

Describing Agricultural Communication Content Implementation in School-Based Agricultural Education

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Abstract

Agricultural communication, as a standalone discipline, has been taught for more than 100 years. Research has been conducted documenting evolution of the discipline within university settings. As the agricultural communication profession and university programs grow in popularity, a trickle-down effect may be occurring within School-Based Agricultural Education programs. This study sought to describe SBAE teachers' implementation of, comfort with, and trainings of agricultural communication content. A nationally representative sample reported a variety of agricultural communication content taught, a general comfort with content, and inconsistent training for content knowledge. It was found that pre-service education programs were the predominant course of training for agricultural communication content. Broadcasting, video media skills, and technical writing were found to be lacking in SBAE programs, which is consistent with gaps in university counterparts but requested by the profession. Reliance on pre-service programs for content training is consistent with previous research on content knowledge. Recommendations are made to continue researching SBAE teacher content knowledge. It is also recommended to increase partnerships between SBAE teachers and faculty with agricultural communication professionals and faculty to support content development.

Introduction and Literature Review

Agricultural communication is continuing to grow and develop into a unique discipline of study. Within the context of School-Based Agricultural Education (SBAE), a four-fold increase in states offering year-long agricultural communication courses has occurred since the turn of the century (Lawson, 2021). Over a 25-year period at the collegiate level, there has been a 25% increase in degree programs and double the average enrollment per program (Canon et al., 2016; Miller et al., 2015). As such, the discipline is growing as a standalone content area within the agricultural education pantheon. Despite the growth, little is known about experiences of students or teachers within the SBAE programs that teach agricultural communication content.

Agricultural Communication in Schools

Although Miller et al. (2015) noted that the discipline is of growing interest to students intending to pursue a college degree, a dearth of research exists targeting experiences of high school students or teachers. Research that does exist indicates that there is a lack of identity for agricultural communication in SBAE (Lawson, 2021) and that SBAE students were most interested in learning about design,

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multimedia, writing, and careers (Calico et al., 2014). Support from, or connections with, universities and peers, such as a community of practice, would help SBAE teachers implementing agricultural communication content (McKay et al., 2022; Swenson et al., 2021). Ease to integrate curriculum materials and resources were identified as a resource needed by SBAE teachers to meet the demands of agricultural communication's evolutionary nature (Swenson et al., 2021). And Atkins et al. (2022) explored topics to update for curricular competencies. There is a gap in the literature regarding what agricultural communication content is being taught in SBAE programs nationally and how teachers are learning that content.

SBAE programs are uniquely situated to teach technical agricultural content due to their structure. SBAE is described as the "systematic instruction in agriculture and natural resources," (p. 3), and serves three main purposes: (1) prepare people for careers in agriculture, (2) promote job creation and entrepreneurship, and (3) increase agriculture literacy (Phipps et al., 2008). National Agriculture, Food, and Natural Resources (AFNR) Content Standards are used to guide state SBAE leaders with standards to guide what their students should know and be able to do through their participation in each AFNR pathway (The Council, 2012). SBAE programs seek to develop skills and knowledge related to agricultural occupations and entrepreneurship as well agricultural literacy (Phipps et al., 2008) and, therefore, could be a quality source for agricultural communication skill development. At the highest levels of implementation, SBAE programs utilize multiple modes of instruction, such as classroom and laboratory instruction, Supervised Agricultural Experiences (SAE), and participation in the National FFA Organization (Phipps et al., 2008).

Training SBAE Teachers in Agricultural Communication

SBAE teachers are expected to possess sufficient knowledge of their subject matter (Talbert et al., 2014). For SBAE teachers to be considered truly accomplished, they should develop an extensive working knowledge of how their subject matter is "created, organized, connected to other disciplines, and applied to real-world settings," (Edwards & Thompson, 2010, p. 113). Teachers need to have a deep knowledge, or *understanding*, of their subject and how to make it accessible to others (Shulman & Shulman, 2004).

