Introduction

Agricultural communicators apply broad communication skills and theories to the agricultural industry (Sprecker & Rudd, 1998). Skills needed by successful agricultural communicators vary; however, some of the most important skills needed in the industry are strong writing skills, public speaking, message development and delivery, audience identification, agriculture industry knowledge, and effective listening (Crawford et al., 2011; Easterly et al., 2017; Kurtzo et al., 2016; Leal 2016; Morgan, 2010; Sprecker & Rudd, 1997). In a survey of agricultural and natural resources leaders, Easterly et al. (2017) sought to determine the workforce competencies graduates of post-secondary agriculture education programs should have obtained and found that dependability, critical thinking, strategic planning, and clear communication were highly rated competencies for agriculture education graduates. In a survey of agricultural communications experts, Kurtzo et al. (2016) found that general agriculture, policy understanding, technical communication, science knowledge, audience identification, agricultural and policy knowledge, and targeted message development and delivery were all important skills needed by agricultural communicators.

Technical skills, such as written and oral communication (Leal et al., 2020), and social skills, such as positive work values and being a productive member in the workplace (Leal et al., 2019), were highest ranking in a survey of agricultural communications industry professionals, graduates, and faculty members assessing the perceived importance of technical and social skills for entry-level agricultural communications college graduates. In addition, Robles (2012) identified the Top 10 soft skills from the perspective of business executives as integrity, communication, courtesy, responsibility, social skills, positive attitude, professionalism, flexibility, teamwork, and work ethic. Soft skills have been defined as character traits, attitudes, and behaviors (Robles, 2012) as well as people and interpersonal skills, such as communicating well, teamwork, and patience (Leal, 2016). Cofelt and Smith (2020) found that business managers value communication skills such as relatability (networking), clear documentation (writing), and audience awareness (listening and adapting).

Many studies have analyzed and evaluated the skills and competencies needed for agricultural communications programs at the collegiate level to prepare job-ready graduates (Irlbeck & Akers, 2009; Leal, 2016; Morgan, 2010; Morgan, 2012; Morgan & Rucker, 2013; Sitton et al., 2005; Sprecker & Rudd, 1998; Sprecker & Rudd, 1997). While there are many resources for collegiate-level agricultural communications curricula, few studies have been conducted to identify skills and competencies that need to be taught in high school agricultural communications programs (Akers, 2000; Atkins et al., 2022). Pennington (2015) emphasized the importance of incorporating agricultural communications into high school curricula, drawing on the long-established presence of formal agricultural communications courses in postsecondary education. Pennington also noted that, given the growing gap between people and agriculture, postsecondary institutions could play a key role in supporting secondary teachers to expand and enhance agricultural communications offerings.

In a national Delphi study using a panel of agriculture educators, industry professionals, and university faculty in agricultural communications departments, Akers (2000) examined competencies that were necessary for high school agricultural communications curriculum. Akers (2000) identified 93 competencies as recommended by the expert panel to include in a high school agricultural communications curriculum. Additionally, Akers (2000) identified 11 topic areas as appropriate to use when developing high school agricultural communications

curriculum. Atkins et al. (2022) built on the findings of Akers (2000), and also used a national Delphi study to identify competencies that should be included in high school agricultural communications curricula from the perspective of university faculty in agricultural communications departments. Atkins et al. (2022) used the 93 competencies found in Akers' (2000) study as a starting point and found that only 68 were recommended by the panel of university faculty to include in a high school agricultural communications curriculum.

Rapid technological change in the past 25 years has affected every aspect of the communication sector, including agricultural communications (Corder & Irlbeck, 2018; Lundy et al., 2022). Given how quickly the communication sector evolves, it is crucial to regularly assess the curriculum to guarantee that students are adequately equipped for their future professions (Finch & Crunkilton, 1989). The curriculum should be reviewed by individuals who are familiar with the coursework (Doerfert & Miller, 2006). Finch and Crunkilton (1989) noted that curriculum review is necessary to determine the quality and worth of a curriculum in vocational and technical education. A quality curriculum should contribute to student growth, curriculum material credibility, and practical considerations associated with their use (Finch & Crunkilton, 1989).

Purpose and Research Objectives

The purpose of this national study was to provide an up-to-date consensus about the competencies needed for high school students who complete agricultural communications courses. The following research objectives guided this study:
1. Identify the competencies that should be included in a high school agricultural communications curriculum.
2. Identify the appropriate scholastic level to introduce the identified agricultural communications competencies to high school students.

Conceptual Framework

The conceptual framework used to guide this study is the Model for Gathering Consensus for Competencies in Education (Atkins et al., 2022) which was adapted from Finch and Crunkilton's (1989) Curriculum Development in Vocational and Technical Education system for implementing competency-based education which has nine main elements:
- Identify the life/work domain
- Review available resources
- Identify competencies
- Verify competencies
- Identify competency standards
- Develop objectives and criterion-referenced measures
- Develop instructional activities and materials
- Develop support plans
- Initiate the program

The Model for Gathering Consensus for Competencies in Education (Atkins et al., 2022; Figure 1) highlights element three, identify competencies, and element four, verify competencies. Previous research indicates that high school agriculture educators often view their job as a lifestyle rather than a career (Murray et al., 2011), which can lead to working excessive hours and poor work-family balance (Sorensen et al., 2016) (step 1, identify the life/work domain). Additionally, high school agriculture educators do not have the resources they need to

gain knowledge in agricultural communications (Atkins, 2023; Lawson, 2021) (step 2, review available resources). In this study, the researchers focused on element three and element four.

