

Early Career Agricultural Education Instructor Expectations for Professional Development Yields

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Abstract

A wealth of professional development programming exists for agricultural educators, but which experiences provide knowledge, skills, and tools most sought by early career agricultural educators? The purpose of this study was to isolate specific desired professional development outcomes for early career agricultural educators, as well as differences in specific expectations related to CASE certification. This study was guided by Mezirow's transformative learning theory, which frames learning in adulthood as a transformative, rather than functional, process. The target population was agricultural educators between zero and five years of experience from Iowa, Minnesota, Missouri, and Nebraska. A sample of 125 early career teachers completed a survey; descriptive statistics were applied to demographics and professional development expectations. The most desired outcomes included classroom procedures and ideas, practical advice and suggestions from both facilitators and co-participants and hands-on practice from the student's perspective. CASE-certified teachers expressed more interest in gaining practical advice and suggestions from both the facilitator and other participants. Non-CASE-certified teachers had more interest in ideas for interest approach strategies, exit ideas, energizer activity ideas, laboratory strategy ideas, equipment storage, and organization suggestions. These findings pose questions about the prioritization of academic integration as well as how experiences such as CASE professional development change expectations for professional development experiences.

Introduction

Throughout the past two decades, researchers have suggested that somewhere between 17% to 50% of all new teachers may leave the classroom before or at the end of their fifth year of teaching (Gray et al., 2015; Kaiser, 2011; Darling-Hammond & Sykes, 2003; NCTAF, 2003; Solomonson et al., 2021). On an individual state level, teacher attrition has resulted in the U.S. Department of Education documenting 25 states as a high need for agricultural educators beginning in 1992 and progressing in the years following (Cross, 2017; United States Department of Education, 2024). Teacher salary, time management, self-efficacy, management of multiple different courses and content areas to teach, work-life balance, and student motivation are just some of the specific factors that have been determined to have a direct

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correlation to early career agricultural teacher attrition (Boone & Boone, 2009; Hainline & Smalley, 2023; Rada, 2023; Solomonson et al., 2019; Touchstone, 2015; Traini et al., 2021). When considering all these factors, many young teachers report feeling ineffective and overwhelmed by teaching responsibilities (Bennett et al., 2002; Johnson & Birkeland, 2003). Teacher self-adequacy is not a new phenomenon; both Fritz & Miller (2003) and Fuller (1969) reported that new teachers feel concern for self-adequacy, themselves as teachers, and how they fit into the school environment. Self-adequacy refers to a person's perceived ability to perform a specific function to a certain standard (Merriam-Webster, n.d.). Teachers who feel as though they are below the adequate teaching standard may struggle with self-efficacy; the ability to assess personal capability to organize and complete specific actions (Bandura, 1994; Bandura, 1997). In teaching, self-efficacy refers to a teacher's level of confidence in their ability to guide their students' learning (Leader in Me, n.d.). Teachers who have high self-efficacy experience more success as classroom teachers (McKim et al., 2017). Therefore, the ideas of self-efficacy and self-adequacy go together.

New teachers commonly struggle with self-efficacy and self-adequacy during their first year due to inexperience (Knobloch & Whittington, 2003). Per Bandura's (1994) research, mastery experiences, physiological and emotional engagement, vicarious experiences, and social persuasion are four sources of information that can affect a teacher's sense of self-efficacy.

To develop self-efficacy in the classroom, professional development may be the answer. Effective professional development allows teachers to experience mastery which can increase teacher self-efficacy (Fleetwood & Langston, 2022). The goal of professional development is to provide essential knowledge, skills, and technical information required for effective performance by teachers in a dynamic classroom environment (Barrick et al., 1983; Birkenholz & Harbstreit, 1987; Nesbitt & Mundt, 1993; Washburn et al., 2001; Saucier et al., 2010). Glasgow (1997) reported that the pedagogical success of implementing various methodologies within a classroom depends on the agricultural education teacher being prepared to facilitate them through planning and designing the student experience, properly executing the class experience, and assessing and evaluating the outcomes. Therefore, professional development experiences should provide opportunities for educators to improve teaching skills to aid in student learning (Shoulders & Myers, 2011).

The purpose of this study was to identify what distinctions exist for professional development expectations of early career teachers according to differences in years of experience and whether they had earned one or more CASE certifications. Within the CASE model, agricultural educators can attend a CASE Institute of their choosing to gain access to quality professional development modeled by peers, along with access to a regularly reviewed and updated curriculum for the course training they completed (Curriculum for Agricultural Science Education, 2024). A CASE Institute is an extensive professional development experience that provides agricultural education teachers with several opportunities for investigation and mastery (Curriculum for Agricultural Science Education, 2024). However, little research has been conducted to determine the effects of CASE Institute professional development on early-career agriculture teachers. This study was developed to fill this disparity as well as consider how CASE certification and specific years of experience influence differences in expectations. As a result of this research, the goal is to discover the tools, skills, or knowledge that early career teachers expect to gain from professional development experiences, including CASE Institutes, so that these opportunities can be more intentionally and effectively designed and delivered to meet the needs of early career teachers—helping sustain them in the classroom well beyond five years.

