

Industry is Talking: A Delphi Study Exploring Oregon State University's Agricultural and Natural Resources Communication Programming

Whitney Stone
Oregon State University

Lauren Chase
Oregon State University

Taylor Foerster
Oregon State University

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Recommended Citation

Stone, Whitney; Chase, Lauren; and Foerster, Taylor (2025) "Industry is Talking: A Delphi Study Exploring Oregon State University's Agricultural and Natural Resources Communication Programming," *Journal of Applied Communications*: Vol. 109: Iss. 3. <https://doi.org/10.4148/1051-0834.2611>

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Abstract

Agricultural and natural resources (ANR) communication undergraduate programs are expanding across the U.S. in response to the increase in employment opportunities and needs of the ANR sector. As such, Oregon State University is developing a curriculum for an undergraduate ANR communication major. To align programming needs with Oregon's industry, this study served as a needs assessment to explore the employability skills and ANR communication competencies expected by an expert panel of communication practitioners in ANR via a three-round Delphi methodology. Fourteen experts panelists obtained 100% consensus on the following nine competencies: (1) Understanding the impact and power of visual storytelling and interactive tools, (2) using credible, science-based content on social media, (3) information literacy, (4) being open to criticism, questions, and feedback, (5) demonstrating writing competencies, (6) storytelling in ANR and humanizing ANR, (7) demonstrating problem-solving, critical thinking, strategic thinking, (8) cultural competencies, (9) listening skills. Panelists also rated communication skills as the most important skills within the state of [State's] Essential Employability Skills (EES) for graduates of higher education. Recommendations include programs that integrate both employability and technical skills, such as the use of visual storytelling and interactive tools, and sourcing credible information into their curriculum based on the consensus of the panel.

Keywords

agricultural and natural resources communication, curriculum development, Delphi, employability skills, undergraduate

Cover Page Footnote/Acknowledgements

The results were first presented as a poster at the NACTA 2025 Conference in Edmonton, Alberta, Canada

Introduction

The academic discipline of agricultural communication has existed for over 100 years, beginning with the need to disseminate information on agricultural and natural resources from land-grant institutions (Doerfert & Miller, 2006). The agricultural communication discipline encompasses a broad variety of communicators, including those who advocate for and promote agriculture and natural resources organizations in both the public and private sectors (Irani & Doerfert, 2017). Over 48 universities have agricultural communication programs (Miller et al., 2015), and the 2020-2025 USDA Employment Opportunities for College Graduate Outlook reflected a 2.6% growth in employment opportunities from the previous five years, with 8,400 new jobs in agricultural education, communication, and government roles (Fernandez et al., 2020).

Regionally, California Polytechnic State University (Cal Poly) is home to California's only agricultural communication major (Cal Poly, 2025), also making it the only institution on the West Coast to offer this major. However, Oregon State University has had Agricultural and Natural Resources (ANR) communication coursework since 2017 and approved an ANR communication minor for undergraduate students on campus and online in 2020. Because of Oregon's unique geographical location and diverse commodities, considerable emphasis is placed on the interdependence of modern agriculture and natural resources management as well as the communication surrounding it. Due to Oregon State University being a land-, sea-, space-, and sun-grant university, the ANR Communication program leads decided to name what is traditionally known as "agricultural communication" at other institutions as *agricultural & natural resources communication* to reflect the College of Agricultural Sciences involvement and commitment to bettering both agriculture and natural resources sectors. The updated major name is also in alignment with other institutions that are adding "natural resources" to their agricultural communication majors, such as Kansas State University and the University of Florida. Oregon State University is developing an agricultural and natural resources communication undergraduate major to address Oregon industry ANR communication needs and to serve students in the Pacific Northwest (Idaho, Oregon, Washington; USDA Climate Hubs, n.d.) who want to major in ANR communication.

The Pacific Northwest encompasses similar geographies and climate that permit a diversity of crops grown, creates close to 300,000 jobs, and in 2017, produced \$13.8 billion in sales (USDA Climate Hubs, n.d.). The region receives 70% of its precipitation from October to March, making it unique from other regions where there is summer rainfall (Schillinger et al., 2010). Land and natural resources management practices in this region have often rely on traditional ecological knowledge from Tribal communities (Bishaw & McFarland, n.d.). For instance, the U.S. Forest Service involves over 70 Tribal Nations to assist with stewardship and conservation practices (USDA Forest Service, 2025). Riparian forest buffers for crops and grazing lands, agroforestry, forest farming, and alley cropping are all unique practices in the region that demonstrate the interconnectedness of agriculture and natural resources (Bishaw & MacFarland, n.d.). For energy, 40% of the U.S.'s hydropower is created in this region (U.S. Energy Information Administration, 2014). Additionally, stakeholders in this region of the U.S. have shown readiness to address climate change readiness, mitigation strategies, and policy (Hall, 2016), prompting a need to have trained science communicators. Having an ANR communication major at Oregon State University will also help the university be in accordance with other land-grant peer institutions, which have had ANR communication majors for decades.