Element three, identify competencies, can be the most critical part of implementing competency-based education because competencies serve as a foundation for educational activities (Finch & Crunkilton, 1989). Competencies have three dimensions that should be taken into consideration when being identified: "the task dimension, the human dimension, and the environmental dimension" (Finch & Crunkilton, 1989, p. 268). The task dimension is typically the easiest to identify because it is a general statement of what needs to be done. The human dimension can be the more difficult to isolate, since this dimension typically includes soft skills and characteristics. The environment dimension is usually localized and depends on the life/work environment graduates of a program are expected to be employed (Finch & Crunkilton, 1989).

Finch and Crunkilton (1989) described element four as the verification step in implementing competency-based education. Once a competency has been identified, it needs to be verified to ensure it is critical to succeed in the vocation. Verification steps can include formal surveys, task analyses, interviews, or other means. Finch and Crunkilton (1989) recognized that overlap exists between element three (identification) and element four (verification). These two steps can happen simultaneously, where a competency is verified as it is identified. It is important at this step in the process, to decide which competencies will actually be used in the educational program, given the educational, fiscal, and resource constraints of educators (Finch & Crunkilton, 1989).

Figure 1
Model for Gathering Consensus for Competencies in Education (Atkins et al., 2022)
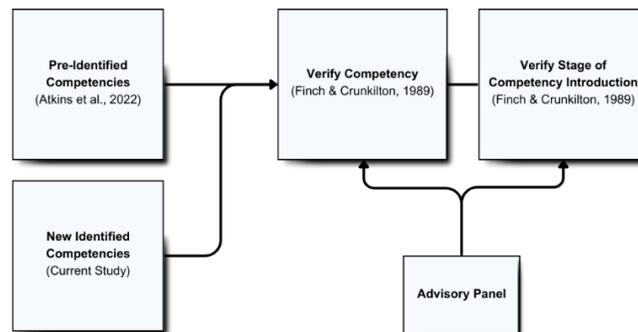
This study adapted elements three and four to organize the identification and verification of agricultural communications competencies for high school education. This adaptation is visualized in the Model for Gathering Consensus for Competencies in Education. In the model, the pre-identified competencies and new competencies are verified by the advisory panel. While the advisory panel is verifying each competency, the panel also verifies the stage of when the competency should be introduced to students. The 68 pre-identified competencies are adapted from Atkins et al.'s (2022) study and originated from Akers' study (2000), and the new competencies were established in this study. The competencies were verified through the advisory panel of high school agriculture educators who teach agricultural communications. The scholastic level that is best to introduce each competency to the student was also verified by the advisory panel.

Methods

This study used a modified Delphi as the method for collecting data. The Delphi has been applied in research for various aspects of curriculum development in agricultural education and competency identification (Linstone & Turoff, 2002; Martin & Frick, 1998; Warner, 2014). According to Linstone and Turoff (2002), "Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem" (p. 3). The Delphi can be used as an alternative to face-to-face group interactions, such as focus groups or interviews, and allows all participants to have an equal opportunity to be involved in the consensus process (Geist, 2010; Linstone & Turoff, 2002). This reduces the possibility for any panelist to influence the decision-making more than another and eliminates scheduling or geographic restrictions (Geist, 2010; Linstone & Turoff, 2002; Warner, 2014;).

Once the problem is identified by the moderator/researcher, the next step in the Delphi process is to organize a panel of experts (Linstone & Turoff, 2002; Warner, 2014). The panel should include individuals who are stakeholders in the issue and are qualified to participate in the decision-making process (Linstone & Turoff, 2002; Warner, 2014). Akers (2000) used a panel of high school agricultural communications teachers, agricultural communications industry leaders, and university faculty in agricultural communications departments to identify what competencies were important to include in an agricultural communications curriculum and identify what scholastic level was appropriate to introduce each competency to students. Atkins et al. (2022) used a panel of university faculty in agricultural communications departments to determine what competencies were important for high school agricultural communications courses. While there is not a perfect number for a panel, a panel of 10 to 15 experts is often recommended as the ideal range (Delbecq et al., 1975).

After a panel is identified and selected, the first of several questionnaire iterations begins (Geist, 2010). The first iteration is typically generative, usually consisting of multiple open-ended questions about the topic, but, in some instances, the panel can be asked to respond to an existing list of data (Akers, 2000; Atkins et al., 2022; Linstone & Turoff, 2002; Warner, 2014). Atkins et al. (2022) used the 93 competencies found in Akers (2000) study, instead of a generative round, and found that only 68 competencies were recommended by the panel of university faculty to include in a high school agricultural communications curriculum. For this study, the 68 competencies found in Atkins et al. (2022) study were used, instead of generating a list of competencies from open-ended questions. After the generative round, the researcher condenses responses and presents them to the panelists in the form of a survey for an additional round of input (Akers, 2000; Atkins et al., 2022; Geist, 2010; Linstone & Turoff, 2002). This continues until the researcher feels that consensus among the panelists has been achieved (Linstone & Turoff, 2002). An ideal number of rounds that must be completed has not been established, but many researchers agree that two to three rounds are sufficient (Akers, 2000; Atkins et al., 2022; Linstone & Turoff, 2002; Warner, 2014). For this study, two rounds of questionnaires were used to establish consensus among the panelists.

Based on the research design for this study, the researchers decided that 10 to 15 high school agriculture educators who teach agricultural communications would be sufficient for this panel. Delbecq et al. (1975) indicated that an effective panel should feel personally involved in the issue, be motivated to complete the Delphi task, and feel that the information gathered from the study will be useful to them. The researchers decided a panel of high school agriculture

educators who teach agricultural communications would fit these criteria and be sufficient for this national study.