Literature Review

Historical Perspective of Agricultural Education Curriculum

The dynamic nature of the agriculture industry, the variety of classes taught, and the rigor of the agricultural education curriculum have been cited as a teaching barrier for teachers, both old and new

(Smalley et al., 2023-a; Solomonson et al., 2018; Stripling & Ricketts, 2016). In many parts of the United States, there has been a shift in the focus of the agricultural education curriculum. As early as 1915, school-based agricultural education programs were designed to prepare students for careers in production agriculture (Leake, 1915). Over time, this focus shifted to a more consumer- or off-the-farm-oriented curriculum, with courses such as agribusiness, food science, and companion animal science (Washburn & Dyer, 2006). With this shift in curricular focus, educators must continue to rise to the challenge of developing a rigorous, career-oriented curriculum that prepares students for today's agricultural careers and employment in a much faster-paced setting, all while maintaining a positive learning classroom environment (Layfield & Dobbins, 2002). The fast-paced transformations facing agricultural education necessitate professional development opportunities to meet the changing demands (Washburn & Dyer, 2006).

Understanding the Professional Development Needs of Early Career Teachers

Developing successful teaching professionals requires accurately identifying professional development needs that are in demand (Layfield & Dobbins, 2002). Early career teachers, who we will classify as teachers with 5 or fewer years of classroom experience (McKim & Velez, 2015), express several concerns which include discipline, motivation, accommodation of students, assessment of student work, relationships with parents, insufficient supplies, addressing individual student problems, insufficient time, and effective teaching methods (Stair et al, 2012). Park et al. (2007) found that agricultural science educators found personalized professional development, tailored to their own needs, most meaningful. Garet et al. (2001) learned that the highest increase in student achievement resulted from content-focused, classroom-applied, and hands-on learning during professional development experiences. Garton and Chung (1996) recommended that professional development “should focus on enhancing instruction, program development and evaluation, and program administration” (p. 58). Joerger (2002) proposed that in-service leaders assess the educational needs of these young teachers, collect substantial background information for each, and then “design in-service education activities and topics that reflect the priority rankings identified from the analyses of the in-service education needs assessment for each cohort” (p. 22).

Outside of attending CASE Institutes, there are a variety of professional development experiences that are available to agricultural education teachers. Research by Smalley et al. (2019) found that primary sources of professional development can include workshops hosted by state or national agricultural education teacher associations, in-service workshops hosted by individual school districts, workshops hosted by universities or land grant institutions, professional organization workshops, and graduate coursework. Of these, state and national teacher association professional development was cited as the most frequented form of professional development engagement, with 68.03% of respondents reporting this as a form of professional development in which they have participated (Smalley et al., 2018).

The Curriculum for Agricultural Science Education (CASE) Project

In 2000, the National Council for Agricultural Education established initiatives for improving agricultural education program quality. One initiative called for transformative professional development; another called for a sequence of courses to enhance the delivery model of agricultural education (NCAE, 2000). As a result of this need, the Curriculum for Agricultural Science Education (CASE) project was developed in 2007 to fulfill these initiatives. According to the CASE mission statement, their primary goal is, “to impact student career readiness by empowering teachers with improved instructional practices and relevant curricula sustained by professional development” (Curriculum for Agricultural Science Education, 2024). Attending a CASE Institute helps agricultural educators “connect education and industry through purposeful curricula and transformative professional development” (Curriculum for Agricultural Science Education, 2024). CASE institutes are facilitated by lead and master teachers modeling laboratory, math, and science integration strategies while providing practical suggestions and facilitation ideas for classroom delivery. This is accomplished through engagement in peer teaching and establishing a cohort and network

of other teachers attending the CASE Institute, or those who have been trained previously (Curriculum for Agricultural Science Education, 2024).

Since its development in 2007, the first CASE Institute was made available to school-based agricultural education teachers in 2009 (Curriculum for Agricultural Science Education, 2024). This opened a variety of opportunities for teachers to take advantage of professional development and curriculum to engage learners in technical agriculture topics while supporting instruction in perceived areas of need such as math and science (Bird & Rice, 2021; Curriculum for Agricultural Science Education, 2024; McKim & Velez, 2017). CASE courses were originally developed to be year-long courses, and it was only made available to any in-service agricultural educator. Since this time, CASE has evolved to have offerings to pre-service teachers through the CASE Fast Track option, providing pre-service agricultural educators with the opportunity to become CASE certified as part of their teacher preparation before they even earn their teaching license (Curriculum for Agricultural Science Education, 2024). Additionally, based on feedback received from participants and perceived areas of need, beginning in 2020, CASE began offering curricula in shorter formats, known as BriefCASE certifications which are only semester-long courses. CASE currently offers 14 course options for educators, ranging from the CASE Animal Science Institute through Plant Science, meeting needs for each of the eight nationally recognized agricultural, food, and natural resource science education pathways (Ortiz, 2023). Of the 14 courses, 10 of them are CASE Institutes, which are longer professional development experiences, generally 5-8 days of training for a year-long curriculum, and four of them are BriefCASE curriculums, generally 1-2 days of training for a semester-long curriculum (Curriculum for Agricultural Science Education, 2024). As a result of the COVID-19 pandemic, CASE also adapted and began offering professional development virtually and has continued to offer this as an option, including remote and hybrid professional development options, to allow for flexibility and reduced costs in terms of travel and lodging expenses for both teachers seeking certification and lead teachers (Curriculum for Agricultural Science Education, 2014; Smalley et al., 2023-b). One unique feature of the CASE curriculum is that since an educator is required to engage in professional development training to receive access to the curriculum, once a teacher is licensed in a specific CASE course, the curriculum and certification remain theirs regardless of the transfer positions or school districts (Curriculum for Agricultural Science Education, 2024).

