Exploring Identities of Extension Faculty and Educators as Science Communicators

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Abstract

This research explored the relationship between University of Idaho (UI) Extension educators and faculty's social identity as science communicators and their most-used communication type. This non-experimental, sequential, mixed-method study with a qualitative priority utilized surveys and interviews to gather data. This paper will focus on the qualitative and mixing components of the study. We used stratified purposive sampling based on location and most used communication type to select participants for interviews and conducted interviews to understand their social identities as science communicators. We identified five main themes: continual development, technology, research dissemination, evaluation for motivation, and community relationships. We employed a cross-case comparison to find relationships between themes and communication type. Science communication identity and communication types have distinct relationships with science communication identity being seen as an adaptable and flexible title. Participants reported diverse motivations for communicating science, but all emphasized their roles in sharing reliable, research-based information with constituents. Participants discussed the value of skill-building and expressed interest in additional training to become more effective science communicators and better meet the needs of the communities they serve. Additional research to understand the constituent perspective is warranted to explore how professionals are using science communication practices to align with the communication preferences of their audiences to achieve intended outcomes. Replicating this study with Extension professionals in other states would provide insight into a national understanding and application of science communication in Extension.

Keywords

Extension, science communication, social identity, community, mixed methods

Cover Page Footnote/Acknowledgements

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Introduction

Cooperative Extension and Science Communication

The Cooperative Extension Service (CES), established in 1914, was designed to communicate and share research-based information to the public (Ray et al., 2015; Seevers & Graham, 2012). CES provides a channel where Extension professionals communicate reliable, scientific information from land-grant universities to surrounding people, communities, and businesses. Fundamentally, CES and its programs were founded for individuals in rural and agricultural communities and their needs. However, there are fewer people living in rural communities and involved in food production than ever before. Only 17% of the population now lives in a rural area and only 10.9% are employed in agriculture and food-related jobs (Economic Research Service [ERS], 2020; National Institute of Food and Agriculture [NIFA], n.d.). This poses a problem and creates a potential disconnect in understanding, values, and communication—especially in urban-based Extension programs where the historic foundations of CES might differ from needs and communication norms in urban areas (Webster & Ingram, 2007). In response, Extension professionals have adapted programming, communication, and outreach efforts to serve various audiences and their needs (O'Brien et al., 2023). To ensure CES can sustainably carry out its mission long-term, Extension and its resources need to be well publicized and used by the public (Ray et al., 2015).

Extension professionals act as communicators and liaisons of reliable, science-based information and are key instigators of dialogue and public engagement in their communities (Jenkins et al., 2020; Kurtzo et al., 2019). To effectively engage in science communication, Extension professionals must rely on various traditional and new media channels and social trends to determine how to broadcast their messages widely to all constituents (Burns et al., 2003; Kurtzo et al., 2019; O'Brien et al., 2023). As the science and landscape of their clientele continue to evolve, Extension professionals have recognized that understanding how to communicate effectively is an important aspect of their job (McDowell & Mizuno, 1987). This specifically includes listening to constituents and reciprocating effective communication through audience segmentation, intentional and engaged message framing, and other tactics based on the audience (Davis et al., 2021; Lamm et al., 2019; Warner et al., 2017).

Communication Types and Information Sharing

Audiences are often segmented, based on shared needs and expectations, which allows Extension professionals to adapt the type or level of their communication and outreach efforts (Lamm et al., 2019). Generally, in Extension, we reference three primary types of communication: individual, group, and mass (Seevers & Graham, 2012). Individual communication occurs one-to-one with constituents and often includes strategies like face-to-face conversations, direct messages, phone, or email correspondence (Rumble et al., 2022). Information is specifically tailored to one person's needs and level of understanding, and feedback is often direct or immediate (Fiebig, 2000; Rumble et al., 2022).

Whereas, with group and mass communication, there are declining levels of direct engagement and information is either targeted to appeal to a specific group or more generalized to resonate with mass public audiences (Lamm et al., 2019; O'Brien et al., 2023). Group, often referred to as small group communication, might occur among members of a constituent group, such as a county or program (i.e. Master Gardeners). Strategies often employed in group

communication within Extension might include postings in a closed social media group, emails, and group discussions (Rumble et al., 2022). Mass communication strategies might be more one-sided and include efforts designed to reach a wider audience, including radio advertisements, press releases, brochures, signage, and newsletters or email marketing campaigns (Rumble et al., 2022; Telg et al., 2007). It is valuable for Extension professionals to understand which communication strategies and/or channels are most appropriate for the type of communication (individual, group, mass) needed to fulfill the expectations of their role and meet the diverse needs of their constituents (O'Brien et al., 2023).