This study used Qualtrics online survey software for both survey instruments, rounds one and two. The surveys used matrix tables with Likert scale response options. The survey for round one was delivered via an anonymous link attached to a post on a Facebook group for high school agriculture educators. The survey for round two was delivered to each panelist's email.

Upon receiving approval from the University of Florida Institutional Review Board, potential panelists were identified through convenience sampling (self-selected) and snowball sampling. Convenience sampling is a form of nonprobability sampling where participants self-select to participate or have easy access to the study instrument (O'Leary & Israel, 2023). Snowball sampling refers to a strategy where a few identified members of a population are asked to identify other members of the population for the purpose of obtaining a population sample (Handcock & Gile, 2011). Snowball sampling was used when the researchers emailed the survey link, along with a request to participate, to agriculture education faculty at land-grant universities in the 14 states identified by Lawson (2021) that teach high school agricultural communications. These faculty forwarded the survey link and participation request to their contact lists of high school agricultural communications teachers in their respective states. Convenience sampling was used when panelists were asked to participate from a national Facebook group "Ag Ed Discussion Lab" for high school agriculture educators. At the time of the study, there were 14,362 members in this Facebook group. Potential panelists were chosen based on two criteria: (1) they were a high school agriculture educator, and (2) they were currently teaching courses in agricultural communications. Filter questions were used on the Qualtrics instrument to determine which respondents fit these criteria. There were 11 complete responses from participants who fit these criteria.

Akers (2000) identified 93 competencies as recommended by an expert panel of agriculture educators, industry professionals, and university faculty to include in a high school agricultural communications curriculum. Atkins et al. (2022) used the 93 competencies found in Akers' (2000) study as a starting point and found that only 68 were recommended by the panel of university faculty to include in a high school agricultural communications curriculum. The first iteration of this study included the list of 68 existing competencies found in Atkins et al.'s (2022) study. The panel was asked to indicate (1) how important they believed each competency is in a high school agricultural communications course and (2) when they felt the competency should be first introduced to the student. The panel was asked to rate each competency using a four-point Likert scale: "No Importance," "Low Importance," "Moderate Importance," and "High Importance." The panel was asked to rate when each competency should be introduced to the student by indicating "High School Freshman," "High School Sophomore," "High School Junior," "High School Senior," or "College" next to each competency that was not rated "No Importance"; competencies that were rated "No Importance" did not receive an introduction rating. The panel was also asked to list any competencies they felt should be included in a curriculum that were not already listed.

Of the 11 participants, three did not respond to the second portion of the survey (introductory levels). Therefore, only eight responses were used in the data analysis for this portion of the survey. The researchers determined a priori that only those competencies receiving a two-thirds level of agreement or higher would be used for inclusion in the curriculum. The percentage of the panel who selected "Moderate Importance" or "High Importance" was used to

measure overall agreement. This iteration was available to panelists from April 14, 2023, to June 14, 2023.

The new responses from the first survey were used to build the second survey. Some of the competencies were reworded for clarity and verbs were changed to performance terms so they could be utilized as competencies. Only six new competencies were identified by the panel. Prior to being used for the second survey, the list of newly identified competencies was reviewed by University of Florida faculty in the agricultural education and communication department. The panel was asked to indicate (1) how important they believed each competency was in a high school agricultural communications course and (2) when they felt the competency should first be introduced to the student. The panel was asked to rate each competency using a four-point Likert scale: "No Importance," "Low Importance," "Moderate Importance," and "High Importance." The panel was asked to rate when each competency should be introduced to the student by indicating "High School Freshman," "High School Sophomore," "High School Junior," "High School Senior," or "College" next to each competency. The researchers determined a priori that only those competencies receiving two-thirds level of agreement or higher would be used for inclusion in the curriculum. The percentage of the panel who selected "Moderate Importance" or "High Importance" were used to measure overall agreement. This iteration was delivered to each participant's email who responded to the first survey (n=11). The second survey was sent on July 31, 2023, and an email reminder was sent to unfinished panelists on August 14, 2023.

Findings

The panel verified the 68 competencies found in Atkins et al.'s (2022) study, which originated from Akers' (2000) 93 competencies, and identified six new competencies, totaling 74 competencies. The six new competencies include: "Develop basic web design skills," "Demonstrate leadership skills," "Write a press release," "Develop podcasting skills," "Utilize a DSLR camera," and "Utilize the basic principles involved in photography." The 74 total competencies can be categorized under Akers' (2000) original 11 topic areas: (1) Writing; (2) Computer/Information Technology; (3) Agricultural Industry; (4) Communication History; (5) Professional Development; (6) Research/Information Gathering; (7) Ethics; (8) Public Relations/ Advertising/ Marketing; (9) Leadership Development; (10) Legislative Issues; and (11) Communication Skills. Competencies also were placed in a twelfth category identified by Atkins et al. (2022): (12) Social Media.

Seventy-four competencies were rated by level of importance in a high school agricultural communications curriculum. The results of the panel's agreement for each competency are provided in Table 1.