Content knowledge development for SBAE teachers occurs throughout their career as a teacher; they should embody the perspectives of a lifelong learner (Talbert et al., 2014). It has been commented that SBAE teachers do not enter the profession fully proficient in the variety of subject matter areas, operationally called content knowledge, they will teach (Talbert et al., 2014). When constructed coherently, teacher preparation curriculum is the starting point for building links between coursework (subject matter), pedagogical knowledge, and practice (Barrick & Garton, 2010, p. 35; Darling-Hammond et al., 2005, p. 391). After entering the profession, SBAE teachers can continue to build content knowledge through industry-related experiences and formalized continuing education programs, traditionally called professional development (Talbert et al., 2014; Yopp et al., 2020). Smalley et al. (2019) posited that the engagement of SBAE teachers in professional development can imply they are interested in enhancing their knowledge of various content areas in agricultural education.

Several studies report that agricultural communication is an emerging content area SBAE teachers identified as needing more skill development opportunities to improve their ability to instruct students (Calico et al., 2013). Additionally, foundational research states that agricultural communication is an important piece of agricultural education and should be one of the goals of agricultural education programs (Birkenholz & Craven, 1996; Phipps & Osborne, 1988). But the authors found no newer claims within scholarly outlets.

Preparing SBAE teachers for the diverse content knowledge has been commented as the "*responsibility* of the entire college and the university," (Barrick & Garton, 2010, p. 33). Akers et al. (2003) identified 11 topic areas that should be included in a collegiate agricultural communication coursework including writing, communication history, ethics, legislative issues, and others. Subsequently, and in support of the notion that SBAE teachers are lifelong learners, Calico et al. (2013) posited it is critical that

university faculty remain partnered with SBAE teachers to assist them in effectively preparing students for a future in the agriculture industry. However, Calico et al. (2014) identified that SBAE teachers often do not have the content knowledge to effectively instruct students in English and writing skills necessary to create or sustain an agricultural communication program.

Career Development Events (CDEs) offered through FFA (2022) serve as continuation of instruction in SBAE and provide student members the opportunity develop college and career readiness skills. CDEs “are academically based competitions where students apply knowledge gained through their participation in SBAE classes and other program components” (Bowling et al., 2020, p. 221). They involve learning skills and knowledge in a non-formal setting that also allows students to compete either individually or as a team (Bowling, et al., 2020). According to FFA (2020), “the purpose of the agricultural communications career development event is to excite and inspire students to develop basic skills relevant to the agricultural communications industry” (p. 2). Through the agricultural communications CDE, members develop skills in collaboration and communication thorough the development of various communication materials and a media plan and pitch (FFA, 2020). The first national contest for the agricultural communications CDE was held in 2000 (National FFA Organization Records, 1916-2008, n.d.). The development of this CDE led to the accumulation of resources for SBAE teachers to use when instructing students in the content area (Calico et al., 2014).

History of Agricultural Communication

Due to the small and specialized disposition of literature on agricultural communication as a content area, a thorough examination of the history is presented here to contextualize this study.

History of the Profession

Researchers have traced the history of the formal agricultural communication profession and claimed it originated in the United States in the first decades of the 1800s (Lee, 1965; Marti, 1979). The continued historical evolution of the agricultural communication industry remained closely linked to the robustness of the U.S. agricultural market (Tucker, et al., 2003). The *New Jersey Gazette*, and *Old Farmer’s Almanac* are recorded as first-of-their-kind printed media sources to farming practices (Boone et al., 2000; Telg & Irani, 2008). Agricultural magazines and newspapers, as specific communication products, saw the greatest growth throughout early 1900s as the number of agrarian magazines and newspapers in the U.S. grew from 157 to 400 and the circulation of these publications grew to nearly 17 million (Telg & Irani, 2008).

Technology continued to influence modes of communication with Morse code being used in 1915, and television being introduced in in the middle of the 20th century (Tedrick, 2009). By 2000, the main media sources for agricultural content included three television stations, more than 100 agricultural newspapers, and more than 400 agricultural magazines, as well as thousands of AM radio stations and nearly 750 FM stations (Boone et al., 2000; Tedrick, 2009). As the sales and production of newspapers began to decline in the late 2000s, a renewed focus was brought to the forefront of the agricultural communication industry for the need for internet-based communication such as webpages and social media (Telg & Irani, 2012).