Before the development of the CASE curriculum, teacher preparation and state agricultural education supervisory staff played primary roles in professional development planning (Barrick et al., 1983), with little input from in-service educators (Washburn et al., 2001). When educator input is solicited, three methods are typically used: research (Layfield & Dobbins, 2000; Washburn et al., 2001), personal experience (Barrick et al., 1983; Saucier et al., 2010), and informal inquiry with current agricultural educators (Barrick et al., 1983; Roberts & Dyer, 2004). However, CASE is unique in that it provides many opportunities for in-service educators and stakeholders to engage in the curriculum process in planning, piloting, revising, and delivering the curriculum. Teachers who attend any CASE Institute training are trained by fellow peers within agricultural education who teach the CASE curriculum, which provides them with meaningful and practical insight relating to how they implement the CASE curriculum or other concepts within their programs; the training reaches far beyond simply getting access to a curriculum (Tummons et al., 2020). Additionally, this type of model also provides the CASE lead teachers with additional professional development opportunities as they can refine their teaching skills and field questions from their peers through facilitating engaging professional development and modeling inquiry-based teaching skills.

Lambert et al. (2014) reported that several experienced teacher participants stated that CASE would have been extremely beneficial during their first few years of teaching as it allows teachers to refocus creative and curriculum development energies into different activities. Participation in a CASE Institute significantly impacts science teaching efficacy and integration of inquiry-based learning experiences for students (Smalley & Hainline, 2024; Ulmer et al., 2013). Likewise, research has indicated early career

teachers struggle with both math and science teaching efficacy (McKim & Velez, 2017), and agricultural educators perceive the greatest professional development needs in the areas of teaching in a laboratory environment and managing instructional facilities (Figland et al., 2019). Additionally, teachers who participate in focused professional development "...are more confident to teach science," (Wilson & Curry, 2011, p. 141). Within the lens of this research, confidence in teaching material is critical because a lack of confidence in teaching the agricultural education curriculum has been cited as a top reason for agricultural educators leaving the profession altogether (Solomonson et al., 2018). Witt et al. (2014) also studied delivery in CASE and non-CASE classrooms and found that "the use of the CASE curriculum had a significant positive impact on student academic engagement" (p. 26).

Currently, incomplete literature exists that investigates early career agricultural teacher expectancies for professional development experiences, and the skills and tools desired by those teachers. As early-career teacher attrition is an ongoing concern (Boone & Boone, 2009; Solomonson et al., 2018), it is imperative to investigate the opportunities that can develop and support early-career teachers. Effective professional development provides an opportunity to support these teachers as it often increases self-efficacy (Fleetwood & Langston, 2022), a known factor related to early career attrition (Boone & Boone, 2009; Rada, 2023). Despite the abundance of professional development experiences available to teachers within all stages of the agricultural education profession, of which has proven to be effective in retaining teachers (Solomonson et al., 2018), attrition and burnout is markedly high among early career teachers (Boone & Boone, 2009). By focusing our research efforts on this specific group of teachers and examining the perspectives of the nationally recognized CASE Institutes specifically, we can better understand the features of this professional development model to enhance professional development experiences inside and outside of CASE to better support and retain early career teachers and beyond.

Theoretical Framework

This study was guided by Mezirow's transformative learning theory (2000), which frames learning in adulthood as a transformative, rather than functional, process. Transformative learning used in teacher professional development builds competence and confidence increasing teacher self-efficacy and professional growth (Fleetwood & Langston, 2022). Teacher professional development must engage the practical knowledge gained from their experiences of teachers as learners (Knowles, 1980; Trotter, 2006). In a functional professional development model, teacher development strengthens and clarifies existing mental models, and teacher improvement occurs through perfecting existing practice (Beavers, 2009). In contrast to functional models, transformative learning in adults takes place when teachers are challenged to think about their prior knowledge to stimulate change in learned habits to act differently. In transformative learning, professional development facilitators lead teachers to critically examine their practice and reflect on the new knowledge gained from the professional development experience (Wright et al., 2019). Following this time of reflection, teachers acquire new or alternative ways of understanding what they do (Cranton, 1996; Mezirow, 1991 via Foster et al., 2014; Wright et al., 2019). This study will provide an opportunity for us to understand the transformative nature of CASE and how institute participation affects early career teacher preferences for professional development formats.

Purpose and Objectives

The purpose of this study was to identify what distinctions exist for professional development expectations of early career teachers according to differences in years of experience and CASE certification. Data collected from this project may improve professional development planning for early career teachers related to knowledge, skills, and tools early career teachers hope to gain through professional development experiences. Specific objectives included:

1. Describe what early career teachers hope to receive from professional development
2. Compare the valued non-content portions of prior CASE Institutes to the expected professional development outcomes of CASE-certified early career teachers

- Determine to what extent early career teachers differ in what they hope to receive from professional development based on years of experience and CASE certification

Limited research has focused on the professional development preferences of early career teachers. The results of this study may influence professional development planning for early career teachers according to concerns and needs. While the main population of interest was agricultural educators in the Midwest, the findings can be used to conclude the impact of CASE curriculum across the nation as it is a curriculum that teachers from all 50 states have the opportunity to implement within their programs (Curriculum for Agricultural Science Education, 2024).