Competencies receiving a 90-99% level of agreement were "Work under pressure," "Converse knowledgeably on the different areas in agriculture," "List qualities of an effective communicator," "Evaluate communications efforts," "Utilize graphic design programs," "Utilize desktop publishing techniques," "Utilize basic graphic design principles," "Effectively utilize the internet," "Develop a multimedia presentation," "Give an effective interview," "Discuss the techniques and principles involved in public speaking," "Demonstrate the ability to be an effective spokesperson for agriculture," "Demonstrate Proper phone skills," "Identify different audiences," "Discuss the role of public relations in farm organizations," "Discuss the role of public relations in agricultural companies," "Utilize social media for public relations," "Identify what makes a topic newsworthy," "Effectively interview a person," and "Create a resume."

Competencies receiving an 80-89% level of agreement were "Perform basic word processing," "Discuss the role of public relations in advertising agencies," and "Conduct audience analysis." One competency received a 72.7% level of agreement: "Demonstrate the ability to cite sources correctly."

Three of the competencies did not meet the two-thirds level of agreement. Competencies receiving lower than a 66.66% level of agreement were: "Utilize an Associated Press stylebook," "Write a script for video," and "Describe the communication model."

Table 1

Agreement levels of agricultural communications competencies from a panel of high school agriculture educators

Competency	Topic Area	% of Agreement
Utilize appropriate agricultural terminology	Agriculture Industry	100.0%
Identify current issues and concerns in the agricultural industry	Agriculture Industry	100.0%
Identify strategies to improve communications	Communication History	100.0%
Identify barriers to effective communication	Communication History	100.0%
Demonstrate different methods of communication	Communication History	100.0%
Define media literacy, basic elements, and techniques	Communication History	100.0%
Use email properly	Computer/ Information Technology	100.0%
Develop basic web design skills*	Computer/Information Technology	100.0%
Identify the importance of correctly reporting the facts	Ethics	100.0%
Identify ethical behavior in journalism	Ethics	100.0%
Identify bias in media stories	Ethics	100.0%
Distinguish between right and wrong	Ethics	100.0%
Demonstrate critical thinking skills	Leadership Development	100.0%
Deliver a formal, oral presentation using clear enunciation, gestures, tone, and vocabulary	Leadership Development	100.0%
Demonstrate leadership skills*	Leadership Development	100.0%
Speak intelligently before a group	Legislative Issues	100.0%
Discuss legal concerns about social media	Legislative Issues	100.0%
Demonstrate an understanding of copyright law	Legislative Issues	100.0%
Work in a team activity	Professional Development	100.0%
Identify the various career opportunities in agricultural communications	Professional Development	100.0%
Demonstrate professional/business etiquette	Professional Development	100.0%
Demonstrate listening skills	Professional Development	100.0%
Demonstrate a proper work ethic	Professional Development	100.0%
Target different audiences	Public Relations/ Advertising/Marketing	100.0%
Seek, gather and synthesize information	Research/Information Gathering	100.0%
Research both sides of an issue	Research/Information Gathering	100.0%
Identify sources for information	Research/Information Gathering	100.0%
Identify biased information	Research/Information Gathering	100.0%
Check facts	Research/Information Gathering	100.0%
Develop content for social media	Social Media	100.0%
Develop a social media schedule	Social Media	100.0%
Write for the web	Writing	100.0%
Write a speech	Writing	100.0%
Write a quality thank-you note	Writing	100.0%
Write a professional letter	Writing	100.0%
Write a news article	Writing	100.0%

Competency	Topic Area	% of Agreement
Utilize the basic principals involved in technical writing	Writing	100.0%
Utilize correct spelling	Writing	100.0%
Utilize correct punctuation	Writing	100.0%
Utilize correct grammar	Writing	100.0%
Effectively edit a story	Writing	100.0%
Accurately proofread a document	Writing	100.0%
Writing for blogs	Writing	100.0%
Write a press release*	Writing	100.0%
Develop podcasting skills*	Communication Skills	100.0%
Utilize a DSLR camera*	Communication Skills	100.0%
Utilize the basic principles involved in photography*	Communication Skills	100.0%
Work under pressure	Professional Development	90.9%
Converse knowledgeably on the different areas in agriculture	Agriculture Industry	90.9%
List qualities of an effective communicator	Communication History	90.9%
Evaluate communications efforts	Communication Skills	90.9%
Utilize graphic design programs	Computer/ Information Technology	90.9%
Utilize desktop publishing techniques	Computer/ Information Technology	90.9%
Utilize basic graphic design principles	Computer/ Information Technology	90.9%
Effectively utilize the internet	Computer/ Information Technology	90.9%
Develop a multimedia presentation	Computer/ Information Technology	90.9%
Give an effective interview	Leadership Development	90.9%
Discuss the techniques and principles involved in public speaking	Leadership Development	90.9%
Demonstrate the ability to be an effective spokesperson for agriculture	Leadership Development	90.9%
Demonstrate proper phone skills	Professional Development	90.9%
Identify different audiences	Public Relations/ Advertising/Marketing	90.9%
Discuss the role of public relations in farm organizations	Public Relations/ Advertising/Marketing	90.9%
Discuss the role of public relations in agricultural companies	Public Relations/ Advertising/Marketing	90.9%
Utilize social media for public relations	Social Media	90.9%
Identify what makes a topic newsworthy	Writing	90.9%
Effectively interview a person	Writing	90.9%
Create a resume	Writing	90.9%
Perform basic word processing	Computer/ Information Technology	81.8%
Discuss the role of public relations in advertising agencies	Public Relations/ Advertising/Marketing	81.8%
Conduct audience analysis	Communication Skills	81.8%
Demonstrate the ability to cite sources correctly	Research/Information Gathering	72.7%
Utilize an Associated Press stylebook	Writing	**63.6%**
Write a script for video	Writing	**54.5%**
Describe the communication model	Communication History	**54.5%**

Note. Competencies that did not meet the agreement threshold of 66.66% are bolded. New competencies identified in round two of the study are denoted with an asterisk (*).