Collegiate History of Agricultural Communication

As agricultural publications grew in popularity, a need for academic training in agricultural communication was identified. In 1905, Iowa State University became the first post-secondary institution to offer a course in agricultural journalism (Boone et al., 2000). This initial department was made up of faculty who had been hired as editors for the growing number of farm journals used to document the research being conducted at land-grant universities (Boone et al., 2000). In 1908, the first bachelor’s degree in agricultural communication was awarded at the University of Wisconsin, which housed the first department of agricultural communication (Tedrick, 2009; Telg & Irani, 2000). As of 1991 more than 30

programs existed at the college level (Doerfert & Cepica, 1991). During that time, the programs were relatively small, averaging less than 30 students (Reisner, 1990b). Continuing to document collegiate programs, Miller et al. (2015) identified a total of 40 U.S. agricultural communication programs with undergraduate degrees in the U.S., and there were about 70 students per program. Within that same study, Miller et al. (2015) noted that the creation of new programs was greater than the phasing out of underutilized programs, specifically citing institutions projecting no decrease in enrollment in the coming five years and responded their enrollment had either increased or stayed constant throughout the previous five years.

Careers within agricultural communication reflect the broad scope of agriculture offering a variety of opportunities for students (Boone et al., 2000). Students' preparation for these careers is accomplished through post-secondary courses, of which writing, internship, and graphic design courses were identified as the most popular courses (Cannon et al., 2016). In addition to programmatic growth and course offerings, post-secondary students in agricultural communication careers founded the Agricultural Communicators of Tomorrow (ACT) organization in 1970 as a co-curricular, professional student organization (Tedrick, 2009).

Educating Agricultural Communicators

As the agricultural communication discipline has developed, research has been conducted that has greatly impacted the profession, with topics including educating agricultural communication professionals being one of the leading areas of research in the last 50 years (Williford et al., 2016). Research on the skills needed by agricultural communication professionals (e.g., Corder & Irlbeck, 2018) and describing the landscape of agricultural communication university programs (e.g., Cannon et al., 2016) have been the predominate research themes related to education. There is a lack of research about agricultural communication in the context of K-12 SBAE programs (Corder & Irlbeck, 2018).

Researchers exploring the needs of agricultural communication professionals have documented skills required by professional in the industry. Studies consistently show that skills in writing and verbal communication and software usage (e.g., Microsoft Office and the Adobe Creative Suite) are expected of collegiate agricultural communication students (Corder & Irlbeck, 2018; Leal et al., 2020; Reisner, 1990a; Sprecker & Rudd 1997). The evolving nature of society's communication environment necessitates a continual need to evaluate what is being taught in agricultural communication programs (Bailey-Evans, 1994).

Guiding Frameworks

Shulman's (1986) theorization of Pedagogical Content Knowledge (PCK) guided this study. PCK has been described as the application of contextually specific, quality pedagogical choices to the subject or content (Shulman, 1986). PCK has also been framed as "subject specific pedagogical knowledge that enables teachers to represent the subject matter that so that it will be accessible to students," (Darling-Hammond, 2006, p. 82). According to Goodnough and Hung (2008), effective teaching "involves having solid subject knowledge of a discipline, as well as an in-depth understanding of how to facilitate student learning within that discipline," (p. 63). Use of PCK requires identifying what makes a specific concept difficult for learners to understand and what conceptions students use to learn those concepts (Goodnough & Hung, 2008). According to Shulman (1986), PCK is the "way of representing and formulating the subject matter that makes it comprehensible for others" (p. 9). Teaching experience and background in the content area both play a role in the development of PCK of teachers in a specific area (Rice & Kitchel, 2015). Factors that can increase PCK in SBAE teachers include levels of content knowledge (Ball et al., 2008; Rice & Kitchel, 2016) and career stage (Hashweh, 2005; Rice & Kitchel, 2017).