Due to the dynamic nature of the agricultural communication industry (Irani & Doerfert, 2017), the expectations of university graduates must be regularly reassessed in light of the industry's needs (Aherns & Gibson, 2013; Clem et al., 2014; Leal et al., 2020; Wilson et al., 2020).

Furthermore, Oregon has identified Essential Employability Skills (EES) for all Oregon graduates in a study conducted by the Oregon Workforce and Talent Development Board in partnership with the Oregon Board of Education (Mersereau et al., 2020). These organizations recognized the value of STEM/STEAM-related skill development; however, they also acknowledged the importance of soft skills, or essential skills, such as critical thinking, communication, and problem-solving, as crucial to success in the majority of workplaces (Mersereau et al., 2020). These organizations noted a lack of concerted effort among employer groups and education systems to develop essential or soft skills (Mersereau et al., 2020).

To collect the perspectives of Oregon employers about the prioritization of EES needed by graduation to be successful in their careers, a survey was deployed to different Oregon industries asking them to rank the 16 EES created and vetted by the Oregon Workforce and Talent Development Board and the Oregon Board of Education. The study identified 16 EES, including communication skills, collaboration, professionalism, adaptability and flexibility, work ethic, critical thinking, time management, cultural awareness, analysis and solution mindset, innovative thinking, digital fluency, resiliency, empathy, entrepreneurial mindset, and leadership (Mersereau et al., 2020). Respondents ($n = 524$) ranked the importance of the 16 EES, and the Agriculture, Food, and Natural Resources industry was the second biggest sector represented in the study (Mersereau et al., 2020). Respondents ranked (in order) work ethic, communication, adaptability and flexibility, professionalism, and time management as the top five EES. The lowest-ranked EES (in order) were entrepreneurial mindset, leadership, digital fluency, innovative thinking, empathy, and self-awareness (Mersereau et al., 2020). Academic programs are encouraged to implement EES in courses to help students meet employer needs (Mersereau et al., 2020).

Given the dynamic nature of the agricultural and natural resources sectors (USDA, 2019), it is crucial that academic programs, such as ANR communication at Oregon State University, are designed to equip students with both the technical knowledge and essential employability skills (EES) needed for success in the workforce. As identified in Oregon's workforce development study, employers value skills such as communication, critical thinking, and adaptability, all of which are critical for future graduates of agricultural and natural resources communication programs (Mersereau et al., 2020). By aligning the curriculum with these evolving industry needs, Oregon State University can ensure its graduates are not only prepared for the current job market but also for the future challenges in agriculture and natural resources management.

Currently, there is a lack of research on the specific competencies required by graduates of ANR communication undergraduate programs in the Pacific Northwest of the U.S. This is a critical gap, as agricultural and natural resources industries vary across different regions of the U.S. and therefore require dedicated attention to discern needs unique to each area. This study aimed to explore the competencies that undergraduates of Oregon State University ANR communication program need to effectively meet the communication demands of the agricultural and natural resources sectors in Oregon, as well as the essential employability skills (EES) identified by the Oregon Workforce and Talent Development Board. This study will provide valuable insights into what Oregon needs in ANR communication undergraduate curriculum, ultimately guiding the development of a program that fosters well-rounded, highly employable

graduates. In tandem, this study provides foundational understanding of competencies that would be particularly useful for undergraduates in Oregon and states with similar commodities, as our discipline and programming continue to expand.

Literature Review

Employability Skills for College Graduates

An increasing number of global employers expect universities to prepare graduates to be job-ready upon leaving higher education and entering the workforce (Baker, 2020). However, there is a gap in the skills needed by the workplace that is missing from higher education; although being academically qualified to fill positions, students must also possess also employability skills that help them transition from education and training to the workplace (Crawford & Fink, 2020; Haji Sarbini, 2023). Al Asefer and Zainal Abidin (2021) found through a synthesis of literature that employability “is a multi-dimensional concept and is used in contexts of transferable, generic, intellectual, interpersonal, industry-specific, and cognitive skills (p. 44). Previous research shows that graduate employability is a multifaceted construct and consists of both technical competencies that are specific to a discipline and essential or sometimes referred to as soft skills, which are transferable across different jobs and scenarios such as communication or problem solving (Mwita et al., 2024; National Research Council, 2013; Villegas, 2024). Understanding how higher education prepares students for the workforce via employability skills is an area of research commonly studied and sponsored by the Association of American Colleges and Universities (AACU), the Association of Public and Land-grant Universities (APLU), and the National Association of Colleges and Employers (NACE; Crawford & Fink, 2020). In a rapidly developing industry where consumers are increasingly interested in the food system and agriculture, agricultural communication students must acquire technical, psychological, and behavioral skills for their careers (Kainer & Leggette, 2023).