Results of the panel's level of agreement as to when the *Agriculture Industry* competencies should be introduced are provided in Table 2. The panel agreed that one competency, "Utilize appropriate agricultural terminology," of the *Agriculture Industry* competencies should be taught at the high school freshman level. Panel members were divided

in their agreement that the competency "Identify current issues and concerns in the agricultural industry" should be introduced at the high school freshman or sophomore level. The panel agreed that one competency, "Converse knowledgeably on the different areas in agriculture," should be introduced at the high school junior level.

Table 2
Introduction levels for Agriculture Industry competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Utilize appropriate agricultural terminology	**62.5%**	25.0%	12.5%	0.0%	0.0%
Identify current issues and concerns in the agricultural industry	**50.0%**	**50.0%**	0.0%	0.0%	0.0%
Converse knowledgeably on the different areas in agriculture	12.5%	25.0%	**50.0%**	12.5%	0.0%

Note. Bolded percent denote the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Communication History* competencies should be introduced are illustrated in Table 3. The panel agreed that two of the Communication History competencies should be taught at the freshman level: "Define media literacy, basic elements and techniques" and "List qualities of an effective communicator." The panel agreed that one competency, "Demonstrate different methods of communication," should be introduced at the high school sophomore level. Panel members were divided in their agreement that the competency "Identify barriers to effective communication" should be introduced at the high school freshman or sophomore level, and the competency "Describe the communication model" should be introduced at the high school freshman, sophomore, or junior level. The panel agreed that one competency, "Identify strategies to improve communications," should be introduced at the high school junior level.

Table 3
Introduction levels for Communication History competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Identify strategies to improve communications	12.5%	25.0%	**37.5%**	12.5%	12.5%
Identify barriers to effective communication	**37.5%**	**37.5%**	25.0%	0.0%	0.0%
Demonstrate different methods of communication	25.0%	**62.5%**	12.5%	0.0%	0.0%
Define media literacy, basic elements, and techniques	**42.9%**	14.3%	14.3%	28.6%	0.0%
List qualities of an effective communicator	**50.0%**	37.5%	12.5%	0.0%	0.0%
Describe the communication model	**28.6%**	**28.6%**	**28.6%**	14.3%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Communication Skills* competencies should be introduced are illustrated in Table 4. The panel agreed that two of the Communication Skills competencies, "Utilize a DSLR camera" and "Utilize the basic principles involved in photography," should be taught at the freshman level. The panel was evenly divided in their agreement that the competency "Evaluate communications efforts" should be introduced at the high school freshman or senior level. The panel agreed that two competencies, "Conduct audience analysis" and "Develop podcasting skills," should be introduced at the high school junior level.

Table 4

Introduction levels for Communication Skills competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Evaluate communications efforts	25.0%	**37.5%**	0.0%	**37.5%**	0.0%
Conduct audience analysis	0.0%	25.0%	**37.5%**	12.5%	25.0%
Develop podcasting skills	20.0%	0.0%	**60.0%**	20.0%	0.0%
Utilize a DSLR camera	**60.0%**	20.0%	0.0%	20.0%	0.0%
Utilize the basic principles involved in photography	**80.0%**	20.0%	0.0%	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Computer/ Information Technology* competencies should be introduced are provided in Table 5. The panel agreed that five of the Computer/ Information Technology competencies, "Use email properly," "Utilize desktop publishing techniques," "Effectively utilize the internet," "Develop a multimedia presentation," and "Perform basic word processing," should be taught at the high school freshman level. The panel agreed that one competency, "Utilize basic graphic design principles," should be introduced at the high school sophomore level. The panel was evenly divided in their agreement that the competency "Utilize graphic design programs" should be introduced at the high school freshman or junior level and the competency "Develop basic web design skills" should be introduced at the high school sophomore or junior level.

Table 5

Introduction levels for Computer/ Information Technology competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Use email properly	**87.5%**	12.5%	0.0%	0.0%	0.0%
Utilize graphic design programs	**37.5%**	25.0%	**37.5%**	0.0%	0.0%
Utilize desktop publishing techniques	**50.0%**	12.5%	37.5%	0.0%	0.0%
Utilize basic graphic design principles	12.5%	**50.0%**	37.5%	0.0%	0.0%
Effectively utilize the internet	**87.5%**	12.5%	0.0%	0.0%	0.0%
Develop a multimedia presentation	**50.0%**	12.5%	37.5%	0.0%	0.0%

Competency	Freshman	Sophomore	Junior	Senior	College
Perform basic word processing	**100.0%**	0.0%	0.0%	0.0%	0.0%
Develop basic web design skills	20.0%	**40.0%**	**40.0%**	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Ethics* competencies should be introduced are illustrated in Table 6. The panel agreed that one competency, "Distinguish between right and wrong," of the Ethics competencies should be taught at the high school freshman level. Panel members were divided in their agreement that the competency "Identify the importance of correctly reporting the facts" should be introduced at the high school freshman or sophomore level. The panel agreed that two of the competencies, "Identify ethical behavior in journalism" and "Identify bias in media stories," should be taught at the sophomore level.

