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Sowing Success: The Impact of Pedagogical Content Knowledge and Professional Development on the Turnover Intentions of SBAE Teachers

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Abstract

This study aimed to describe school-based agricultural education (SBAE) teachers' perceived Pedagogical Content Knowledge (PCK), individualized professional development needs, and turnover intentions by certification type. Moreover, this study aimed to explain the relationship between these variables and the turnover intentions of SBAE teachers. A series of survey questions were used to describe the sample of SBAE teachers, their PCK, professional development needs, and turnover intentions. Notably, regardless of certification type, participants displayed comparable levels of PCK, and there was a considerable overlap in their preferences for professional development topics. Despite the certification differences, both groups of teachers exhibited moderately low turnover intentions. Furthermore, the statistical analysis addressing the impact of PCK on turnover yielded insignificant results, suggesting that a myriad of factors play a role in influencing the turnover intentions of SBAE teachers.

Introduction and Need for the Study

The landscape of school-based agricultural education (SBAE) is undergoing rapid changes, marked by a significant increase in enrollment (Baker et al., 2013; Retallick & Martin, 2008; Velez et al., 2018). However, this surge in enrollment poses a considerable challenge in recruiting and retaining qualified teachers nationally. According to Eck et al. (2019), the SBAE profession is grappling with various challenges, including the training and recruitment of new SBAE teachers and the retention of current SBAE teachers. To compound this challenge, Cowan et al. (2016) found that fewer than 50% of traditionally certified (TC) pre-service teachers accepted teaching positions immediately after graduation. Adding to the complexity is the escalating issue of teacher turnover, as highlighted by Smith et al. (2022). Their study reported that in 2021, 674 SBAE teachers left the profession, with only 29% attributing their departure to

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retirement. As a result, the education sector is increasingly relying on individuals entering the classroom through alternative certification (AC) programs, as observed by Claflin et al. (2020).

While AC has partially filled the void within the SBAE profession, concerns have arisen regarding the effectiveness of AC teachers and their means of preparation. Critics have pointed to the perceived lack of pedagogical skills among AC teachers, accentuating the numerous challenges these teachers face compared to their TC counterparts (Bowling & Ball, 2018; Hoerst & Whittington, 2009; Porter, 2011; Roberts & Dyer, 2004; Stair et al., 2019; Touchstone, 2015).

As AC gains prominence as a potential solution to addressing teacher shortages, it becomes imperative to identify the differences in pedagogical content knowledge (PCK) between TC and AC teachers. Recognizing that all SBAE teachers enter the classroom with varying pedagogical skills emphasizes the importance of tailored intervention. Targeted intervention, specifically professional development, can positively influence SBAE teachers' behaviors, enhancing their effectiveness in the classroom and contributing to teacher retention and student success. Understanding the connection between professional development, PCK, and teacher turnover becomes paramount for agricultural education programs' continued growth and success as we navigate teacher recruitment and retention challenges.

In response to the challenges the SBAE profession faces, this study focuses on probing the intricate connection between PCK and professional development and their potential impact on teacher turnover. The investigation highlights how tailored professional development, specifically addressing the developmental needs of both TC and AC SBAE teachers, can influence PCK and how this relationship impacts teacher turnover intentions. By emphasizing this relationship, the research sheds light on effective strategies that can enhance the pedagogical skills and overall effectiveness of SBAE teachers and potentially mitigate the challenges associated with teacher turnover.

Theoretical Framework

Teacher turnover within SBAE is a multifaceted challenge influenced by diverse factors. This theoretical framework builds upon key studies by Ingersoll et al. (2014), Blackburn et al. (2017), and Qin (2019), underscoring the pivotal role of human capital theory in grasping the motivations behind turnover among SBAE teachers. The literature emphasizes the substantial impact of teacher preparation programs on the human capital of pre-service SBAE teachers, shaping variables such as efficacy, motivation, and the ability to navigate the complexities of teaching (Ingersoll et al., 2014). Experiences during pre-service coursework and student teaching emerge as pivotal elements influencing the human capital of future SBAE educators. In contrast, in-service SBAE teachers develop their human capital through ongoing professional development and reflective practices, which are crucial for cultivating high-quality teaching skills and adapting to the evolving educational landscape.