Desired Essential (Soft Skills) Competencies

Across the agricultural and natural resources fields, employers consistently prioritize soft skills, such as communication, teamwork, professionalism, and problem-solving, over technical expertise, which they believe can be taught on the job (Crawford et al., 2011; Wilson et al., 2019; Colclasure, 2020; Rinker & Smalley, 2020). Studies of employers, alumni, and faculty highlight communication, both verbal and written, as the most critical competency, even though students often undervalue its importance compared to technical skills (Crawford & Fink, 2020; Hendrix & Morrison, 2018).

Within agricultural communications, recent work underscores the need to integrate writing, social media, ethics, leadership, and industry knowledge into curricula at both high school and undergraduate levels (Atkins et al., 2022; Atkins et al., 2025; Kainer & Leggette, 2023; Leal et al., 2019). Employers also emphasize the importance of conflict management, adaptability, and critical thinking for entry-level positions (Dyment et al., 2025; Leal et al., 2019). These findings suggest that foundational soft skills form the basis for career readiness and prepare students for increasingly complex communication roles in the agricultural industry.

Desired Technical Competencies

Research consistently demonstrates that soft skills, particularly communication, teamwork, and professionalism, are prioritized by employers in agriculture and natural resources fields (Colclasure, 2020; Crawford et al., 2011; Rinker & Smalley, 2020; Wilson et al., 2019). Studies using Delphi methods, content analyses of job postings, and surveys with stakeholders all reinforce that competencies such as verbal and written communication, problem-solving, leadership, and time management are considered more critical than technical skills, which employers believe can often be taught on the job (Crawford & Fink, 2020; Hendrix & Morrison, 2018).

Within agricultural communications specifically, recent research highlights the importance of integrating competencies like writing, social media, ethics, leadership, and industry knowledge at both high school and undergraduate levels (Atkins et al., 2022; Atkins et al., 2025; Kainer & Leggette, 2023; Leal et al., 2019). Employers and industry professionals emphasize conflict management, critical thinking, initiative, and adaptability as key hiring qualities (Dyment et al., 2025; Leal et al., 2019). These findings suggest that while students often undervalue communication compared to technical skills, industry consistently identifies employability skills such as communication, ethics, and teamwork as foundational for career success in agricultural communication and related industries. Additionally, Settle et al. (2025) explored the most important skills needed in agricultural communications at the master's level. Settle et al. (2025) found that faculty rated competencies such as advanced communication theory, professional media relations, and strategic messaging techniques as the most needed skills in agricultural communications graduate programs. This aligns with the foundational skills identified for high school and undergraduate students, such as writing, social media, ethics, leadership, and industry awareness (Atkins et al., 2022; Atkins et al., 2025; Kainer & Leggette, 2023; Leal et al., 2019). Together, these findings suggest that soft skills and basic technical abilities provide a foundation for agricultural communications programs to build discipline-specific communication expertise.

While these previous sections have outlined the desired technical skills for agricultural communications programs and the desired soft skills, both technical and soft skills are necessary in the agricultural communications workplace and agricultural communications program should be a blend of technical and soft skills (Corder & Irlbeck, 2018; Dyment et al., 2025; Leal et al., 2019). There is still a lack of literature that focuses specifically on agricultural *and* natural resources communication competencies identified by industry as a blended discipline.

Theoretical Framework

This study was guided by constructivist learning theory, where human knowledge and meaning are based on their experiences (Bada, 2015). Constructivism in an educational setting explains how individuals learn and acquire knowledge, where learners have to explore and ask questions on knowledge. Knowledge is constructed and built on previous learning and knowledge (Bada, 2015). Learning is an active process where new understandings and knowledge based on experience can contribute to knowledge generation (Phillips, 1995). In this study, knowledge and experience of the Delphi panel are assessed and explored through an iterative consensus-building technique to understand what skills and competencies are needed for undergraduates at Oregon State University. Each panelist had varying years of experience

working in communication in Oregon, which was part of the sampling process. Therefore, each panelist brought their own knowledge and understanding of what skills would be needed for ANR communication for students completing the undergraduate major at Oregon State University. The panelist's knowledge is generated by their experience and is impacted by social, cultural, and contextual sources (Kanuka & Anderson, 1999).

Purpose of the Study

The purpose of this study was to identify the competencies that undergraduates of Oregon State University ANR communication program need to effectively meet the communication demands of agricultural and natural resources sectors in Oregon, as well as the essential employability skills (EES) identified by the Oregon Workforce and Talent Development Board. In addition to the program specific benefits of the study, we also sought to provide foundational information on skills that may be relevant for students wanting to work in states with similar commodities as Oregon to gain as a part of their higher education in ANR communication programming. The study sought to address the following research objectives:

RO1: Identify the Oregon Department of Education employability skills industry thinks are most important for ANR communication undergraduates to have upon graduation.

RO2: Identify the competencies industry deems the most important to include in ANR communication undergraduate curriculum.

Methods

This study used a needs assessment to explore the skills needed by students, which could then better inform curriculum development. A needs assessment in curriculum is an empirical process that focuses on defining a desired result or product of a given sequence of curriculum development (English & Kaufman, 1975). Developing the right curriculum is the foundation for high-quality educational programs and institutions (Khan & Law, 2015). For a needs assessment to be useful and valid, it is a participatory process where educators, partners of learning, and community members help define the needs (English & Kaufman, 1975).