Table 6

Introduction levels for Ethics competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Identify the importance of correctly reporting the facts	**37.5%**	**37.5%**	12.5%	0.0%	12.5%
Identify ethical behavior in journalism	0.0%	**37.5%**	25.0%	25.0%	12.5%
Identify bias in media stories	0.0%	**75.0%**	25.0%	0.0%	0.0%
Distinguish between right and wrong	**75.0%**	12.5%	0.0%	12.5%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Leadership Development* competencies should be introduced are illustrated in Table 7. The panel agreed that three of the Leadership Development competencies, "Demonstrate critical thinking skills," "Deliver a formal, oral presentation using clear enunciation, gestures, tone, and vocabulary," and "Demonstrate leadership skills," should be taught at the high school freshman level. The panel was evenly divided in their agreement that the competency "Give an effective interview" should be introduced at the high school sophomore or junior level, and the competency "Demonstrate the ability to be an effective spokesperson for agriculture" should be introduced at the high school freshman or junior level. The panel agreed that one competency, "Discuss the techniques and principles involved in public speaking," should be taught at the sophomore level.

Table 7

Introduction levels for Leadership Development competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Demonstrate critical thinking skills	**62.5%**	37.5%	0.0%	0.0%	0.0%
Deliver a formal, oral presentation using clear enunciation, gestures, tone, and vocabulary	**75.0%**	12.5%	12.5%	0.0%	0.0%

Competency	Freshman	Sophomore	Junior	Senior	College
Give an effective interview	25.0%	**37.5%**	**37.5%**	0.0%	0.0%
Discuss the techniques and principles involved in public speaking	37.5%	**50.0%**	12.5%	0.0%	0.0%
Demonstrate the ability to be an effective spokesperson for agriculture	**37.5%**	0.0%	**37.5%**	25.0%	0.0%
Demonstrate leadership skills	**100.0%**	0.0%	0.0%	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Legislative Issues* competencies should be introduced are illustrated in Table 8. The panel agreed that one of the Legislative Issues competencies, "Speak intelligently before a group," should be taught at the high school freshman level. The panel agreed that one competency, "Discuss legal concerns about social media," should be taught at the high school senior level. The panel was evenly divided in their agreement that the competency "Demonstrate an understanding of copyright law" should be introduced at the high school junior or senior level and college level.

Table 8

Introduction levels for Legislative Issues competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Speak intelligently before a group	**50.0%**	37.5%	12.5%	0.0%	0.0%
Discuss legal concerns about social media	0.0%	12.5%	37.5%	**50.0%**	0.0%
Demonstrate an understanding of copyright law	12.5%	12.5%	**25.0%**	**25.0%**	**25.0%**

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Professional Development* competencies should be introduced are illustrated in Table 9. The panel agreed that four of the Professional Development competencies, "Work in a team activity," "Demonstrate listening skills," "Demonstrate a proper work ethic," and "Work under pressure," should be taught at the high school freshman level. The panel agreed that two competencies, "Identify the various career opportunities in agricultural communications" and "Demonstrate proper phone skills," should be taught at the high school sophomore level. The panel was evenly divided in their agreement that the competency "Demonstrate professional/business etiquette" should be introduced at the high school freshman and sophomore level.

Table 9

Introduction levels for Professional Development competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Work in a team activity	**75.0%**	12.5%	12.5%	0.0%	0.0%

Competency	Freshman	Sophomore	Junior	Senior	College
Identify the various career opportunities in agricultural communications	25.0%	**37.5%**	25.0%	12.5%	0.0%
Demonstrate professional/business etiquette	**37.5%**	**37.5%**	25.0%	0.0%	0.0%
Demonstrate listening skills	**75.0%**	12.5%	12.5%	0.0%	0.0%
Demonstrate a proper work ethic	**75.0%**	12.5%	12.5%	0.0%	0.0%
Work under pressure	**50.0%**	25.0%	25.0%	0.0%	0.0%
Demonstrate proper phone skills	37.5%	**62.5%**	0.0%	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Public Relations/Advertising/ Marketing* competencies should be introduced are illustrated in Table 10. The panel agreed that two of the Public Relations/Advertising/Marketing competencies, "Identify different audiences" and "Target different audiences," should be taught at the high school sophomore level. The panel was evenly divided in their agreement that the three competencies, "Discuss the role of public relations in farm organizations," "Discuss the role of public relations in agricultural companies," and "Discuss the role of public relations in advertising agencies," should be taught at the high school senior level.

Table 10
Introduction levels for Public Relations/Advertising/Marketing competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Identify different audiences	0.0%	**87.5%**	12.5%	0.0%	0.0%
Discuss the role of public relations in farm organizations	12.5%	25.0%	12.5%	**50.0%**	0.0%
Discuss the role of public relations in agricultural companies	12.5%	37.5%	0.0%	**50.0%**	0.0%
Discuss the role of public relations in advertising agencies	12.5%	25.0%	12.5%	**37.5%**	12.5%
Target different audiences	0.0%	**62.5%**	37.5%	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Research/Information Gathering* competencies should be introduced are illustrated in Table 11. The panel agreed that all six of the Research/Information Gathering competencies should be taught at the high school freshman level: "Seek, gather and synthesize information," "Research both sides of an issue," "Identify sources for information," "Identify biased information," "Check facts," and "Demonstrate the ability to cite sources correctly."

Table 11

Introduction levels for Research/Information Gathering competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Seek, gather and synthesize information	**75.0%**	12.5%	12.5%	0.0%	0.0%
Research both sides of an issue	**50.0%**	37.5%	12.5%	0.0%	0.0%
Identify sources for information	**87.5%**	12.5%	0.0%	0.0%	0.0%
Identify biased information	**62.5%**	12.5%	25.0%	0.0%	0.0%
Check facts	**62.5%**	25.0%	12.5%	0.0%	0.0%
Demonstrate the ability to cite sources correctly	**75.0%**	0.0%	25.0%	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Social Media* competencies should be introduced are noted in Table 12. The panel members were divided in their agreement that all three of the Social Media competencies should be taught at the high school sophomore or junior level: "Develop content for social media," "Develop a social media schedule," and "Utilize social media for public relations."

