participated, yielding a 16.6% response rate. Among the respondents, 19.1% (n = 76) had 1-3 years of teaching experience, 20.6% (n = 82) had 4-8 years, 26.4% (n = 105) had 9-17 years, and 33.9% (n = 135) had 18 or more years. Based on these ranges and the recommendations of Katz (1972), teachers were categorized into four stages: survival, renewal, late phase, and wind down.

Results/Findings

The findings indicate a progressive increase in perceived PCK as teachers advance in their careers. Teachers in the survival stage reported an average PCK rating of 3.95 (SD = 0.49), suggesting they perceived their knowledge as developing. Those in the renewal stage reported a higher mean PCK of 4.08 (SD = 0.62), indicating a shift closer to proficiency. Teachers in the late phase exhibited further improvement with a mean PCK of 4.21 (SD = 0.59), while those in the wind down stage reported the highest average PCK of 4.33 (SD = 0.52), approaching mastery. Examining the six PCK construct areas individually, all but one showed increases with years of experience. Notably, Knowledge of Content and Curriculum was rated the lowest across all career stages, and Horizon Content Knowledge remained consistent across all four stages.

Regarding professional development needs, survival stage teachers prioritized curriculum development, classroom management and engagement, FFA, content resources, and SAE. Renewal stage teachers shift focus slightly focusing more on FFA, SAE, content resources, and technology. Late phase teachers emphasized professional development on content resources, burnout/work-life balance, and technology. Lastly, wind down stage teachers prioritized professional development in technology and retirement/succession planning.

Conclusions/Recommendations/Impacts

The findings of this study underscore the importance of understanding the evolving PCK and professional development needs of SBAE teachers at different career stages. Teachers in the survival stage reported lower PCK ratings, indicating they perceived their knowledge as developing. In contrast, those in the wind down stage reported the highest PCK ratings, approaching mastery. This progression aligns with Fessler and Christensen's (1992) teacher career cycle model, which highlights the influence of career stages on teacher development. Additionally, the consistently lower ratings for Knowledge of Content and Curriculum across all stages suggest an area requiring focused professional development.

To address these findings, professional development programs must be tailored to the specific needs of teachers at each career stage. Early-career teachers (survival stage) should receive support in curriculum development, classroom management, and student engagement strategies, as Voges et al. (2020) highlighted. Mid-career teachers (renewal stage) and late-phase teachers need advanced technical training and resources to combat burnout (Stair et al., 2019; Smalley et al., 2019). For veteran teachers (wind down stage), professional development should focus on technology integration and succession planning, ensuring a smooth transition for future educators. By implementing these targeted strategies, educational institutions can enhance teacher efficacy, improve student outcomes, and reduce attrition rates in agricultural education.

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