Beyond general experiences, specific factors such as student teaching, pre-service coursework, and professional development opportunities significantly enhance self-efficacy among SBAE teachers (McKim & Velez, 2016). PCK is also recognized as a distinct form of human capital. Teachers with strong PCK exhibit high self-efficacy, contributing to their overall effectiveness (Ingersoll et al., 2014). Research consistently demonstrates that higher levels of self-efficacy correlate positively with greater career commitment (Ashton & Webb, 1986; Bandura, 1997; Knobloch & Whittington, 2003; McKim & Velez, 2015). In conclusion, this theoretical framework asserts that human capital development, encompassing teacher preparation programs, ongoing professional development, and the cultivation of PCK, plays a central and interconnected role in mitigating teacher turnover in SBAE.

Review of Literature

In the ever-evolving education profession, the intersection of PCK and professional development is a critical juncture influencing the teaching profession. This literature review delves into the intricate web connecting these two facets, shedding light on their collective impact on teachers' turnover intentions. As educators navigate the profession's challenges, the depth of their subject matter expertise, coupled with ongoing professional development opportunities, becomes pivotal. Understanding the relationship between PCK and professional development offers insight into effective teaching practices and holds the key to comprehending the factors contributing to or mitigating teachers' turnover intentions.

Pedagogical Content Knowledge

Numerous pieces of literature have concluded that PCK is a professional knowledge base held by teachers that is defined as the knowledge of, the rationale behind, the planning for, and the art of teaching subject matter using specific methods for specific students to promote student learning (Carlson et al., 2015). While PCK is a newer topic in education, the theory proposed by Lee Shulman has seen many revisions in recent years. Shulman (1986) originally postulated that teachers possess more than content or pedagogical knowledge. He fused the two knowledge bases, creating the term pedagogical content knowledge, or PCK. Additionally, he identified categories of teacher knowledge essential for teachers to be successful and effective in the classroom: content, pedagogy, curriculum, learners and learning, contexts of schooling, and educational philosophies, goals, and objectives (Shulman, 1986 & 1987).

The foundation of PCK lies in a teacher's ability to convey knowledge to students in a way that guides them to develop a deeper understanding of the content (Morrison & Luttenegger, 2015). Moreover, effective teachers must be able to determine the needs of individual students, plan and evaluate instruction, utilize various teaching methods, appeal to student learning modalities, and demonstrate their knowledge of content, teaching, and the learning process (Rice & Kitchel, 2017). With an influx of novice teachers and retention issues plaguing the SBAE profession, it has become imperative to assess the pedagogical knowledge bases of SBAE teachers to determine where deficits lie in pedagogy and content knowledge, regardless of a teacher's prior experience or path to certification.

The majority of research on this topic has only focused on identifying a need for greater recruitment and retention efforts (e.g., Blackburn et al., 2017; Lawver & Torres, 2011), the current presence of AC teachers in agricultural education (e.g., Bowling & Ball, 2018), and the in-service needs among TC or AC teachers (e.g., Stair et al., 2019; Smalley & Smith, 2017). Due to a lack of research on PCK, specifically in agricultural education, there is a need to rely on close fields such as mathematics and sciences. While these fields indicate deficiencies in the PCK of their teachers, PCK research in agricultural education is needed to elucidate the complexity of the profession, how teaching in the SBAE classroom doesn't compare to other fields, and further establish the importance of developing teachers' professional knowledge (Phelps & Schilling, 2004).

Professional Development

Professional development opportunities empower teachers to refine their pedagogical skills and stay abreast of emerging educational trends and best practices. As the education landscape continues to evolve, teachers, including secondary agricultural educators, must engage in continuous learning to ensure that they are better prepared to meet the diverse needs of their students and tackle current and future complex problems.

However, the role of secondary agricultural educators extends beyond traditional classroom teaching. They are also tasked with facilitating students' Supervised Agricultural Experiences (SAE) and fostering leadership development through organizations like the National FFA Organization (Croom, 2008; Phipps et al., 2008). Therefore, professional development opportunities for these educators must go beyond

content-focused training and include aspects related to experiential learning, leadership development, and community engagement.