To employ a participatory process, we used modified Delphi methodology to identify key skills for agricultural and natural resources communication programming at Oregon State University to gain consensus among a panel of experts. In line with Atkins et al. (2022; 2025), we used a three-round Delphi technique, including an initial exploratory round, followed by a second and third round of surveys to gather insight on consensus among the identified competencies.

Recruitment

The subjects that comprise an expert panel of a Delphi need to be highly trained in a specific knowledge area (Hsu & Sandford, 2007). We identified our expert panel of respondents by contacting professionals who worked in agricultural and natural resources communication using a purposive and snowball sampling (Warner, 2024). Agricultural and natural resources communication professionals in Oregon are currently limited, so we also used a snowball sampling to increase the number of participants on our expert panel. After identifying the possible participants on the expert panel, we contacted 27 participants, and 17 agreed to

participate. A Delphi should have 10-15 participants (Delbecq et al., 1975), so we contacted more people than needed, knowing that not everyone would opt in to participate.

Instrumentation

Exploratory First Round Survey

We sent the first round of the survey in August 2024 and completed it in October 2024. After each round of the survey was sent out via a Qualtrics link through email, the panel had two weeks to complete the survey. An email reminder was sent out a week before the survey was due, which prompted significant gains in completion of each round of the survey (Dillman, 2014). The first round of the survey was sent to 17 respondents, indicating a 100% response rate and included three questions, gathering qualitative and quantitative responses. We used Acker (2010) as the guide for one of the questions: “Under each topic area, please list the skills associated with each topic area that are most important for Oregon agricultural and natural resources communicators to have. Example skills are listed after each topic area in parentheses.” Respondents then wrote in their responses. The second question included, “What topic areas were not featured on the previous question that you think would be important for Oregon State University agricultural and natural resources communication graduates to have experience in?” Our third question referenced the Oregon Workforce and Talent Development Board and the Oregon Board of Education Essential Employability Skills survey (2020) study, where we asked the panel to note their level of agreement for 16 essential employability skills (strongly disagree to strongly agree) on a 5-point Likert-type scale. These skills included self-awareness, collaboration, digital fluency, resiliency, analysis solution mindset, entrepreneurial mindset, adaptability and flexibility, communication skills, empathy, cultural awareness, work ethic, leadership, innovative thinking, professionalism, critical thinking, and time management.

The first round of survey data yielded 238 qualitative responses that were analyzed using deductive thematic analysis based on Atkins et al. (2022; 2025) twelve categories of skills. These themes included writing, computer information/technology, agriculture industry knowledge, communication history, professional development, research information, ethics, public relations, leadership, legislative issues, communication skills, and social media. We removed the ethics category because we embedded ethics within the existing categories and to extract more nuance in the coding. Additionally, we asked the panel to identify skills that might not be featured in the outlined themes and inductively coded their responses. We based this inductive approach on how Atkins et al. (2022; 2025) had an emergent category in their Delphi study. Author 1 and author 2 coded the qualitative responses together agreeing on groups of codes from the written responses, creating categorical segments to link to the research objectives (Thomas, 2006). Author 3 was consulted for peer-debriefing of the codes to ensure they aligned from an external perspective (McLeod, 2024). To mitigate bias or incorrectly coding a participant’s answer, we included the following language in Round 2 of the Delphi: “If you feel we merged a skill that changed the original meaning of the one you provided, please include your preferred wording at the end of the survey. We will make sure to include it in the next round of the survey.” However, participants did not make any adjustments to the coding.

After collapsing the qualitative responses into the themes and comparing similar responses, we had 98 total competencies. For validity, we based our instrument on the Atkins et al. (2022; 2025) instrument and also worked with a panel of experts to gain consensus. To

provide an overview of the progression of our competencies, we began the rating process with 98 competencies in round two that were distilled to 56 competencies rated in our final round, indicating a 57% retention rate. All ratings for the final round of panel review are presented below. The next section describes this progression in detail.

Competency Rating and Agreement: Second and Third Round Survey

After condensing panelist responses through the thematic analysis, panelists were asked to rate the importance of each competency in line with their perceptions of skills that graduates from Oregon State University should have upon graduation. Our approach was modified from previous Delphi studies for curriculum development for agricultural communication programs (Atkins et al., 2022; 2025; Morgan, 2010; Morgan & Rucker, 2013). Panelists used a five-point Likert-type scale ranging from “Not important at all” (1) to “Absolutely essential” (5), modified from Atkins et al. (2022; 2025).