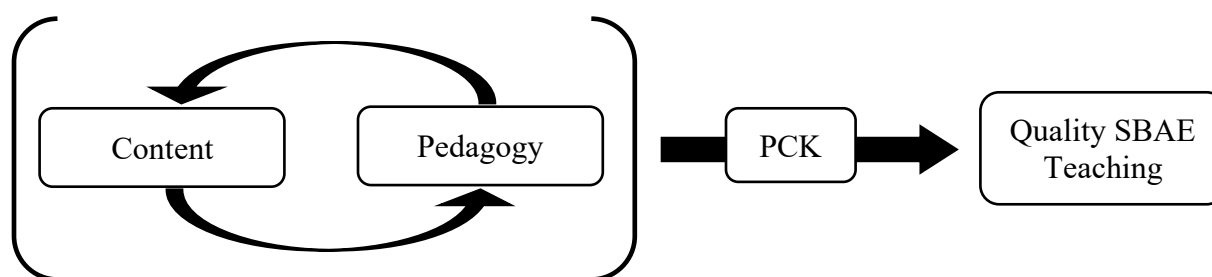
Pedagogical content knowledge has been further described with sub-components by Magnusson et al. (1999): knowledge of four areas: learners, assessments, instructional strategies, and curriculum.

Orientations, teacher beliefs and approaches, and teacher epistemologies have all been integrated into PCK frameworks for research (Rice & Kitchel, 2017).

Figure 1 visually represents the conceptual framing of PCK for this study. Types of content in agricultural communication are operationalized as content knowledge, which has been cited as the foundation of PCK development (Ball et al., 2008). The various trainings that teachers accessed and espoused comfort in are operationalized as representations of knowledge of curriculum and assessments. With the variety of content areas in SBAE, it is important to assess the comfortability, knowledge, training opportunities offered to SBAE teachers to ensure the content being taught is accurate and delivered effectively. PCK can serve as a framework to understand how SBAE teachers use their content knowledge of agriculture and agricultural communication and sound pedagogical practices to tailor instruction to the needs of their students.

Figure 1

Guiding Conceptual Framework of PCK



Purpose and Research Questions

While contemporary literature has explored needs of agricultural communication programs from a curricular lens, these studies have almost exclusively used collegiate expert voices (Atkins et al., 2022; Lawson et al., 2021; Leal et al., 2020). This study seeks to fill a gap in the literature by providing SBAE teachers' perspectives. The purpose of this study was to describe the current state of SBAE programs' agricultural communication content. To accomplish that purpose, the following research questions guided the inquiry:

1. How is agricultural communication content being implemented within SBAE programs?
2. Where do SBAE teachers obtain content knowledge for agricultural communication content?

Methods

Data Collection

This descriptive study consisted of an online survey of SBAE instructors in the United States. This study sought to explore the inherent nature and incidences of agricultural communication content taught by SBAE teachers (Ary et al., 2019). A sample of FFA advisors was requested from the National FFA Organization after IRB approval was secured. Cluster random sampling was used to select 40 FFA advisors from each state to ensure adequate representation in the sample. In the event a state did not have at least 40, all advisors were included to ensure each state was adequately represented in the study. There were 1,876 individuals on the initial list. The original intent of the study was to draw regional comparisons and inferences. Size of sample frame was determined using G*Power software (Faul et al., 2009). Due to historically low response rate from this sampling frame, the recommended quantity was doubled to oversample and reduce potential response rate issues.

A prenotice email was sent to everyone on the list to ensure they knew to expect the survey and so they would know to check their junk folders in case the invitation via Qualtrics was caught by a spam filter. Of the initial invites, 48 bounced back. Three reminder notices were sent out, which ended because new responses were no longer high enough to justify sending out further emails (Dillman et al., 2014). After removal of incompletes, the final sample was 251, resulting in a response rate of 13.4%, which is in line with documented low response rates for this population (e.g., Hile, 2019; McKim & Sorensen, 2020). This low response rate, even after original oversampling, caused generalizability issues that precluded the use of inferential statistics.

Instrument

The researcher-developed questionnaire consisted of two sections, the second of which was not included in this study. The section included in this paper addressed SBAE program characteristics. Respondents were given an overview of the National Council for Agricultural Education's (The Council, 2002) Agriculture, Food, and Natural Resources (AFNR) Career Clusters and were then asked which career clusters they teach, including if they no longer taught a cluster but had in the past. To address the primary purpose of this study, they were then asked if they taught agricultural communication content, including if that was as a lesson, unit, and/or course. If they did, they were asked to specify what agricultural communication content was taught in class. The list of topics taught were drawn from 2020-21 Florida's agricultural communication standards because no national standards exist for implementation of agricultural communication coursework (Florida Department of Education, 2021). The Florida list of items was chosen because it was publicly accessible and comprehensively addressed agricultural communication topics. The Florida frameworks is also updated on a 5-year basis with input from both teachers and industry professional. Additionally, Florida's standards for agricultural content encompass year-long courses or multiyear programs of study. Items from the Florida standards were consolidated if they were similar to or duplicated other items or were not relevant to agricultural communication. Respondents were then asked to indicate how comfortable they were teaching those items (1 = *extremely uncomfortable* to 5 = *extremely comfortable*). Respondents were asked what previous training they had for all agricultural communication content areas, including pre-service coursework, in-service organizational professional development, in-service for-credit coursework, other in-service training, or no training. They were also asked if their FFA program participated in the FFA agricultural communication CDE.