Professional development plays a pivotal role in shaping the effectiveness and competence of educators in any field. In the context of agricultural education, it is imperative to tailor professional development efforts to meet the specific needs of teachers at different stages of their careers. As Antoniou and Kyriakides (2013) emphasized, teacher professional development should be closely aligned with the professional needs of teachers and their unique developmental stages.

Despite the growing recognition of the significance of career stage-based professional development, many efforts still need to be made to differentiate activities to suit the needs and experiences of teachers. Easterly and Myers (2019) and Figland et al. (2019) have cautioned against this one-size-fits-all approach to professional development, highlighting that it fails to acknowledge the challenges and requirements that arise as teachers progress through their careers.

To better understand the distinct needs of agricultural educators, it is crucial to recognize the various career stages they navigate. Fessler and Christensen (1992) proposed a non-linear model of teacher career stages consisting of eight phases: (1) pre-service, (2) induction, (3) competency building, (4) enthusiastic and growing, (5) career frustration, (6) career stability, (7) career wind-down, and (8) career exit. Each stage brings its own set of challenges, opportunities, and areas for growth. As teachers advance through these stages, their motivations, aspirations, and concerns undergo significant transformations.

Additionally, the differences in paths to certification can have implications for teachers' professional development needs. TC teachers typically undergo a comprehensive university-based teacher preparation program. This includes coursework in educational theory and methods and student-teaching experiences to apply their knowledge in real classrooms (Hawley et al., 1992). On the other hand, AC teachers may enter the classroom through non-traditional routes, such as occupational competency testing, professional experience, or completion of a baccalaureate degree in a specified content area (Ruhland & Bremer, 2003).

While AC programs offer an opportunity for individuals with substantial content knowledge to enter the teaching profession, they often lack the pedagogical training traditional teacher preparation programs possess (Wayman et al., 2003). Consequently, AC teachers may face unique challenges upon entering the classroom, leading to a lower retention rate when compared to their TC counterparts (Robinson & Edwards, 2012).

It is crucial to understand the professional development needs of SBAE teachers based on their certification type and current career stage to provide appropriate support and improve their effectiveness in the classroom. By identifying the specific needs of SBAE teachers by certification type and career stage, stakeholders can tailor professional development to address these needs, ultimately fostering teacher growth and retention (Darling-Hammond et al., 2017).

Purpose and Objectives

This study aimed to describe the PCK levels (of generalized agricultural topics) of SBAE teachers in the United States and determine their individualized professional development needs based on certification type. Additionally, this study sought to explain the relationship between PCK and turnover intentions of SBAE teachers. This research supports the first value statement outlined by the American Association for Agricultural Education. Specifically, this value statement addresses the need for "instruction to help individuals make informed decisions as AFNR consumers and to prepare them for skilled agricultural work" (AAAE, 2023, p. 6). This research supports this value statement as it intends to advance

public knowledge of various challenges facing SBAE teachers. The following research objectives guided this study:

1. Describe the sample of SBAE teachers by certification type.
2. Describe SBAE teachers' PCK, professional development needs, and turnover intentions by certification type.
3. Explain the relationship between PCK and turnover intentions among SBAE teachers by certification type.

Methodology

Participants

We investigated SBAE teachers nationwide who were actively instructing agricultural education courses during the 2023-2024 academic year. To be eligible, individuals needed official listing as SBAE teachers in their respective states' directories. We constructed a comprehensive participant list by gathering information from each state's agricultural education directory. We categorized SBAE teachers based on NAAE regions using a cluster sampling approach to ensure a fair and representative sample. Subsequently, we employed random sampling to choose states or groups of states within each NAAE region for survey distribution, extending invitations to all teachers within the selected states to encourage participation.

As of 2022, the total number of SBAE teachers in the United States was approximately 14,516 (Foster et al., 2023). Specific distribution figures for each NAAE region were identified in a detailed breakdown. Regarding sample size, I used Cochran's (1977) formula to calculate the target sample size. More specifically, a 95% confidence interval and a ± 5% margin of error required a target sample size of 385 respondents to ensure generalizability to this population. Therefore, I set 385 as the desired sample size for the study.