To identify this consensus, we ran frequency data, and the cumulative percentages were considered for agreement. To begin, only competencies that met or surpassed the ~66.7% “of average importance (3)” were rated in the final survey, similar to Atkins et al. (2022; 2025). However, our results showed that almost all competencies matched this criterion, limiting our ability to identify and distill competencies with emphasized importance. To address this limitation, we modified our analysis procedure to include only competencies that were rated as “very important” (4) or “absolutely essential” at two-thirds agreement (~66.7%) for re-rating in our third round of surveys. Forty-two (42) competencies were removed during this process, resulting in a total of 56 competencies ranked. The entire panel completed the second round of the survey, indicating a 100% response rate.

Panelists rated the 56 competencies using the same scale as the second round, indicating their perceived level of importance for each competency. Fourteen (14) out of 17 on the expert panel completed the third round of the survey, indicating an 82% response rate. We also included a series of demographic questions in our final round in addition to competency ratings. All competency scores, regardless of percent agreement, are reported here. Percentages reported are based on cumulative percentages of a score of four and above.

Panelists

Our final panelists consisted of fourteen professionals spanning a variety of agricultural and natural resource communication fields who currently or previously worked in Oregon. Our panelists ranged in years of experience from 4 years to 35+ years and most ($n = 7$) were between 28-46 years old, with two participants between 18 and 27 and one between 59-77, mostly female ($n = 9$), with four males and one participant preferring not to disclose their gender (Table 1).

Table 1
Industry Representation among Delphi Panelists

What field of Oregon agriculture/natural resources do you work in?
Communication
Forestry
Government
Government Affairs

Growing/processing fruits and vegetables
 Higher education
 Higher education/Alumni Affairs
 Non-profit/Education
 Non-profit Advocacy
 Research
 Science writer and educator
 Seed sales and general branding/marketing
 University communication

Results

RO1: Identify the Oregon Department of Education employability skills industry thinks is most important for ANR communication graduates to have upon graduation.

Panelists rated the highest employability skill for Oregon graduates as communication skills ($M = 4.94$, $SD = .243$), while they rated leadership as the lowest skill set ($M = 3.94$, $SD = .966$).

Table 2

Employability Skills Rated by Delphi Panelists

Employability Skill	Mean	SD
Communication Skills	4.94	.243
Collaboration	4.82	.393
Professionalism	4.82	.393
Adaptability and Flexibility	4.76	.437
Work Ethic	4.76	.437
Critical Thinking	4.71	.588
Time Management	4.65	.862
Cultural Awareness	4.59	.712
Analysis Solution Mindset	4.53	.624
Innovative Thinking	4.47	.624
Digital Fluency	4.47	.624
Resiliency	4.41	.870
Empathy	4.35	.862
Entrepreneurial Mindset	4.24	.903
Leadership	3.94	.966

RO2: Identify the competencies industry deems the most important to include in the ANR communication undergraduate curriculum.

Twelve categories were derived and adapted from Atkins et al. (2022; 2025), including writing, computer and information technology, agricultural and natural resources industry, communication history, professional development, research/information gathering, ethics, public

relations/advertising/marketing, leadership development, legislative issues, and communication skills, and social media. The Diversity, Equity, and Inclusivity and Journalism categories were added in an effort to comprehensively capture the breadth of our panelists' suggestions for skills in the first round of data collection. We also modified the naming of leadership development to be workplace skills, to better reflect additional competencies that fit this category but operate slightly outside of leadership and more toward previous literature.

The panel rated 56 competencies by level of importance in the third round of our data collection. Of these 56, 45 met consensus based on a two-thirds (~66.7) rating of "very important", a score of four, or above. Percent agreement was defined here as the cumulative percentage of panelists who rated "Very Important (4)" or "Absolutely Essential (5)." Of the 56 competencies rated, nine had received 100% agreement among panelists. Specifically, all panelists agreed that "Understanding the impact and power of visual storytelling and interactive tools," "Using credible, science-based content on social media," "Information literacy...", "Being open to criticism, questions, and feedback," "Demonstrating writing competencies...", "Storytelling in ANR and humanizing ANR," "Demonstrating problem-solving, critical thinking, strategic thinking," "Cultural competencies..." and "listening skills" were rated as very important or higher for undergraduates in the agricultural sciences and natural resources communication program at Oregon State University to have post-graduation. Five competencies ranked between 90-99.9%, 12 between 80-89.9%, and 19 between 67-79.9%. Table 3 provides a comprehensive overview of all competencies and their respective ratings.

Table 3
Competencies Ranked by Panelists

Competency	Agreement (%)
Computer and Information Technology	
Using and managing email and communication systems properly and professionally (MailChimp, Outlook, WhatsApp, etc.)	85.7
Understanding the appropriate use of AI (artificial intelligence) and AI tools (like Chat GPT)	78.6
Social Media	
Understanding the impact and power of visual storytelling and interactive tools	100.0
Using credible, science-based content on social media	100.0
Proper use and selection of social media platforms for intended audiences	85.7
Understanding social media ethics (accessibility, legal issues, authenticity)	85.7
Utilizing social media management and strategy (developing a content calendar, building community, communicating with followers, knowing how to react to trends, managing engagement, managing comments, formatting messages appropriate for different platforms)	71.4
Utilizing "call to action" in social media	42.9
Research/Information Gathering	
Information literacy (finding credible sources and citing them, fact-checking, identifying biases in sources, using databases and repositories)	100.0