Methods and Procedures

Population and Participants

The target population for our study consisted of early-career agricultural education teachers in the Midwestern United States. We chose a population of early career agricultural education teachers from Iowa ($n = 90$), Minnesota ($n = 78$), Missouri ($n = 183$), and Nebraska ($n = 86$). These states were chosen because they comprise a substantial population of early-career CASE-certified agricultural education instructors. To be a part of the sample population, the participants must have been serving as agricultural education teachers in those states and have completed their first through fifth years of teaching. Due to the selected survey method for our study, the participants also needed an email address to participate.

Within the sample, 32 teachers (26%) reported 1 year of teaching experience, 25 teachers (20%) had two years of experience, 28 teachers (22%) had three years' experience, 17 teachers (14%) reported four years of experience, and 23 teachers (18%) were in their fifth year of teaching. Eighty-seven participants (70%) of the sample identified as female, and 38 (30%) identified as male. Among the sample, 41 females and 10 males reported holding at least one CASE certification (41.8%), whereas 43 females and 28 males reported they had not earned a CASE certification (58.2%).

Among the early career teachers in the study, 41 taught in Iowa (33%), 32 in Missouri (26%), 28 in Minnesota (22%), and 24 in Nebraska (19%). State personnel shared data with us before the distribution survey, which indicated that about 38% of all school-based agricultural educators (SBAE) in these four states are classified as early career teachers. The population of early career SBAE instructors in Nebraska is about 51%, Iowa 38%, Missouri 37%, and Minnesota 31% (see Table 1).

Table 1

Demographics of Early Career Teachers

State	<i>n</i> (#)	Total Early Career Teachers (#)	Total SBAE Instructors (#)	Early Career Teacher Portion of State SBAE Population (%)
Iowa	41	90	236	38.1%
Minnesota	28	78	254	30.7%
Missouri	32	183	490	37.3%
Nebraska	24	86	170	50.6%
Total	125	437	1,150	38.0%

Instrumentation

The instrument consisted of a questionnaire that was designed in Qualtrics. The instrument consisted of closed-ended questions to describe the demographics and the participants' professional development expectations. Both non-CASE and CASE-certified instructors were asked to select their top three expectations for professional development from a list of potential professional development expectations. CASE-certified instructors were also asked to reflect on the three most valuable non-content components of CASE professional development. A total of 125 early career teachers responded to the survey, for a 29% response rate. To handle non-respondents, we compared early and late respondents (Ary et al., 2014; Linder et al., 2001). Respondents were divided into two groups: the early-responding group and the late-responding group. An independent *t*-test was utilized to compare the early career teachers, and the results indicated an absence of nonresponse bias within the sample, denoting the respondents as unbiased (Ary et al., 2014; Linder et al., 2001).

A pilot test study was conducted with preservice teachers not included in the population before the commencement of the study to establish the reliability and validity of the instrument. According to Creswell & Creswell (2018), pilot testing is essential to ensure content validity and maintain internal consistency across items within any instrument, while also providing the researchers an opportunity to evaluate the formatting and accessibility of the instrument. Reliability coefficients were utilized to measure the reliability of the survey instrument with the Cronbach alpha scores ranging from .75 to .84. According to Ary et al. (2010), the reliability coefficients meet the threshold, and the results suggest the instrument is reliable.

Professional development expectation options included examples of features or experiences that could be found in both CASE and non-CASE venues. The featured professional development expectations that were utilized as part of instrumentation included: classroom procedures and expectations, equipment storage and organization suggestions, facilitation activity ideas (interest approaches, exit tickets, and energizers), facilitation ideas from a practicing teacher's perspective, hands-on practice from the student perspective, laboratory strategy ideas, math integration strategy ideas, practical advice and suggestions from facilitators and other participants, purchasing advice or tips, and reading strategy ideas. To establish consistency, all participants were given the same list of potential professional development expectations. These specific expectation options were chosen because they are typically implemented, discussed, or otherwise modeled during a typical CASE professional development experience. The demographic information sought to further describe the population, so we could determine the effects of CASE and non-CASE professional development on the participants.

Data Collection

The survey was administered in the fall, following the onset of the academic year. To collect the data needed for our study, we emailed a link to the survey questionnaire to agricultural education leaders in each state, and the state leaders distributed the link to all early career teachers in their state. Dillman's Tailored Design Method for Internet Surveys (Dillman et al., 2014) with reminders was used to remind state leaders to encourage early career teachers within their state to complete the questionnaire in a timely manner. Before beginning the survey, the participants were asked to read and acknowledge a one-page informed consent form. Following the informed consent form, participants were asked to share their demographic information. Then, the teachers were asked to identify their CASE certification status and select the top three characteristics they hoped to receive from their professional development experiences from the provided list. CASE-certified teachers were also asked to select the three most valuable non-content portions of CASE Institute professional development from a list.

Data Analysis

Data collected from the survey were quantitative, utilizing an *ex post facto* design. The SPSS statistical software was used to analyze the data collected. For objectives one and two, we calculated

frequencies and percentages. For objective three, we utilized a Chi-square analysis to calculate goodness of fit for frequency of response and years of experience, for both CASE and non-CASE certified teachers. The level of significance was set *a priori* at $\alpha = 0.05$. The instrument was examined for validity and reliability by an expert panel, resulting in minor changes. A panel of experts, including four agricultural education faculty members and two graduate students determined the instrument's face and content validity. Additionally, two other teacher educators were expert reviewers to enhance the clarity and validity of the questionnaire.