Once the number of survey recipients for each region was established, states were randomly selected using the NAAE region map, emphasizing proximity to each region's total teacher count. Contact information, including names and email addresses, was sourced from each state's Agriculture Teacher Directory, and efforts were made to survey all SBAE teachers within the selected states. The participant pool included teachers from the following states: Alaska (N = 5), Arizona (N = 112), Colorado (N = 163), Indiana (N = 355), Louisiana (N = 300), Montana (N = 127), Nebraska (N = 248), New Hampshire (N = 25), New Jersey (N = 64), New Mexico (N = 133), South Carolina (N = 163), Tennessee (N = 413), Utah (N = 175), and West Virginia (N = 110).

Data Collection

In October 2023, we administered the survey using the online survey program Qualtrics. This program enabled participants to complete the survey online and facilitated the collecting and downloading of data for analysis. Following principles from Dillman's (2007) Tailored Design Method, we made three contact points with the participants to elicit responses. Participants received their first contact through an email introducing them to the study and inviting them to participate. Approximately seven days after the first email, a follow-up email was sent as a reminder and an opportunity to thank the participants who completed the survey. The third and final email was sent seven additional days or two weeks after the first email, serving as a final reminder and another opportunity to express thanks to participants. We collected a total of 470 usable responses.

Instrumentation

The instrument utilized consisted of four sections. The first section of the instrument consisted of eighteen items, adapted from Tonnessen (2021) and Rice & Kitchel (2015). Each statement was measured on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree." PCK levels were

determined based on six distinct expertise areas, as Hill et al. (2008) outlined. The PCK construct encompassed the following facets: (1) Horizon Content Knowledge, (2) Common Content Knowledge, (3) Specialized Content Knowledge, (4) Knowledge of Content and Teaching, (5) Knowledge of Content and Students, and (6) Knowledge of Content and Curriculum. Each item was aligned to one of the six PCK areas defined by Hill et al. (2008). The six PCK area scores were then combined to create one PCK construct.

The second section of the instrument consisted of one open-ended question asking participants to identify professional development areas they felt were of the greatest need. For each group of teachers, responses were thematically coded into thirteen topics. The third section of the instrument consisted of twenty items adapted from Sorensen (2015). In their study, Sorensen (2015) assessed SBAE teachers' work and family domain characteristics, work-family conflict, and turnover intentions. Overall, I used most of the same questions on turnover intentions when developing the instrument for this research. Slight changes occurred to fit the instrument to the study parameter. These items comprised the turnover intentions construct and were measured on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree."

The final section consisted of questions about teacher demographics. The demographic section of the instrument elicited both personal and programmatic information and was developed by the researchers. The survey instrument was reviewed for content and face validity by a panel of faculty and graduate student experts familiar with research design, SBAE, and the topic areas. We conducted a pilot test with SBAE teachers in Delaware, Maryland, and Virginia to ensure reliability and validity. The PCK ($\alpha = .92$) and turnover intention constructs ($\alpha = .93$) exceeded the alpha of .70 recommended by Nunnally & Bernstein (1994); therefore, we proceeded with administering the instrument.

Data Analysis

The study categorized SBAE teachers into two groups: traditionally certified (via a four-year education program) and alternatively certified (e.g., obtained licensure through alternative routes, those who hadn't fulfilled the licensure requirements, or those who self-identified as having gained licensure through a different method). Descriptive statistics were used to describe the sample of SBAE teachers, including demographic information and their path to certification.

Moving to the second objective, descriptive statistics (means and standard deviations) were utilized to depict PCK levels, professional development needs, and turnover intentions among SBAE teachers. Next, an independent sample T-test was completed, comparing the PCK levels and turnover intentions of SBAE teachers by certification type.