Competency	Agreement (%)
Science literacy (understanding science, understanding what data represents, interpreting data and using statistics accurately)	78.6
Staying up to date with ANR issues, legislation, and monitoring media	78.6
Creating and conducting ANR research projects (e.g., interviewing people, surveys, focus groups, asking follow-up questions, researching demographics, data collection, and analysis, knowing qualitative vs. quantitative research)	64.3
Professional Development	
Being open to criticism, questions, and feedback	100.0
Practicing Professionalism (e.g., showing up with your gear ready to roll so you are not wasting others' time, follow-up, and responsiveness)	92.9
Interpersonal Communication (e.g., how humans use verbal and nonverbal cues to accomplish several personal and relational goals)	85.7
Emotional Intelligence	71.4
Innovation and Creativity	64.3
Networking Skills (e.g., utilizing in-person and online)	64.3
Communication Skills	
Differentiating facts vs. feelings (e.g., discerning facts vs. feelings, dissecting emotion in communication)	92.9
Tailoring messages (e.g., adjusting messages to fit the audience)	85.7
Utilizing and understanding different communication channels (e.g., email, text, verbal, print, digital)	85.7
Attention to detail	85.7
Ability to read the room (e.g., finding unspoken needs, nonverbal cues, noticing what is said and not said)	71.4
Being transparent	71.4
Journalism	
Using Journalism best practices (using reliable sources; writing in a nonbiased tone; understanding and disclosing bias; conducting interviews; finding counterpoints; keeping confidentiality; foundations of journalism; having journalistic integrity; interviewing skills; ability to write feature stories and hard press stories; not only relying on info on the web; appropriate background research; story structure)	85.7
Journalism Interviewing: (conducting interviews; visiting in person with interviewees; designing follow-up questions)	78.6
Communication History	
How to transfer past communication efforts into modern modes (what would work in the past, present, and future, print to digital)	57.1
Public Relations/Advertising/Marketing	
Defining the purpose of communication effort (knowing communication purpose)	85.7

Competency	Agreement (%)
Tailoring the mode of communication to various audiences and understanding demographics (meeting farmers in person to talk about new wheat varieties, creating a video for consumers, etc.)	78.6
Addressing/anticipating negative comments, messages, and press	78.6
Framing messages (the process of selecting and how information is presented to inform or influence)	71.4
<i>Public Relations/Advertising/Marketing (continued)</i>	
Audience Segmentation: Identifying target audiences and conducting audience analysis	57.1
Writing a news/press release	57.1
Working with the media/media training (e.g., developing relationships with reporters and editors)	50.0
<i>Agriculture/Natural Resources Industry Knowledge</i>	
Translating complex ANR issues into a digestible manner for consumers (e.g., not using jargon)	92.9
Using correct ANR terminology	85.7
Where to find ANR industry research and knowledge	78.6
Understanding the uniqueness of the ANR industry in Oregon and people in agriculture and natural resources	57.1
<i>Writing</i>	
Demonstrating writing competencies: proper spelling, grammar, sentence structure, proper tone, clarity, and conciseness	100.0
Using an in-house style guide or brand guide	78.6
<i>Legislative Issues</i>	
Basics of Government: how government functions, law reading comprehension, understanding public funding of research through tax dollars, basic civics, and how a bill is passed	57.1
<i>Diversity, Equity, and Inclusivity</i>	
Storytelling in AG/NR and humanizing ANR	100.0
Creating an inclusive space for those who are outside of ANR	78.6
Inclusive Communication (e.g., using a second language for communication, integration of diversity, equity, inclusivity, and belonging [DEIB])	71.4
<i>Workplace Skills</i>	
Demonstrating problem-solving, critical thinking, and strategic thinking	100.0
Cultural competencies (collaborating across cultures and ways of knowing and thinking, cultural sensitivities and relevancy)	100.0
Listening skills	100.0
Project Management (understanding the different types of projects to know their checkpoints and timeliness, working with clients to understand their needs, project evaluation, meeting deadlines, utilizing databases)	92.9

Competency	Agreement (%)
Adaptability (managing change, adapting to new technologies, etc.)	85.7
Conflict resolution (creating compromise, etc.)	78.6
Being a good team player (working cohesively with diverse teammates)	78.6
Leading a team (being a good leader, being transparent, knowing how to motivate others, and team building)	50.0

Note. Percentages reported represent the cumulative percent that indicated “very important” (4) or above in the third and final round of Delphi analysis.

Discussion

This study sought to identify the employability skills and competencies from an expert panel of agricultural and natural resources communication professionals for undergraduates to obtain upon completion of the Oregon State University. For RO1, not surprisingly, the expert ANR communication expert panelists rated “communication” as the highest ranked employability skill from the Essential Employability Skills for Oregon list. This finding is similar to Crawford et al. (2011) and Kainer and Leggette (2023), where the top-ranked skill needed by university graduates was communication skills by employers in the agriculture and natural resources industries. Collaboration and professionalism were the second most top-ranking skills by the expert panel. Additionally, these findings align with the ESS for Oregon participants (Mersereau et al., 2020). The panelists’ high ratings of collaboration and professionalism may be attributed to the fact that communication positions often require teamwork and collaboration in various agricultural and natural resources industries context.