Changing audiences and funding problems continue to pose a challenge for CES (Harder et al., 2009; Narine et al., 2019). To ensure the longevity and effectiveness of research-based information that stems from CES, Extension professionals need effective communication methods for their new and changing audiences. Understanding constituents needs, characteristics, and demographics can help an Extension professional tailor their communication efforts and increase the likelihood of understanding and accepting scientific information (Agunda, 1998). An individual who identifies as a science communicator is more likely to actively apply science communication principles to increase the quality and personalization of their communication (Baram-Tsabari & Lewenstein, 2017). Successfully understanding their role in diffusing information within a community can help Extension professionals advance awareness and encourage use of CES resources by a larger, statewide audience.

Theoretical Framework

The theoretical foundation for this study included the integrated model of science communication and social identity theory (Longnecker, 2016; Tajfel, 1974). Longnecker's (2016) integrated model of science communication presents the internal and external factors associated with effective science communication. This model depicts the multifaceted experience of sharing and receiving scientific information—including means and strategies for distributing information and factors that influence how individuals might receive, process, and use that information (Longnecker, 2016). As such, this model can serve as a referential foundation for Extension professionals making communication and outreach decisions based on these different factors and their various responsibilities, audiences, or contexts.

According to Tajfel's (1974) social identity theory, an individual's sense of belonging in a group with shared values and norms influences their behavior and personal identity (Stets & Burke, 2000). An individual's social identity as a communicator can impact the type of communication they might use, how they communicate with their constituents (e.g., framing messages, designing programs, exposing the audience to new innovations and information), and the extent to which they seek to strengthen their abilities (Baram-Tsabari & Lewenstein, 2017). Using these guiding theories, we sought to further understand how the identity alignment of Extension professionals as science communicators impacts their preferences and decision-making when sharing information with their constituents.

Purpose

This research was part of a larger study looking at communication preferences, behaviors, and identities of University of Idaho (UI) Extension professionals. The purpose of this study was to explore how UI Extension faculty and educators conceptualize their identities as science

communicators and what relationship their identities might have on the types of communication they use. These research questions guided this study:

1. How do UI Extension faculty and educators describe their social identities as science communicators?
2. What is the relationship between social identity as a science communicator and the communication types preferred by UI Extension faculty and educators to communicate with their constituents?

Methods

We designed this research study as a non-experimental, sequential, mixed methods study with a qualitative priority (Creamer, 2017). This paper focuses on the qualitative and mixing components of the study. We collected the qualitative data following the collection of quantitative survey data (O'Brien et al., 2023). We utilized stratified purposive sampling to select participants from the survey responses for interviews.

We conducted semi-structured Zoom interviews to provide insight into how the selected participants identified themselves as science communicators. Interviews followed a pre-set protocol adapted from Longnecker's (2016) integrated model of science communication and Parrella and Leggette's (2020) protocol. The interviews were conducted in March and April of 2021. At this time, several county offices in Idaho still required masking indoors and social distancing restrictions were still in place. Interviews ranged from 15 to 53 minutes and lasted, on average, 26 minutes.

Population and Sample

The target population for this study was UI CES faculty and educators. The individuals in this category have obtained a master's or doctorate degree and are working in one of the four UI Extension districts at one of the nine research and experiment stations or in one of the 45 Extension offices in 42 of Idaho's 44 counties. All UI Extension faculty and educators ($N = 139$) initially received the Qualtrics survey. We achieved 72 full responses for a final response rate of 52%. At the end of the survey, 37 respondents provided their contact information for a follow-up interview. We then stratified the 37 respondents (Creswell, 2014) to ensure representation from each district, with consideration of rural and urban county type, and each preferred communication type. We selected a purposive sample from respondents using stratified purposive sampling (Creswell, 2014). We selected 16 initial candidates to be interviewed. We were only able to contact and interview 12 individuals, as seen in Table 1. We contacted missing participants via email twice and phone three times. After contacting these individuals through both email and phone, we revisited the concept of saturation (Glaser & Strauss, 1967) and determined that data saturation was met. We determined saturation by reviewing the transcribed interviews and finding repetitive responses and themes.