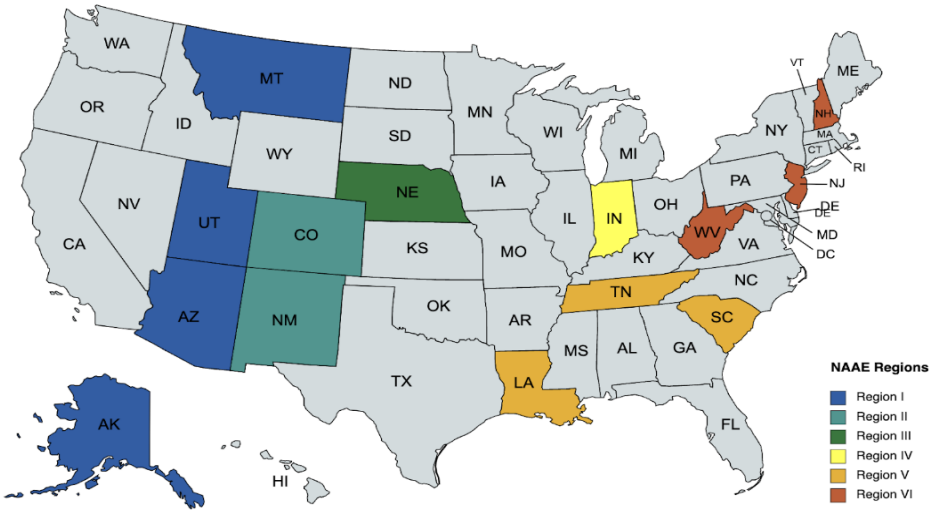
Finally, the third objective utilized an Ordinary Least Squares (OLS) regression analysis to explore the relationships between PCK and turnover intentions. The model identified turnover intentions as the dependent variable and PCK as the independent variable.

Results

Four hundred seventy individuals participated in this study, representing fourteen states (Figure 1).

Figure 1

Surveyed States by NAAE Region



Research Objective One:

Among the educators surveyed, 67.2% (n = 316) identified themselves as TC teachers, with 57.6% female and 42.4% male. TC teachers' ages ranged from 22 to 70 years (M = 38.46, SD = 12.65), and their teaching experience varied from 1 to 48 years (M = 15.01, SD = 10.71). The TC cohort represented fourteen states, with Nebraska, Indiana, Utah, and South Carolina having the highest participation rates across the surveyed educators. Regarding NAAE regions, 25.3% of TC teachers were from Region I (n = 80), 16.1% from Region II (n = 51), 18.0% from Region III (n = 57), 11.4% from Region IV (n = 36), 21.0% from Region V (n = 66), and the remaining 8.2% from Region VI (n = 26).

As for AC teachers, 32.8% (n = 154) identified as such, with 56.5% female, 42.8% male, and the remaining 0.7% identifying as non-binary. The age range for AC educators ranged from 23 to 65 years (M = 42.09, SD = 10.41), and their teaching experience spanned from 1 to 28 years (M = 10.10, SD = 7.55). The AC cohort represented fourteen states, with Tennessee, Colorado, and Utah having the highest participation rates. When examining NAAE regions, 22.7% of AC teachers were from Region I (n = 35), 23.4% from Region II (n = 36), 7.8% from Region III (n = 12), 8.45% from Region IV (n = 13), 29.2% from Region V (n = 45), and the remaining 8.45% from Region VI (n = 13). Table 1 shows the number of TC and AC teachers by state.

Table 1

Surveyed States by Certification Type

State	TC		AC	
	f	%	*f*	%
Alaska	3	0.9	3	2.0
Arizona	19	6.0	9	5.8
Colorado	29	9.2	22	14.3

Indiana	36	11.4	13	8.4
Louisiana	16	5.1	14	9.1
Montana	27	8.5	8	5.2
Nebraska	57	18.0	12	7.8
New Hampshire	4	1.3	4	2.6
New Jersey	7	2.2	5	3.3
New Mexico	22	7.0	14	9.1
South Carolina	31	9.8	9	5.8
Tennessee	19	6.0	22	14.3
Utah	31	9.8	15	9.7
West Virginia	15	4.8	4	2.6

Note: Traditionally Certified (n = 316), Alternatively Certified (n = 154)