For RO2, panelists obtained a 100% consensus on the following nine competencies: (1) understanding the impact and power of visual storytelling and interactive tools, (2) using credible, science-based content on social media, (3) information literacy, (4) being open to criticism, questions, and feedback, (5) demonstrating writing competencies, (6) storytelling in ANR and humanizing ANR, (7) demonstrating problem-solving, critical thinking, strategic thinking, (8) cultural competencies, (9) listening skills. Panelists reached complete consensus regarding skillsets centered on engaging communication strategies, such as the use of storytelling and interactive tools on social media and being able to tell stories that work toward humanizing agriculture and natural resources. The results reflect the panelists’ perceived value of credible, science-based information, strengthened by graduates’ information literacy (finding credible sources and citing them, fact-checking, identifying biases in sources, using databases and repositories). The panel all agreed that the ability to demonstrate technical writing skills, such as proper punctuation, grammar, spelling, appropriate sentence structure, tone clarity and conciseness, was essential for graduates. Lastly, panelists comprehensively agreed that undergraduates should have skills that contribute to personal development and teamworking qualities. These skills included demonstrating problem-solving, critical thinking, strategic thinking, openness to criticism, questions, and feedback, listening skills, and the ability to collaborate across cultures, cultural sensitivity, and cultural relevancy. Cultural competency, sensitivity, and relevancy might be unique competencies compared other ANR communication competencies studies due to the importance of how traditional ecological knowledge is still practiced in the Pacific Northwest regarding land and natural resources management (Bishaw & MacFarland, n.d.). When holistically examining the 12 domain areas adapted from Atkins et al. (2022; 2025) in the results, workplace skills had three of the nine 100% agreement competencies.

This finding reflects the panel's propensity of skills outside of ANR communication and more to employability skills, specifically the ones highly ranked as the Essential Employability Skills of Oregon.

Our findings are complementary to both past literature and persistent societal needs. Regarding literature, the results indicate that there is a need for both the integration of soft skills and employability skills with technical skills (Corder & Irlbeck, 2018; Dymment et al., 2025; Leal et al., 2019). Further, the emphasis on writing ability seen here is similar to past Delphi studies in agricultural communication (Atkins et al., 2022; Atkins et al., 2025; Morgan et al., 2013) and surveys of communication industry professionals (Leal et al., 2020; Wyss & Cletzer, 2023). Journalism competencies did not reach 100% consensus yet yield "using journalism best practices" (85.7%) and "journalism interviewing" (78.6%) were highly agreed upon by the panel. These findings are similar to Wyss and Cletzer (2023) who found that reporting and writing are top foundational skills for agricultural communication graduates to be career ready. An interesting dichotomy that exists is between audience-focused skillsets. Specifically, "Tailoring messages (e.g., adjusting messages to fit the audience)," "Understanding various methods of audience comprehension," were rated highly, as was "Proper use and selection of social media platforms for intended audiences" but "Audience Segmentation: Identifying target audiences and conducting audience analysis" (57.1%) was not. This finding may be due to the specialized expertise our panelists have regarding the audiences that they communicate with, minimizing the need to segment audiences regularly. Another possibility is the time and resources needed to segment an audience and tailor communication to several audiences versus a broader audience.

A unique result from the panel was the emergence of DEI skills as competencies. For instance, using inclusive communication (e.g., using a second language, integration of diversity, equity, inclusivity, and belonging) gained a 71% agreement on importance. This finding differs from Wyss and Cletzer (2023), who found that speaking a second language was the lowest-rated soft skill. Additionally, when Clem et al. (2014) conducted a Delphi with agricultural communications professionals from California, Iowa, and Texas, the more than half (57.1%) of the panelists were "uncertain" of the importance of speaking more than one language. Spanish is the second most widely spoken language in Oregon to English (Shumway, 2025), and some of our panelists might have valued this competency based on their experiences in Oregon communities. Conversely, when examining what panelists disagreed on in importance, "legislative issues" and "communication history" were identified by the end of the third round of the Delphi. This result could be due to the nature of the panel's industry representation, where three panelists identified as government, government affairs, and non-profit advocacy and points to prioritizing communication efforts toward the future instead of the past.