Results and Findings

For the first objective, we sought to describe what early career teachers hoped to receive from their professional development experience. Teachers responding to the survey were asked to select the three outcomes they most desired to receive during professional development. Over two-thirds ($n = 86$) of all early career teachers surveyed hoped to receive classroom procedures and ideas from their professional development. Other top desired professional development outcomes included practical advice and suggestions from both the facilitator and other participants ($n = 68$), hands-on practice from the student's perspective ($n = 66$), and facilitation ideas from a practicing teacher's perspective ($n = 61$). Less than 20% of all early career teachers surveyed indicated they hoped to receive equipment storage and organization suggestions ($n = 23$), reading strategy ideas ($n = 14$), purchasing advice or tips ($n = 12$), and math integration strategy ideas ($n = 11$) (see Table 2). While overall rankings are only slightly different, a higher percentage of CASE-certified teachers (61%) value practical advice and suggestions from both the facilitator and other participants compared to non-CASE certified teachers (50%). On the other hand, higher percentages of non-CASE certified teachers value interest approach, exit, and energizer activity ideas for lesson planning, laboratory strategy ideas, and equipment storage and organization suggestions compared to CASE-certified teachers (see Table 2).

Table 2

Frequency of Professional Development Outcomes Early Career Agriculture Teachers Hope to Receive from Professional Development Experiences (n = 125)

Characteristic	CASE-certified ^a f(%)	Non-certified ^b f(%)	Total ^c f(%)
Reading strategy ideas	6 (11.8%)	8 (10.8%)	14 (11.2%)
Purchasing advice or tips	7 (13.7%)	5 (6.8%)	12 (9.6%)
Math integration strategy ideas	4 (7.8%)	7 (9.5%)	11 (8.8%)

Notes. ^a $n = 51$; ^b $n = 74$; ^c $n = 125$

Objective two sought to compare CASE-certified teachers' value of non-content portions of prior CASE Institutes and their expected outcomes for professional development. CASE-certified teachers were asked to select the three most valuable non-content portions of CASE Institute professional development. The highest valued non-content portion of CASE Institute was hands-on practice from the student's perspective ($n = 44$), followed by practical advice and suggestions from the facilitator and other participants ($n = 29$) and facilitation ideas from a practicing teacher's perspective ($n = 27$) (see Table 3). Contrasted with expectations for professional development, CASE-certified teachers found more value in hands-on practice from the student perspective (86%) than they expect to receive in future professional development (see Table 3). The values placed on reading strategy ideas and purchasing advice and tips are also higher than the expected outcome of professional development for these two categories (see Table 3). On the other hand, the frequency of expected outcomes regarding classroom procedures and ideas was greater than the

frequency of value from a prior CASE professional development training regarding classroom procedures and ideas (see Table 3). While 18% of the CASE-certified teachers placed laboratory strategy ideas in their top three, 28% of them now hope to receive laboratory strategy ideas during professional development (see Table 3).

Table 3

Frequency of Values from Non-Content Portions of Institutes by CASE-certified Teachers Compared to Outcomes CASE-certified Teachers Hope to Receive from Professional Development Experience (n = 51)

Characteristic	Valued Non-Content Portions of Prior CASE Institute <i>f</i> (%)	Expected Outcomes for Professional Development <i>f</i> (%)
Classroom procedures and ideas	21 (41.2%)	35 (68.6%)
Practical advice and suggestions from facilitator and other participants	29 (56.9%)	31 (60.8%)
Hands-on practice from the student's perspective	44 (86.3%)	26 (51.0%)
Facilitation ideas from a practicing teacher's perspective	27 (52.9%)	26 (51.0%)
Interest approach, exit, and energizer activity ideas for lesson planning	14 (27.5%)	15 (29.4%)
Laboratory strategy ideas	9 (17.6%)	14 (27.5%)
Purchasing advice or tips	12 (23.5%)	7 (13.7%)
Reading strategy ideas	12 (23.5%)	6 (11.8%)
Equipment storage and organization suggestions	5 (9.8%)	5 (9.8%)
Math integration strategy ideas	5 (9.8%)	4 (7.8%)

For objective three, we investigated to what extent teachers differ in what they hope to receive from professional development based on years of experience. For first year teachers without CASE certification, the top three items they hope to receive from professional development include classroom procedures and ideas, hands-on practice from the student's perspective, and interest approach, exit, and energizer activity ideas. Second year non-CASE certified teachers identified classroom procedures and ideas, hands-on practice from the student's perspective, and interest approach, exit, and energizer activity ideas. Third year non-CASE certified teachers hope to gain classroom procedures and ideas, hands-on practice from the student's perspective, and laboratory strategy ideas. Non-CASE certified teachers in the fourth year of teaching expect hands-on practice from the student's perspective, practical advice and suggestions from both the facilitator and other participants, and laboratory strategy ideas. The most experienced group, the fifth-year non-CASE certified teachers, selected classroom procedures and ideas, and practical advice and suggestions from both the facilitator and other participants. They are the only cohort to identify facilitation ideas from a practicing teacher's perspective as a top priority (see Table 4). We conducted a Chi-square goodness of fit to identify any significant ($p < 0.05$) differences between observed and expected frequencies for each item. We determined there are non-significant differences in the desired professional development outcomes for CASE- and non-CASE certified early teachers. Only one construct, reading strategy ideas

(CASE-certified), was significantly different than the expected value where four of the six CASE-certified teachers in their second year of teaching valued reading strategies.