Table 12

Introduction levels for Social Media competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Develop content for social media	25.0%	**37.5%**	**37.5%**	0.0%	0.0%
Develop a social media schedule	14.3%	**42.9%**	**42.9%**	0.0%	0.0%
Utilize social media for public relations	14.3%	**42.9%**	**42.9%**	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students.

Results of the panel's level of agreement as to when the *Writing* competencies should be introduced are provided in Table 13. The panel agreed that seven of the Writing competencies should be taught at the high school freshman level: "Write a speech," "Write a quality thank-you note," "Utilize the basic principals involved in technical writing," "Utilize correct spelling," "Utilize correct punctuation," "Utilize correct grammar," and "Accurately proofread a document." The panel agreed that three competencies, "Write for the web," "Write a press release," and "Write a script for video," should be taught at the high school sophomore level. The panel agreed that four competencies, "Write a professional letter," "Write a news article," "Effectively interview a person," and "Create a resume," should be taught at the high school junior level. The panel agreed that one competency, "Utilize an Associated Press stylebook," should be taught at the high school senior level. Panel members were divided in their agreement that the competency "Identify what makes a topic newsworthy" should be introduced at the high school sophomore and junior level.

Table 13

Introduction levels for Writing competencies

Competency	Freshman	Sophomore	Junior	Senior	College
Write for the web	0.0%	**50.0%**	25.0%	25.0%	0.0%
Write a speech	**50.0%**	37.5%	12.5%	0.0%	0.0%
Write a quality thank-you note	**87.5%**	12.5%	0.0%	0.0%	0.0%
Write a professional letter	25.0%	0.0%	**50.0%**	25.0%	0.0%
Write a news article	12.5%	37.5%	**50.0%**	0.0%	0.0%
Utilize the basic principals involved in technical writing	**50.0%**	25.0%	12.5%	12.5%	0.0%
Utilize correct spelling	**87.5%**	0.0%	12.5%	0.0%	0.0%
Utilize correct punctuation	**87.5%**	0.0%	12.5%	0.0%	0.0%
Utilize correct grammar	**87.5%**	0.0%	12.5%	0.0%	0.0%
Effectively edit a story	12.5%	62.5%	12.5%	0.0%	12.5%
Accurately proofread a document	**75.0%**	12.5%	0.0%	12.5%	0.0%
Identify what makes a topic newsworthy	12.5%	**37.5%**	**37.5%**	12.5%	0.0%
Effectively interview a person	12.5%	12.5%	**50.0%**	25.0%	0.0%
Create a resume	37.5%	12.5%	**50.0%**	0.0%	0.0%
Utilize an Associated Press stylebook	12.5%	12.5%	12.5%	**50.0%**	12.5%
Write a script for video	12.5%	**37.5%**	25.0%	25.0%	0.0%
Write a press release	20.0%	**60.0%**	20.0%	0.0%	0.0%
Writing for blogs*	0.0%	**50.0%**	**50.0%**	0.0%	0.0%

Note. Rounding may make some totals not equal to 100%. Responses are from eight participants. Bolded percent denotes the scholastic level each competency should be introduced to students. *Responses are from six participants.

Conclusion and Recommendations

The conclusions for this study are based on interpretations of the data collected and are limited to the participants surveyed. Data was sorted by percentage of agreement from the participants. Two-thirds of the high school agriculture education panel members identified 71 competencies as moderately to highly important for inclusion in a high school agricultural communications course. Of these 71 competencies, 65 were derived from the findings of Atkins et al. (2022), while six were newly identified in the present study. Three competencies from Atkins et al.'s (2022) research did not achieve the two-thirds consensus threshold among the panel of high school educators. These competencies – utilizing an Associated Press stylebook, writing a script for video, and describing the communication model – should be further examined (considering the discrepancy between university professors (Atkins et al., 2022) and high school educators) prior to their inclusion in high school agricultural communications courses or their incorporation into subsequent studies. Additionally, agricultural communication educators' and agricultural communication university faculty's experiences with and knowledge of these competencies should also be examined.

The panelists identified a substantial number of competencies appropriate for introduction at the freshman and sophomore levels. This finding raises the consideration of

whether these competencies can be effectively integrated into a single introductory course for these students, with a more limited set of competencies reserved for an advanced course targeting juniors and seniors.

Overall, high school agriculture educators had more agreement about the competencies than the panel of agricultural communications university faculty surveyed in Atkins et al. (2022). The high school agriculture educators in this study had 100% agreement that 46 (out of 71) competencies are important to include in a high school agricultural communications curriculum. However, in Atkins et al. (2022), the agricultural communications university faculty only had 100% agreement about 24 (out of 68) competencies that are important to include in a high school agricultural communications curriculum.

Recommendations for Practice

Based on the competencies identified as moderately and highly important by the high school agriculture educator panel, as well as their consensus on the appropriate timing for introducing these competencies to students, the researchers recommend that the identified and verified competencies be introduced to students in an introductory and advanced agricultural communications course. The introductory agricultural communications course should encompass the following topic areas and competencies, and it is suggested that this course be designed for high school freshmen and sophomores:

Writing: Write for the web, write a speech, write a quality thank-you note, utilize the basic principals involved in technical writing, utilize correct spelling, utilize correct punctuation, utilize correct grammar, effectively edit a story, accurately proofread a document, identify what makes a topic newsworthy, write for blogs, and write a press release.