Another unique finding was the relatively lower agreement scores pertaining to writing news and press releases and working with the media/acquiring media training (e.g., developing relationships with reporters and editors). Though we did not ask our panelists to reflect on their rankings, we suspect this finding may speak to the broader societal embrace of social media platforms. This speculation was due in part to the high ranking of social media-related constructs, with understanding the impact and power of visual storytelling and interactive tools and the use of credible science-based content on social media receiving 100% agreement and proper use and selection of platforms and social media ethics garnering 85.7% agreement. Social media skillsets have been rated highly in other ANR communication Delphi studies (Atkins et al., 2022, 2025). Our findings align with others, like Wyss and Cletzer (2023), who found that news writing was rated as the lowest scoring of the "Reporting" category, though the skill was

not poorly rated relative to other constructs. Similarly, Leal et al. (2020) saw that press release creation and editing were rated relatively moderate for importance among other constructs. We also acknowledge that our press release writing and media training constructs were ranked as important skills but did not rise in importance like some other skills.

Interestingly, despite the apparent importance of social media skills among our panelists, “Utilizing ‘call to action’ in social media” received the lowest agreement percentage of all competencies rated. This result was surprising, as a call to action is foundational for campaign design and persuasive strategy, both of which are cornerstones of the communication discipline and agricultural and natural resources advocacy, marketing, and the promotion of behaviors. Perhaps our findings reflect the specificity of social media versus call to action in general, or the broad use of the term versus more disaggregated competencies. Alternatively, a call to action may not be viewed as a skillset, but rather as a part of communication design.

Limitations

Though we are appreciative of the panel, we were able to coordinate there were key limitations that speak not only to our study but to the broader needs of agricultural and natural resources communication in Oregon. First, we recognize that the inclusion of natural resources professionals in our panel was limited. As programs grow and continue to prioritize the inclusion of natural resources in agricultural (and natural resources) communication programming, this need will be amplified. Future studies should aim to recruit additional natural resources panelists to more comprehensively reflect the needs of industry. Second, it is worth noting that many of our competencies would reach consensus if “of average importance (3)” score was used versus the “very important (4)” rating. This indicates that more granular evaluation of competencies and more valid measurements of skillset desirability may be needed in future research. Lastly, we acknowledge the potential bias we had in the coding process of the first round of the Delphi where we sought to categorize patterns based on Atkins et al. (2022; 2025)’s study categories. This coding process could have biased our results.

Implications and Recommendations

Using a three-round Delphi technique, this study identified the most vital competencies needed for Oregon State University graduates through consensus with ANR communication experts working or having worked in Oregon. Although the results are local to Oregon, other universities, curriculum designers and educators working with similar agricultural and natural resources commodities, can utilize the results when building agricultural and natural resources communication programming that prepares future ANR communication professionals. The highest ranked skills (understanding the impact and power of visual storytelling and interactive tools, using credible, science-based content on social media, information literacy, being open to criticism, questions, and feedback, demonstrating writing competencies, storytelling in ANR and humanizing ANR, demonstrating problem-solving, critical thinking, strategic thinking, cultural competencies, listening skills) should be prioritized when curriculum mapping and designing ANR communication programming. Additionally, this program focuses on incorporating natural resources into agriculture, aligning with the approach of other modern programs and the distinct interconnectedness of these industries in the Pacific Northwest. Moreover, though not empirically tested, panelists commented on how the integrated survey items were geared to more

agricultural communication than to natural resources communication. This emphasizes the need to explore the integration of natural resources into agricultural communication in future research and curriculum development.

To help students graduating and seeking careers in the ANR sectors, we recommend ANR communication programming be promoted across colleges of agriculture and natural resources to help enhance the soft skills deemed critical in past literature (Colclasure, 2020; Crawford et al., 2011; Hendrix & Morrison, 2018; Wilson et al., 2019). For instance, Hendrix and Morrison (2018) reported that agriculture students did not feel competent in writing skills. ANR communication courses could offer the development of writing skills to help address this skill gap for agriculture and natural resources students entering their respective industries. Additionally, given that Spanish is the second most spoken language in Oregon and is also widely spoken in the U.S., we recommend that students develop competencies in Spanish for employability reasons. This is particularly beneficial for individuals working in agriculture and for graduates seeking communication careers in community-based organizations and Extension. Since legislative and communication history competencies did not reach consensus in the final round, we recommend that they be integrated in other parts of ANR communication curriculum via case studies or explored more deeply in students' career interests through internships. At the classroom level, we recommend that the curriculum include project-based learning approaches to enable students to apply technical skills (Leal et al., 2020) and soft skills (Kainer & Leggette, 2023).

For future Delphi studies exploring ANR communication skills and competencies, we recommend the inclusion of a DEI category as a skillset to meet the diverse needs of communities and requirements of communication practitioners. Future studies should investigate students' perception and the employability skills they desire after completing their undergraduate program, particularly in undergraduate programs as students are the primary drivers and stakeholders in acquiring these skills (Tymon, 2013). Upon completing the developed curriculum, future studies could include a Borich model to determine priority competencies of students completing an ANR communication program on their perceived ability of skills and how important skills are for job success (Narine & Harder, 2021). To better understand how the competencies could be incorporated into class projects and curriculum, focus groups using qualitative methodologies could help enhance programming. Future studies should seek consensus from the agricultural and natural resources sectors to ensure that the curriculum is relevant and develops students' employability skills.

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