Research Objective Two:

The second research objective aimed to describe the PCK levels, professional development needs, and turnover intentions of SBAE teachers based on their certification type. To achieve this, first, participants responded to a series of statements corresponding to six PCK areas. Analysis of participant responses revealed that TC and AC teachers rated their PCK levels similarly. To consolidate the findings, we amalgamated the six PCK areas into a single PCK variable, as presented in Table 2. The PCK construct variable substantiates the previously mentioned results, indicating relatively close mean values. Furthermore, the constructed variable exhibited a p-value of .339 and a medium to large effect size from Cohen's d post hoc analysis (d = 0.58).

Table 2

PCK of SBAE Teachers by Certification Type

	TC		AC				
Construct Variable	*M*	*SD*	*M*	*SD*	*t*	*p*-value	Cohen's *d*
Pedagogical Content Knowledge	4.16	0.61	4.21	0.53	-.959	.339	0.58

Note: For observed means, 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree * $p < 0.05$

Moreover, we aimed to describe the professional development needs of both TC and AC teachers. TC teachers' primary professional development needs centered around Content-Specific Topics, FFA, Technology, Curriculum Development, and Time Management/Work-Life Balance. In contrast, AC teachers identified Curriculum Development, Content-Specific Topics, Technology, Classroom Management/Student Engagement, and FFA as their foremost areas of need. While both teacher groups expressed a need for professional development in similar areas, TC teachers gave greater priority to Content-Specific Topics, FFA, and Time Management/Work-Life Balance. Conversely, AC teachers

emphasized Curriculum Development and Classroom Management/Student Engagement as their key focus areas, as outlined in Table 3.

Table 3

Professional Development Needs of TC and AC SBAE Teachers

	TC			AC		
Professional Development Area	*Rank*	*f*	%	*Rank*	*f*	%
Content-Specific Topics Ex. Ag Mechanics, Greenhouse Management, Aquaponics, etc.	1	71	21.7	2	18	17.1
FFA Ex. Degrees, CDEs, etc.	2	45	13.7	5	10	9.5
Technology Ex. Integrating technology in the classroom, virtual teaching	3	40	12.2	3	16	15.2
Curriculum Development	4	36	11.0	1	20	19.0
Time Management/Work-Life Balance	5	35	10.7	6	9	8.6
SAE & AET Ex. Navigating the AET website, managing student SAEs, etc.	6	32	9.8	7	7	6.7
Classroom Management/Student Engagement	7	29	8.8	4	13	12.4
Instructional Strategies	8	18	5.5	8	4	3.8
Retirement	9	8	2.4	12	0	0
Funding Ex. Writing grants, Permissible use of federal grants, etc.	10	5	1.5	10	2	1.9
Administration Ex. Teaching administration about the SBAE program, etc.	11	4	1.2	11	1	1.0
Supporting Students Ex. Special Education, Social-Emotional Learning, etc.	12	3	0.9	9	3	2.9
Work-Based/Project-Based Learning	13	2	0.6	10	2	1.9

Lastly, we sought to describe the turnover intentions of SBAE teachers based on their certification type. According to the results presented in Table 4, both TC and AC teachers expressed moderately low

turnover intentions, with AC teachers (M = 2.91, SD = 0.37) having a slightly higher turnover intention than TC teachers (M = 2.89, $SD.$= 0.38). An examination of how TC and AC teachers assessed each statement within the turnover intentions construct revealed similar ratings for most items. The constructed variable exhibited a p-value of .642 and a small to medium effect size from Cohen's d post hoc analysis (d = 0.38).