Table 4

Distribution and Chi-square Goodness of Fit for Frequency of Professional Development Characteristics for Non-CASE certified Early Career Teachers (n = 71)

Characteristic	Years of Teaching Experience					χ^2 (p)
	1 ^a f(%)	2 ^b f(%)	3 ^c f(%)	4 ^d f(%)	5 ^e f(%)	
Classroom procedures and ideas	15 (83.3%)	9 (60.0%)	11 (64.7%)	4 (44.4%)	12 (80.0%)	5.82 (0.21)
Practical advice and suggestions from both facilitator and participants	10 (55.6%)	5 (33.3%)	6 (35.3%)	5 (55.6%)	11 (73.3%)	6.74 (0.15)
Hands-on practice from the student's perspective	11 (61.1%)	7 (46.7%)	9 (52.9%)	6 (66.7%)	9 (60.0%)	1.29 (0.86)
Facilitation ideas from a practicing teachers' perspective	8 (44.4%)	6 (40.0%)	6 (35.3%)	4 (44.4%)	11 (73.3%)	5.47 (0.24)
Interest approach, exit, and energizer activity ideas for lesson planning	11 (61.1%)	7 (46.7%)	6 (35.3%)	2 (22.2%)	6 (40.0%)	4.53 (0.34)
Laboratory strategy ideas	7 (38.9%)	6 (40.0%)	7 (41.2%)	5 (55.6%)	5 (33.3%)	1.19 (0.88)
Equipment storage and organization suggestions	5 (27.8%)	5 (33.3%)	2 (11.8%)	1 (11.1%)	5 (33.3%)	3.75 (0.44)
Reading strategy ideas	3 (16.7%)	1 (6.7%)	2 (11.8%)	0 (0.0%)	2 (13.3%)	2.11 (0.72)
Purchasing advice or tips	2 (11.1%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	1 (6.7%)	3.46 (0.49)
Math integration strategy ideas	3 (16.7%)	0 (0.0%)	2 (11.8%)	0 (0.0%)	2 (13.3%)	3.97 (0.41)

Notes: ^an = 18; ^bn = 15; ^cn = 17; ^dn = 9; ^en = 15

Among first year teachers holding CASE certification(s), the top three items they hoped to receive from professional development included classroom procedures and ideas, hands-on practice from the student perspective, and facilitation ideas from a practicing teacher's perspective. Second year CASE-certified teachers selected classroom procedures and ideas, practical advice and suggestions from both the facilitator and other participants, and facilitation ideas from a practicing teacher's perspective. The third-year CASE-certified teacher group indicates interest in practical advice and suggestions from both the facilitator and other participants and classroom procedures and ideas. Nearly half of this group also selected interest approach, exit, and energizer activity ideas as well as laboratory strategy ideas as a top three expectation. Fourth-year CASE-certified teachers selected practical advice and suggestions from both the

facilitator and other participants, hands-on practice from the student's perspective, classroom procedures and ideas, and facilitation ideas from a practicing teacher's perspective. Expectations identified by the fifth-year CASE-certified teacher cohort were classroom procedures and ideas, practical advice and suggestions from both the facilitator and other participants, hands-on practice from the student perspective, and facilitation ideas from a practicing teacher's perspective (see Table 5). Again, we determined that there are non-significant differences in the desired professional development outcomes for both CASE- and non-CASE-certified early teachers in this study. Only one construct, reading strategy ideas (CASE-certified), was significantly different than the expected value where four of the six CASE-certified teachers in their second year of teaching valued reading strategies.

Table 5

Distribution and Chi-square Goodness of Fit for Frequency of Professional Development Characteristics for CASE-certified Early Career Teachers (n = 51)

Characteristic	Years of Teaching Experience					χ^2 (p)
	1 ^a f(%)	2 ^b f(%)	3 ^c f(%)	4 ^d f(%)	5 ^e f(%)	
Classroom procedures and ideas	11 (78.6%)	6 (60.0%)	6 (54.5%)	5 (62.5%)	7 (87.5%)	3.465 (0.64)
Practical advice and suggestions from facilitator and other participants	6 (42.9%)	6 (60.0%)	7 (63.6%)	6 (75.0%)	6 (75.0%)	3.28 (0.51)
Hands-on practice from the student's perspective	7 (50.0%)	4 (40.0%)	4 (36.4%)	6 (75.0%)	5 (62.5%)	3.70 (0.49)
Facilitation ideas from a practicing teachers' perspective	7 (50.0%)	5 (50.0%)	4 (36.4%)	5 (62.5%)	5 (62.5%)	1.80 (0.77)
Interest approach, exit, and energizer activity ideas for lesson planning	4 (28.6%)	4 (40.0%)	5 (45.5%)	1 (12.5%)	1 (12.5%)	6.52 (0.16)
Laboratory strategy ideas	2 (14.3%)	3 (30.0%)	5 (45.5%)	2 (25.0%)	2 (25.0%)	3.09 (0.54)
Equipment storage and organization suggestions	1 (7.1%)	1 (10.0%)	2 (18.2%)	0 (0.0%)	1 (12.5%)	1.92 (0.75)
Reading strategy ideas	0 (0.0%)	4 (40.0%)	1 (9.1%)	0 (0.0%)	1 (12.5%)	10.69* (0.03)
Purchasing advice or tips	2 (14.3%)	2 (20.0%)	0 (0.0%)	2 (25.0%)	1 (12.5%)	2.96 (0.57)
Math integration strategy ideas	1 (7.1%)	2 (20.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	3.91 (0.42)

Notes: ^an = 14; ^bn = 10; ^cn = 11; ^dn = 8; ^en = 8

We conducted a Chi-square goodness of fit to identify any significant ($p < 0.05$) differences between observed and expected frequencies for each item. We identified one area of professional development, reading strategy ideas, where year two frequencies were significantly ($p < 0.05$) higher than expected.