Respondents then answered teaching demographic questions. This included if they had a degree in agricultural communication and their post-secondary communication coursework. They also reported what technical or industry-based certifications (e.g., Microsoft Office® Certified) they had completed, as well as how they completed their teaching licensure. The final demographics addressed non-teaching descriptors, including age, state, gender, race, and Hispanic/Latino status.

Validity

To help ensure the validity of the instrument, cognitive interviews were conducted with members of the target population who were not included in the sampling frame. The interviews helped ensure that respondents would understand the questions and that the instrument would be usable for them. The cognitive interviews led to more specificity in asking if respondents taught agricultural communication content in a lesson, unit, or full course. Other changes were not relevant to the questions in this paper but were relevant to the other research paper from this project.

Data Analysis

Descriptive statistics were used to address the research questions. According to Ary et al. (2010) descriptive statistics are appropriate for organizing and summarizing observations to describe overall events and phenomenon. Frequencies, percentages, means, and ranges are presented where appropriate to answer the research questions.

The unit of analysis for items related to demographics, agricultural content taught, and comfortability was individual SBAE teacher responses. The unit of analysis for items pertaining to trainings SBAE teachers received for agricultural communication content was a multiplicative function of quantity of teachers by quantity of standards. Comfort with teaching was recorded and centered in data analysis resulting in a scale ranging from -2 to 2 with zero as neutral comfort. Additionally, respondents could select all that applied, resulting in a varying quantity of trainings by standard.

Results and Conclusions

The average age of respondents was 38.6 years ($M = 12.04$), with a range of 21 to 82 years of age. The sample was predominately female (62.5%), with one individual reporting non-binary and one not disclosing gender. The sample was predominately White (91.6%). Each of the other racial categories had three or fewer respondents.

There were responses from all 50 states. Maine, North Dakota, Rhode Island, and Texas had one respondent each. Colorado ($n = 14$) had the most respondents, followed by Nebraska ($n = 11$), and Oregon ($n = 10$). Table 1 includes the frequency of respondents by National Association of Agricultural Educators (NAAE) regions.

Respondents reported an average of 12.4 years of teaching experience ($s = 10.3$), with a range of 0 to 57 years of experience. There were 37.1% ($n = 93$) five or fewer years of teaching experience, 29.9% ($n = 75$) between 5 and 15 years, 27.1% ($n = 68$) between 15 and 30 years, and 6.0% ($n = 15$) more than 30 years. For levels of degrees held by SBAE teachers, 96.0% ($n = 241$) of teachers held a bachelor's degree, 52.6% ($n = 132$) held a master's degree, 4.4% ($n = 11$) held an administrative or principal's license, and 1.6% ($n = 4$) held a doctorate degree.

Table 1

Respondents by NAAE Region

NAAE Regions	<i>f</i>	%
I (AK, AZ, CA, HI, ID, MT, NV, OR, UT, WA, WY)	64	22.5
II (AR, CO, KS, LA, NM, OK, TX)	38	13.4
III (IA, MN, NE, ND, SD, WI)	30	10.6
IV (MO, IL, IN, OH, MI, KY)	29	10.2
V (AL, FL, GA, MS, NC, SC, TN)	33	11.2
VI (CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV)	57	20.1

Note: States within each region included as abbreviations. US Virgin Islands and Puerto Rico were not sampled.

SBAE reported teaching a variety of the AFNR clusters, as reported in Table 2. Roughly three-quarters of teachers reported teaching courses from the Animal, or Plant Systems. About half of teachers reported teaching Agribusiness, Natural Resource, or Power, Structural, and Technical Systems. Nearly nine of every 10 teachers reported teaching multiple AFNR content areas currently.