Computer/Information Technology: Use email properly, utilize graphic design programs, utilize desktop publishing techniques, utilize basic graphic design principles, effectively utilize the internet, develop a multimedia presentation, perform basic word processing, and develop basic web design skills.

Agricultural Industry: Utilize appropriate agricultural terminology and identify current issues and concerns in the agricultural industry.

Communication History: Identify barriers to effective communication; demonstrate different methods of communication; define media literacy, basic elements, and techniques; and list qualities of an effective communicator.

Professional Development: Work in a team activity, identify the various career opportunities in agricultural communications, demonstrate professional/business etiquette, demonstrate listening skills, demonstrate a proper work ethic, work under pressure, and demonstrate proper phone skills.

Public Relations/Advertising/Marketing: Identify different audiences and target different audiences.

Research and Information Gathering: Seek, gather, and synthesize information; research both sides of an issue; identify sources for information; identify biased information; check facts; and demonstrate the ability to cite sources correctly.

Ethics: Identify the importance of correctly reporting facts, identify ethical behavior in journalism, identify bias in media stories, and distinguish between right and wrong.

Leadership Development: Demonstrate critical thinking skills; deliver a formal, oral presentation using clear enunciation, gestures, tone, and vocabulary; give an effective

interview; discuss the techniques and principles involved in public speaking; demonstrate the ability to be an effective spokesperson for agriculture; and demonstrate leadership skills.

Legislative Issues: Speak intelligently before a group.

Communication Skills: Evaluate communication efforts, utilize a DSLR camera, and utilize basic principles involved in photography.

Social Media: Develop content for social media, develop a social media schedule, and utilize social media for public relations.

An advanced agricultural communications course should include the following topic areas and competencies and be taught for high school juniors and seniors:

Writing: Write a professional letter, write a news article, identify what makes a topic newsworthy, effectively interview a person, and create a resume.

Computer/Information Technology: Utilize graphic design programs and develop basic web design skills.

Agriculture Industry: Converse knowledgeably on the different areas in agriculture.

Communication Skills: Evaluate communications efforts.

Communication History: Identify strategies to improve communications.

Public Relations/Advertising Marketing: Discuss the role of public relations in farm organizations, discuss the role of public relations in agricultural companies, and discuss the role of public relations in advertising agencies.

Leadership Development: Give an effective interview and demonstrate the ability to be an effective spokesperson for agriculture.

Legislative Issues: Discuss legal concerns about social media, and demonstrate an understanding of copyright law.

Social Media: Develop content for social media, develop a social media schedule, and utilize social media for public relations.

Recommendations for Future Research

Researchers recommend that any curriculum developed with the identified competencies be pilot-tested to assess its effectiveness and determine whether any revisions are necessary. Given the foundational nature of this study, further investigation is needed into whether the competencies identified could be applicable to other elective courses, such as high school English or journalism courses, to reduce the burden on high school agriculture educators. The potential overlap between agricultural communications competencies and those in other elective courses presents a promising avenue for future research (Advance CTE, 2008; Polman et al., 2012).

The panelists identified many competencies to be introduced at the freshman and sophomore levels. Can the number of competencies identified in this research adequately be integrated into a single introductory course to freshman and sophomores, with much fewer competencies introduced in an advanced course to juniors and seniors?

Similarly, research should be conducted to identify how prepared high school agriculture education teachers are to teach such a wide variety of agricultural communications topics and competencies in introductory and advanced courses, building upon previous research identifying challenges high school agriscience teachers who teach agricultural communication have (Lawson, 2021). Given the dynamic nature of technology in the agricultural communications field and emerging communications trends and advancements, research also should be conducted to determine the accessibility high school agricultural education teachers have to communication

technology, such as photographic and video cameras, computers, or design software, to teach students the competencies identified in this and previous studies (Akers, 2000; Atkins et al., 2022; Calico, 2014; Hanson, 2007; Lawson, 2021; Stockamp, 2010).

A significant discrepancy between the panel in Atkins et al. (2022) and the high school agriculture educators in the current study was observed in the level of agreement regarding the competency of utilizing an Associated Press Stylebook. In this study, the competency received only a 63.6% level of agreement, which is considered insufficient for inclusion in future curricula. In contrast, Atkins et al. (2022) reported a higher level of agreement at 78.57%. This divergence may be attributed to a lack of resources among high school agriculture educators necessary for effectively teaching this competency. Future research could explore the skills and capabilities of secondary agricultural communications educators in integrating such competencies into their curricula (Calico, 2014; Lawson, 2021).

Future research in this area should also consider updating wording of some of the competencies. For example, in earlier studies, "Utilize a DSLR camera" was used. In future studies because other types of digital cameras, such as mirrorless cameras, are being used, it may be preferable to not specify a particular type of camera, but rather say something like "Utilize a professional camera."

If a Delphi technique is employed in future iterations of this study, the researchers suggest that the first round should be generative in nature, since this is the typical route taken with this method of research. Furthermore, an additional study should be conducted with professionals from the agricultural communications sector to provide an alternative perspective on the competencies needed in high school agricultural communications programs. Future research could also examine the differences between the agricultural communication industry. professionals, agricultural communication university faculty, and agricultural communication high school educators, including these professional respondents' experiences and knowledge, as well as the competencies they recommend.

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