Table 4

Turnover Intentions of SBAE Teachers by Certification Type

	TC		AC				
Construct Variable	*M*	*SD*	*M*	*SD*	*t*	*p*-value	Cohen's *d*
Pedagogical Content Knowledge	2.89	0.38	2.91	0.37	-.465	.642	0.38

Note: For observed means, 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree * $p < 0.05$

Research Objective Three:

For the third research objective, we sought to explain the relationship between PCK and turnover intentions among SBAE teachers, categorized by certification type, through a regression analysis. The analysis shows that PCK does not seem to have a meaningful impact on the turnover intentions of TC teachers. This is evidenced by a low R-squared value of 0.001, a non-significant p-value of 0.574, and a beta coefficient of 0.035. The corresponding t-value of 0.562 further suggests that the PCK's influence is not statistically significant among this group. In contrast, AC teachers show a marked difference. With an R-squared value of 0.073, the model suggests that PCK accounts for approximately 7.3% of the variance in turnover intentions. The beta coefficient of 0.269 is significant, evidenced by a t-value of 3.34 and a highly significant p-value of 0.001. This indicates that PCK significantly predicts turnover intentions for AC SBAE teachers. This data suggests that AC teachers may exhibit a stronger relationship between their PCK and their inclination to stay in or leave their teaching roles, highlighting the importance of PCK in their retention (Table 5).

Table 5

Influence of PCK on the Turnover Intentions of SBAE Teachers by Certification Type

Certification Type	R^2	*S.E.*	*F*	β	*t*	*p*
Traditionally Certified	.001	.387	.316	.035	.562	.574
Alternatively Certified	.073	.368	11.18	.269	3.34	.001

Conclusions and Recommendations

Our investigation examining the PCK of SBAE teachers by certification type revealed no statistically significant difference between TC and AC teachers. Although notable, the similarity in PCK means, and the medium effect size lacks statistical significance, suggesting a degree of similarity in the PCK of SBAE teachers, irrespective of certification type. These findings refute the previous literature suggesting that AC teachers are less prepared than their TC counterparts and that AC preparation programs are deficient and less rigorous (Darling-Hammond et al., 2005; Watts, 1986). The findings of this research indicate that TC and AC teachers collectively possess similar PCK levels. Future research should explore

the six PCK areas (Common Content Knowledge, Specialized Content Knowledge, Horizon Content Knowledge, Knowledge of Content and Students, Knowledge of Content and Teaching, and Knowledge of Content and Curriculum) to see how TC and AC teachers compare.

The PCK findings mentioned above coincide with the self-reported professional development needs of both groups of teachers. Specifically, both teacher cohorts stated they would likely benefit from similar professional development topics. While TC teachers placed greater emphasis on professional development related to FFA and AC teachers emphasized a greater need for professional development on curriculum development and classroom management/engagement, both groups of teachers collectively agreed that professional development on content-specific topics, technology, FFA, and curriculum development were top priorities. While other professional development areas were noted as possible areas for SBAE teacher development, the remaining factors had less than ten percent of the respondents indicating each topic as a potential need area. These findings support prior literature citing a need for professional development in content, curriculum development, teaching methods, student engagement, and FFA (Stair et al., 2019). Additionally, our findings are contrary to the previous work of Rocca and Washburn (2006), which suggested that AC teachers had more content expertise than TC teachers. Our findings indicate that TC and AC teachers are in great need of content-specific professional development, identifying this professional development area as a top need area.

Our investigation into the turnover intentions of SBAE teachers by certification type revealed closely aligned means, a non-significant *t*-value, and a small to medium Cohen's *d* effect size ($d = 0.38$). The moderately low turnover intention matches the findings of Sorensen et al. (2016) and Claflin et al. (2020), with no statistical difference between TC and AC teachers. This suggests that factors beyond certification type play a more influential role in understanding and mitigating turnover intentions among SBAE teachers.

Lastly, our third objective examined the influence of PCK on the turnover intentions of SBAE teachers by certification type. The findings from the analysis revealed a weak and statistically insignificant relationship, further emphasizing the complexity of factors that can contribute to the turnover intentions of SBAE teachers. Specifically, PCK only accounted for a 1% and 7% variance in turnover intentions among TC and AC teachers. Therefore, future research should explore other areas of human capital besides PCK, such as mentoring, to see how mentoring can influence teachers' turnover intentions. Additionally, future research should examine the various teacher career stages to see how teachers' turnover intentions vary by career stage and certification type. Finally, the researchers also recommend exploring other areas of capital (e.g., social, psychological, and structural) individually and collectively to determine their influence on the turnover intentions of SBAE teachers.

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