Conclusions, Recommendations, and Implications

This study was developed and executed to identify the distinctions between professional development expectations of early career teachers based on differences in years of experience and CASE certification. This study does not have generalizability as it utilized a sample population of early career teachers from only four states. Additionally, a limiting factor for our study is the development of the provided list used to discover early career teachers' professional development expectations; the list was formulated using practices commonly found or strived for during CASE Institute professional development programs. Potential expectations from other professional development sources were not acquired. Results should be inferred and applied with caution. Agricultural education leaders, teacher induction programming planners, young teacher mentors, and professional development planners at national, regional, state, and local levels may wish to consult these lists of expectations for professional development planning for early career agricultural educators as Park et al. (2007) found that agricultural science educators profoundly valued personalized professional development tailored to their own needs.

Rising teacher attrition rates are a concern in agricultural education as many teachers are leaving before or at the end of their fifth year of teaching (Gray et al., 2015; Kaiser, 2011; Darling-Hammond & Sykes, 2003; NCTAF, 2003). Though there are several different factors for this rise in attrition, self-efficacy is a common factor among early career teachers (Boone & Boone, 2009). New teachers often struggle with self-efficacy, especially in science- and math-related instruction within the agricultural education content area (McKim & Velez, 2017) due to their inexperience in the profession. Professional development provides an opportunity for early career teachers to receive the training and support they need to increase their self-efficacy (Fleetwood & Langston, 2022). Transformative learning is important to use in professional development settings because it builds competence and confidence which leads to an increase in self-efficacy (Fleetwood & Langston, 2022). CASE Institute professional development provides many opportunities for transformative learning by helping early career teachers increase their self-efficacy in applied areas such as math and science (McKim & Velez, 2017) as the curriculum focuses on critically examining past practices and reflecting on new material and procedures which is an important process in adult transformative learning (Wright et al., 2019). While the majority of the expectations were not statistically significant between the populations of both CASE-certified and non-CASE certified teachers, we did discover there are some minor differences, most notably in their perceptions relating to reading strategies. The CASE institutes provide certified teachers with a variety of different reading strategies they can utilize to help their students better read pre-lab activities (purpose statements), procedures, and much more. This may be a symptom of the transformative learning theory (Mezirow, 2000) wherein these teachers have set aside previous thinking and doing due to the stimulation of new ideas and practices during the CASE training. As CASE Institute is a professional development opportunity that is specific for agricultural education teachers, we determined that it was an important program to feature in our study to see if it affects early career teachers' expectations for professional development.

Examining the demographics of respondents helps us better understand the data in the context of the current demographics of the agricultural education field. The sample includes a higher proportion (58.2%) of CASE-certified teachers than the national average. In the U.S., 3,667 teachers from over 40 states hold one or more CASE certifications (Curriculum for Agricultural Science Education, 2024), representing less than 18% of all agricultural educators ($n = 14,516$) (Smith et al, 2023). States with higher CASE certification incidence were selected so that we would have a larger sample population to compare CASE-certified and non-CASE-certified early career teachers. The four states in this study had a large

proportion of their teaching population in the first five years of their career. Over one-third (38%) of the total agricultural education instructor population in the four states are within the first five years of experience.

Objective One

Related to objective one, a substantial proportion of early career teachers in this study hope to receive professional development with the following characteristics: 1) classroom procedures and ideas, 2) practical advice and suggestions from the facilitator and other participants, 3) hands-on practice from the student's perspective, and 4) facilitation ideas from a practicing teacher's perspective. Based on the data collected, it is recommended that this list of expected professional development characteristics be used for any individuals or organizations involved in the preparation of professional development for early career teachers. Conversely, less than one in three teachers in this study prioritized the following professional development outcomes: 1) interest approach, exit, and energizer activity ideas for lesson planning, 2) laboratory strategy ideas, 3) purchasing advice or tips, reading strategy ideas, equipment storage and organization suggestions, and 4) math integration strategy ideas. Early career teachers do not highly value the math, science, and literacy integration outcomes that educational leaders deem appropriate (Shinn et al., 2003; Stone et al., 2008; Myers & Thompson, 2009). However, integration of these types of concepts continues to be cited as a major challenge (Bird & Rice, 2021; McKim & Velez, 2017). According to the National Research Center for Career and Technical Education (n.d.), "iterations of the Perkins legislation represent a major development in CTE—notably, an increased emphasis on academic achievement as well as occupational skills. Notably, Perkins IV requires the integration of rigorous and challenging academic and career and technical education in programs of study and career pathways." Therefore, we recommend future research designs which explore how additional in-servicing might highlight the need for, or importance of, such content in agricultural education in a way to meet the top needs felt by early career teachers. For professional practice, CASE can provide additional training and resources embedded within the institutes themselves, or as standalone supplemental lessons available on the CASE teacher portal that provide educators with further ideas and resources on how to best integrate these core academic areas into the curriculum.