Table 2

Percentage (%) of AFNR Content Areas Taught

	Currently	Have Taught
Animal	76.9	9.6
Agribusiness	45.4	17.9
Biotechnology	18.3	12.0
Environmental Service	27.9	8.8
Food Products and Processing	36.7	11.6
Natural Resource	51.4	18.3
Plant	74.5	12.7
Power, Structural, and Technical	53.0	10.8
Multiple Areas	87.6	N/A

Note: Title of pathways shortened by removing “systems” from applicable titles.

Agricultural Communication Content

To answer the first research question, SBAE teachers were asked about what content and in what structure they taught agricultural communication. Additionally, SBAE teachers were asked to describe their level of comfort with agricultural communication content they taught. A majority of SBAE teachers (54.6%, $n = 137$) reported that they teach agricultural communication content in some capacity. Of those who teach agricultural communication content, 52.5% ($n = 72$) reported teaching content as lessons, 56.2% ($n = 77$) as units of instruction, and 17.5% ($n = 24$) as an entire course. All SBAE teachers who teach agricultural communication content reported teaching oral communication skills. Of the 19 standards included, 12 of the standards were taught by a majority of SBAE teachers who teach agricultural communication content. Table 3 lists the percentage of SBAE teachers who teach a given content standard and their associated comfort levels. It is concluded that diverse amounts of agricultural communication content are taught with SBAE programs.

SBAE Teachers reported the highest average comfort for teaching oral communication skills ($\mu = 1.39$), which was also taught by all SBAE teachers who teach agricultural communication content. The next three highest average comfort levels of content taught by SBAE teachers were found to be for standard *Demonstrate leadership, employability, and human relations skills* ($\mu = 1.37$), *Conduct interviews* ($\mu = 1.26$), and *Identify forms of communication* ($\mu = 1.21$). Content standards taught by a majority of SBAE teachers were found to trend closer to an average level of *comfortable*. No standards taught by SBAE teachers were found to have an average comfort level less than 0.51 units, meaning on average SBAE teachers are at least neutral in comfort to teach the agricultural communication standards taught within their programs. It is concluded that SBAE teachers are comfortable teaching agricultural communication standards in their programs.

SBAE teachers were asked to what extent they participated in the National FFA Agricultural Communications CDE. A majority of respondents (70.5%, $n = 177$) had never participated in the Agricultural Communication CDE. Of those who reported some level of participation ($n = 74$), 55.4% reported they currently participate in the Agricultural Communications CDE.

Table 3

Agricultural Communication Standards Taught and Comfort Levels

Content Standard	%	Comfort Level (f, %)			μ
		Uncomfortable	Neutral	Comfortable	
Demonstrate oral communication skills	100.0	8	3	126	1.39
Demonstrate leadership, employability, and human relations skills	95.6	6	3	122	1.37
Utilize printed agricultural media	81.0	8	12	91	1.03
Utilize photography and graphics	70.8	6	19	72	0.92
Identify the forms of communication	69.3	5	9	81	1.21
Create communication messages	69.3	11	12	72	0.88
Create, design and edit publications and documents	65.7	4	19	67	0.93
Conduct interviews	65.0	7	2	80	1.26
Develop, design and edit publications and documents	63.5	5	11	71	0.95
Generate printed agricultural media	60.0	8	19	55	0.77
Use online social media	59.1	10	11	60	0.93
Explore the communications sector of the agricultural industry	54.0	6	14	54	0.82
Investigate the communications sector of the ag industry	48.2	5	17	42	0.68
Investigate ethical and professional issues in agricultural communications	44.5	7	12	42	0.69
Develop audio and video media	40.1	10	15	30	0.51
Create or analyze audio and video media	38.7	6	13	34	0.60
Investigate agricultural cooperatives structure and function	35.0	8	8	32	0.54
Modify photography and graphics	32.1	8	6	30	0.66
Create an agricultural communications campaign	28.5	5	7	27	0.72

Note: Comfort levels were collected on a 5-point scale. Scale was collapsed to report frequencies. Calculated mean was centered on a neutral zero. Feelings reported as levels of uncomfortable will result in negative scores, and comfortable will be positive.

