

Examining a Perception-based Pedagogical Content Knowledge Survey for Agricultural Educators in Colorado

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Introduction

In recent years, numerous articles and conference papers have shed light on the growing attrition rate and difficulty filling agricultural education roles in the United States (Deimer et al., 2019). To address this widespread challenge, various approaches have been taken. One such method involves enhancing the preparation and support of pre-service and in-service agricultural educators through a deeper understanding of their pedagogical content knowledge (Rice & Kitchel, 2018). Researchers specializing in agricultural education have recognized the importance of understanding pedagogical content knowledge (PCK) in this field (Knobloch, 2002; Roberts & Kitchel, 2010). Exploring PCK in agricultural education poses a unique and complex challenge due to the diverse content of this Career and Technical Education (CTE) pathway (Rice & Kitchel, 2010; Van Driel & Berry, 2012). Given the growing interest in PCK and the unique situation of this CTE pathway, there is a pronounced need for further investigation into this concept within the profession (Wood & Sorenson, 2023; Rice & Kitchel, 2018, 2015). This research aligns with the American Association for Agricultural Education's research value, advancing public knowledge of AFNR systems (AAAE, 2023). Examining the perception of PCK of agricultural education teachers will yield insights into their content knowledge and pedagogical practices, which are fundamental elements within the teaching profession. The research questions this study aims to answer are: What content areas do Colorado agricultural education teachers perceive to be the most confident teaching? What content areas do Colorado agricultural education teachers perceive to be the least confident teaching? Lastly, where do Colorado agricultural education teachers learn the content to teach?

Conceptual or Theoretical Framework

The concept of pedagogical content knowledge (PCK) was developed by Lee S. Shulman (1986). Shulman identified significant gaps in understanding the space between content knowledge and teaching procedures (pedagogy). PCK describes the knowledge required for effective teaching, including the teacher's ability to transform subject matter knowledge into a context suited for student learning (Van Driel & Berry, 2010). Further investigation into this topic has also prompted the addition of “the knowledge of the rationale behind, the planning for, and the act of teaching a piece of subject matter using specific methods for specific students to promote student learning” to its description (Rice & Kitchel, 2017, p. 199).

Methods

This study aimed to evaluate teachers' perceptions of PCK and gain an understanding of agricultural educator characteristics. This is part of a more extensive analysis investigating the pedagogical content knowledge of Colorado agricultural educators. The target population was licensed secondary agricultural education educators in Colorado during the 2022-2023 school year. During the Colorado Vocational Agricultural Teachers Association meeting in January 2023, an online Qualtrics survey was administered during the business session via a QR code. Of the total respondents ($N=91$), 70 ($n=70$) were validated as our sample. The survey instrument used in this analysis was adopted from another instrument used in studies that explored pedagogical content knowledge in secondary agricultural educators (Wood & Sorenson, 2023). In the survey instrument, participants were allowed to select a topic area within the Agriculture,

Food, and Natural Resources (AFNR) pathway, where they possessed the highest and lowest levels of confidence in teaching. Then, they were presented with a series of questions on a five-point Likert scale, which pertained to their perceptions of pedagogical knowledge and teaching.

Results

Results of the survey revealed that 68% ($N=48$) of the teachers identified as female. 73% ($N=51$) come from a traditionally licensed background, and the average years taught was slightly over 10 ($M=10.61$). Overwhelmingly, 44% ($N=31$) of teachers perceived that Animal systems: livestock production was the topic they felt the most confident teaching. Topics related to power, structure, and technical systems were the second most popular choice. Interestingly, 24% ($N=17$) of the responders indicated that power, structure, and technical systems was where they felt the least confident, followed by plant science topics. When asked about their sources of knowledge to prepare for teaching in these topic areas, most teachers claim that their teaching experience is the primary source of their knowledge ($M=3.89$, $SD=1.26$). The next most common source of knowledge was prior or current agricultural experiences ($M=3.77$, $SD=1.25$). Finally, the most minor expected sources of knowledge included the teacher's high school ag program ($M=2.87$, $SD=1.51$) and their previous ag employment ($M=2.87$, $SD=1.86$).

Conclusions/ implications/ recommendations/impact on the profession

The survey results provide valuable insights into the characteristics and perceptions of agricultural education teachers. Reverting to this study's research questions, teachers felt the most confident teaching about livestock production and the least confident in teaching plant systems. The topic of power, structural, and technical systems attracted individuals to different ends of the spectrum. It was the second most commonly taught topic area in which people felt confident. Simultaneously, it emerged as the topic where the majority felt the least confident teaching. When examining the knowledge for preparing to teach these research topics, the teachers predominantly relied on their teaching experience or experiences in agriculture, and these areas were deemed the most valuable in shaping their understanding and expertise. These findings are consistent with Wood & Sorenson (2023), who found that agricultural educators in the Northeast also identified their teaching experience as the most common source of knowledge to prepare for their teaching.

The findings of Wood and Sorenson (2023) and this study highlight the need to prioritize genuine, experiential learning opportunities in agriculture and agricultural education for pre-service and in-service teachers. To achieve this, pre-service and in-service entities can provide agricultural experiences coupled with sessions dedicated to developing pedagogical skills. Experience-based learning facilitates a meaningful understanding of content more likely to be retained (Kolb & Kolb, 2009). Subsequently, the time dedicated to pedagogical skill development in the agriculture classroom offers individuals the chance to practice applying the subject matter learned in the experience and translating it to a context suitable for their students. The survey results indicate the significance of agriculture and classroom experiences in the agriculture teachers process of becoming effective, confident educators.

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