Objective Two

Objective two sought to compare CASE-certified teachers' value of non-content portions of prior CASE Institute experiences and their professional development expectations. More than 50% of respondents among the sample valued the following non-content portions of CASE training: 1) hands-on practice from the student perspective, 2) practical advice from the facilitator and other participants, and 3) facilitation ideas from a practicing teacher's perspective. Overall expected professional development outcomes from CASE-certified early career teachers included: 1) classroom procedures and ideas, 2) practical advice and suggestions from facilitator and other participants, 3) hands-on practice from the student perspective, and 4) facilitation ideas from a practicing teacher's perspective. As their valued non-content portions and expected professional development outcomes overlap, it is apparent that these specific areas of professional development are important to early career teachers, especially as they relate to teaching in laboratory settings (Figland et al., 2019). These characteristics and tools are hallmarks of good professional development (Garton & Chung, 1996; Garet et al., 2001) and should be provided for all early career teachers regardless of their CASE certification status. For professional practice, states can look at adopting statewide mentorship or induction programs to assist early career teachers in developing these important skills. Furthermore, teacher preparation programs can work to address these topic areas within their pre-service coursework.

Objective Three

Objective three sought to identify differences in expected professional development outcomes by CASE certification and years' experience. We determined that there are non-significant differences in the desired professional development outcomes for both CASE- and non-CASE certified early teachers in this

study. Only one construct, reading strategy ideas (CASE-certified), was significantly different than the expected value where four of the six CASE-certified teachers in their second year of teaching valued reading strategies. It is recommended to investigate how participation in CASE professional development can create more transformative changes for future professional development yields. Expanding the population of interest to encompass educators across all career stages may also influence the perceptions and the overall findings.

Although the frequencies were not significantly different, we noticed an increase in the frequency for classroom procedures and ideas from years three and four to year five. Over 80% of year five teachers still identify classroom procedures and ideas as a priority for professional development outcomes. Further research into the increase in frequency for year five teachers is recommended. It is also recommended to follow up with teachers who left the profession to find out to what extent their needs differed from teachers who persisted within the profession. Future research topics include the value of professional development topics for early career teachers and qualitative work that uncovers specific ways that CASE professional development aids teachers.

We discovered the desired professional development outcomes of the early career teachers in this study, including classroom procedures and ideas, practical advice and suggestions from both facilitator and participants, hands-on practice from the student's perspective, and facilitation ideas from a practicing teacher's perspective, are both static and persistent. Based on the participants' responses, the implementation of professional development around the outcomes most frequently identified as priorities by new teachers is recommended (see Figure 1).

Figure 1

Professional items for early career agriculture teachers with over 50% agreement by years of experience (organized by frequency). Notes: ^a≥80% agreement; ^b70-79% agreement; ^c60-69% agreement; ^d50-59% agreement

Year 1		Year 2		Year 3		Year 4		Year 5	
CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE
Classroom procedures and ideas ^b	Classroom procedures and ideas^a	Classroom procedures and ideas ^c	Classroom procedures and ideas ^c	Practical advice and suggestions from the facilitator and other participants ^c	Classroom procedures and ideas ^c	Practical advice and suggestions from the facilitator and other participants ^b	Hands-on practice from the student's perspective ^c	Classroom procedures and ideas^a	Classroom procedures and ideas^a
Hands-on practice from the student perspective ^d	Hands-on practice from the student's perspective ^c	Practical advice and suggestions from the facilitator and other participants ^c		Classroom procedures and ideas ^c	Hands-on practice from the student's perspective ^d	Hands-on practice from the student's perspective ^b	Practical advice and suggestions from the facilitator and other participants ^d	Practical advice and suggestions from the facilitator and other participants ^b	Practical advice and suggestions from the facilitator and other participants ^b
Facilitation ideas from a practicing teacher's perspective ^d	Practical advice and suggestions from the facilitator and other participants ^c	Facilitation ideas from a practicing teacher's perspective ^c				Classroom procedures and ideas ^c	Laboratory strategy ideas ^d	Hands-on practice from the student perspective ^c	Facilitation ideas from a practicing teacher's perspective ^b
						Facilitation ideas from a practicing teacher's perspective ^c		Facilitation ideas from a practicing teacher's perspective ^c	Hands-on practice from the student's perspective ^c

Impact and National Applications of the Research

While the study was targeted toward beginning agricultural educators in the Midwest, the findings can be valuable on a national-scale. Teacher attrition continues to be a significant challenge within the profession, especially for early-career teachers (Gray et al., 2015; Kaiser, 2011; Darling-Hammond & Sykes, 2003; NCTAF, 2003; Solomonson et al., 2021). Among these challenges, several of them are issues that CASE can assist all educators in solving, such as meaningful curriculum development (Traini et al., 2021), the preparation of laboratory and inquiry-based experiences (Boone & Boone, 2009; Solomonson et al., 2019; Touchstone, 2015), building community and social learning (McKendree & McKim, 2021), and pressure to succeed placed upon themselves or by others (Lemons et al., 2015). As a transformative learning experience (Curriculum for Agricultural Science Education, 2024), the CASE curriculum empowers agricultural educators across over 40 states to focus more on program management and building support for their program and stress a little less about planning and organizing curriculum since they are already given ready-to-use resources to teach. If the CASE curriculum continues to be encouraged and offered as a professional development opportunity for educators across the nation, they can reap the benefits of both the curriculum and the other positive factors as identified within this study that extend far beyond the lessons and resources provided by the curriculum itself, including classroom procedures, new ideas for interest approaches, facility design and operation, reading strategy ideas, math integration, and so much more. As additional educators continue to receive certifications within the CASE curriculum, future research efforts should examine the professional development needs and expectations of CASE and non-CASE certified teachers, regardless of geographic region or years of experience, in an effort to see if there are any key trends that emerge based on these demographic characteristics.

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