Sources of Agricultural Communication Training

SBAE teachers reported sources of training by content standards. Two respondents did not report answers for this block of questions and were excluded from analysis for this section. Of the total possible standards teacher could have been trained to teach, 53.8% of SBAE teachers reported no formal trainings for agricultural communication content standards. More than 50% of SBAE teacher respondents reported no training for 12 of the 19 agricultural communication content standards. As seen in Table 4, the two content standards SBAE teachers reported the highest quantity of trainings were also the most taught content standards: *Demonstrate leadership, employability, and human relations skills*, and *Demonstrate oral communication skills*. Conversely, the two least taught content standards were also reported as the standards SBAE teachers were least trained: *Modify photography and graphics*, and *Create an agricultural communications campaign*. It is concluded that SBAE teachers are inconsistently trained in agricultural communication content.

Respondents were asked to mark all sources of training for agricultural communication content standards. Of the total claimed trainings received for agricultural communication standards ($n = 1445$), 53.1% occurred during pre-service coursework and 9.8% occurred during in-service, for credit coursework. Additionally, of those respondents who claimed multiple sources of training ($n = 173$), 92.5% included pre-service coursework as one of their sources. In-service, for credit coursework was consistently the least reported option for trainings with 9.8% of the total trainings. Additionally, in-service, for credit coursework was the least reported training option for 18 of the 19 standards, even when considered part of multiple trainings reported. It is concluded that SBAE teachers who teach agricultural communication content rely on training received while in their pre-service programs.

Table 4
Frequencies of Agricultural Communication Training Sources

Content Standard	None	Pre-service Course	In-service			Multiple Sources ^a
			For Credit Course	Organizational PD	Other	
Demonstrate leadership, employability, and human relations skills	29	74	18	41	28	32 ^b
Demonstrate oral communication skills	35	75	19	31	26	29 ^b
Conduct interviews	52	60	6	18	20	14
Develop, design and edit publications and documents	60	51	7	18	12	12 ^b
Identify the forms of communication	60	52	11	13	12	7
Create, design and edit publications and documents	61	48	8	11	17	6 ^b
Create communication messages	66	39	11	12	21	9 ^b
Utilize photography and graphics	73	39	4	11	14	4
Utilize printed agricultural media	76	41	11	10	12	9 ^b
Generate printed agricultural media	76	38	4	14	15	8
Explore the communications sector of the agricultural industry	83	38	6	12	6	4
Investigate the communications sector of the ag industry	83	39	3	10	6	4
Use online social media	78	26	10	20	18	14
Investigate ethical and professional issues in agricultural communications	84	29	6	15	8	6 ^b
Develop audio and video media	89	21	5	10	3	4 ^b
Investigate agricultural cooperatives structure and function	89	29	2	11	9	3 ^b
Create or analyze audio and video media	90	26	4	7	11	3
Modify photography and graphics	91	25	4	9	14	4
Create an agricultural communications campaign	105	17	2	3	9	1
Totals, by training type		767	141	276	261	

Note. Respondents selected all that apply.

^a Respondents who selected multiple sources.

^b At least one respondent did not select pre-service coursework.

Discussions, Implications, and Recommendations

While growth of agricultural communication programs at the university level has been documented (Cannon et al., 2016; Miller et al., 2015), there is a need to better understand how agricultural communication is being implemented at the secondary level given the lack of identity of agricultural communication within SBAE (Lawson, 2021). This study provided a description of agricultural communication content within SBAE programs across the nation. No research of its kind has been found at the time of data collection. Based on the results and conclusions, agricultural communication content is most likely taught in the context of other technical agricultural content. Tucker et al. (2003) discussed this integration phenomena as a benefit to university-level programs that house formal teacher education and agricultural communication disciplines. Additionally, McKay et al. (2022) described benefits of integrating communication skills into technical agricultural content with SBAE programs using digital media. Due to this potentially integrated relationship of agricultural communication content and technical content within SBAE programs, higher levels of PCK may be required to support students' simultaneous conceptualization of multiple disciplines' content (Schulman, 1986).

Corder and Irlbeck (2018) espoused four domains of agricultural communication skills needed by college graduates. When the findings regarding agricultural communication standards taught are examined within the context of those four domains, high school students are being taught oral communication, character and personal, and print media skills. What may be lacking in SBAE programs are technical writing skills, such as punctuation and grammar, as well as broadcasting and video media skills. SBAE also reported these content areas as being least trained to teach, and those who did teach associated standards espoused a lower level of comfort to teach standards related to the lacking skills. This interrelated lack of teaching, lower comfort, and lower training could be a relationship symptomatic of teachers' PCK development being reduced because PCK foundationally builds from content understandings (Ball et al., 2008; Rice & Kitchel, 2017).

An additional way to examine the data on implementation variances for agricultural communication across SBAE is how SBAE programs are situated within the school. Namely, SBAE programs are elective courses and housed within the career and technical education systems. Nearly half of the respondents reported not overtly teaching agricultural communications, and of those that do, less than one-fifth teach an entire course in the content area. Elective enrollment competition may be an underlying issue for SBAE programs and teachers. The gap in broadcasting and video media skills may be a result of schools having competing electives, such as yearbook, journalism, or broadcasting. Therefore, addressing the challenges of elective enrollment competition and ensuring dedicated resources for agricultural communication within the broader curriculum could significantly enhance the proficiency and availability certain communication skills in SBAE programs. Fostering interdisciplinary collaboration and advocating for the integration of agricultural communication into existing elective offerings could help bridge the gap in broadcasting and video media skills within SBAE programs, ensuring comprehensive education opportunities for students. This potential collaborative approach could produce synergies within a school system, rather than competition.

Continued examination of SBAE content from the perspective of competencies needed by professional agricultural communicators will help planners design curricula that enable graduates to be more competitive in the marketplace (Sprecker & Rudd, 1997). Previous research has suggested that SBAE teachers should participate in the planning and evaluation processes of content (Sprecker & Rudd, 1997). Additionally, a community of practice linking SBAE teachers who implement agricultural communication content to university faculty and other peers could help implementation of agricultural communication content (McKay et al., 2022; Swenson et al., 2021). Finally, this study did not explore teaching or assessment strategies utilized by SBAE teachers for agricultural communication content. Because teaching

and assessment strategies are foundational pieces of PCK (Magnusson et al., 1999), this study is limited in the exploration of the entire scope of PCK for SBAE teachers teaching agricultural communication content.

Recommendations

Further research on content being taught from the lens of curriculum standards versus teacher-perceived needs should be conducted. This will help faculty and other content supporters better understand curriculum and content needs of teachers when building their partnerships. This recommendation is for all AFNR clusters. Exploring clusters taught less frequently, for example Biotechnology or Environmental Science Systems, may shed light on content comfortability and training gaps that could be inhibiting factors to teach highly evolutionary content areas. If content knowledge is foundational to PCK development (Ball et al., 2008), research on content knowledge could aid SBAE teacher effectiveness.

Based on the findings, SBAE teachers rely on pre-service experiences as a content knowledge source. Therefore, it is recommended that university programs evaluate their programs for places where agricultural communication content skills can be integrated. Teacher preparation programs could expose students to agricultural communication content and skills throughout their pedagogical coursework in a way that supports practical usage, and not just theoretical knowledge accumulation (McKay et al., 2022). Swensen et al. (2021) specifically calls for university programs to create curriculum materials and resources to meet the demands of agricultural communication's evolutionary nature that is easy to integrate into existing SBAE programs. With a growing number of agricultural communication programs (Miller et al., 2015) being housed in the same departments as SBAE programs (Harder et al., 2021), relevant experts are accessible. This recommendation follows the implications left by DeBenidetto et al. (2018) that university programs have been the guiding force in determining content programming as well as in-service needs for SBAE teachers that was initially posited by Barrick et al. (1983). Since this recommendation could be interpreted to expect more from university programs that may already be taxed or stretched thin, it is also recommended that SBAE support agencies, like NAAE or Team Ag Ed, to build synergistic partnerships with established agricultural communication faculty to increase efficacy for disseminating content and pedagogical content knowledge trainings.

Given the need for responses from this population and prior studies also having difficulty garnering more ideal response rates (e.g., Hile, 2019; McKim & Sorensen, 2020), research is needed to address sampling limitations when researching SBAE teachers from the National FFA database. Ideally, this research should address improving response rate, but research should also address how to assess the impacts of possible non-response error with this population.

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