Table 1

Characteristics of Interview Participants (n = 12)

Pseudonym	Comm Type Used	Urban/ Rural	District	Years in Extension	Age	Gender

Gladys	Group	Urban	Eastern	8	n/a	Female
Mabel	Group	Urban	Central	23	67	Female
Howard	Ind. & Group	Rural	Central	6	68	Male
Beatrice	Group	Urban	Southern	25	67	Female
Albert	Group	Rural	Northern	7	40	Male
Sue	Group	Rural	Northern	3	30	Female
Elmer	Individual	Urban	Northern	8	50	Male
Ester	Group	Rural	Eastern	29	57	Female
Shirley	Individual	Urban	Southern	3	25	Female
Ernest	Individual	Urban	Southern	4	31	Male
Florence	Group & Mass	Rural	Southern	7	42	Female
Frank	Mass	Rural	Eastern	5	33	Male

Note. Comm Type Used represents the communication type the interviewee indicated in the survey as their most used type when communicating with constituents.

Instrumentation and Semi-structured Interviews

To determine each participant's communication type, we included an item to ask what percentage of time, on average, they spent using each communication type: individual, group, and mass (Seevers & Graham, 2012; Telg & Irani, 2012). We grouped individuals into the communication type they indicated using the majority of the time. We then used an interview protocol to gain an understanding of Extension professionals' social identities as communicators. We conducted one-on-one semi-structured online interviews, via Zoom, to understand how UI Extension faculty and educators identified themselves as science communicators and what role communication plays in their jobs. To guide the interviews, we used a pre-set interview protocol with 16 questions adapted from Parella and Leggette's (2020) protocol which was based on Longnecker's (2016) integrated model of science communication. We allotted time for anecdotal conversations if needed. All eight components of the model were addressed by questions within the interview protocol. The questions to address each factor were as follows: understanding (three questions), affect (one question), values (two questions), awareness (one question), skills (three questions), behavior (two questions), attitudes (two questions), and beliefs (two questions).

Data Analysis

We conducted and recorded the semi-structured interviews via Zoom. We played back recordings and transcribed interviews verbatim. We then deconstructed interviews into meaning units (Yin, 2011). We employed an iterative process to provide rigor and increase the credibility of the coding and meaning-making process (Creswell, 2014). Two researchers read each meaning unit and open-coded the singular units of data into codes and subcodes (Creswell, 2014). We used a constant comparative method through open coding followed by axial coding to make meaning of the codes (Yin, 2011). The two researchers then discussed the codes for interrater agreement and to identify patterns for emergent themes. This collaborative process continued until the researchers agreed upon meaning. Member checking was then used to validate the accuracy of the quotes and themes coded from the interviews (Yin, 2011). In the

member checking process, coded themes with direct quotes were emailed to each participant for review and agreement.

To further understand the relationship between communication preferences and the identity as a science communicator, we stratified the responses coded to common themes based upon the interviewee's communication type. We then compared these stratified piles in themes with cross-case comparison to examine the similarities and differences in the way the theme was discussed, based on communication type. If we did not identify shared patterns, we designated it as 'no significant influence.' We discarded incomplete data sets. We considered data incomplete if less than 60% of the interviewees in each communication type were represented in the theme.

Results

Research Question 1

Our first research question aimed to explore how Idaho Extension educators describe their identities as science communicators. The analysis resulted in five themes: continual development, technology use, research dissemination, evaluation and motivation, and community relationships.

Continual Development

Participants discussed the importance of professional development, learning about new technology, association with professional organizations, and the need to continue to grow as science communicators, UI Extension faculty, and educators. Ernest said, "I think as an educator, it's my job to look for ways to continue to improve my communication skills and continue to look for ways to reach new audiences." The idea of learning from mentors and collaborators across the state was brought up as an avenue to improve and further develop expertise in their program area. Elmer said, "I just try to learn from other experienced educators and science communicators." Participants who were not as familiar with science communication expressed a desire for training. Sue noted she would like to learn, "how to effectively advocate in agriculture or communicate in agriculture." She said, "I would be interested in a conference like that or even a class." Other participants indicated how their personal experiences allowed them to learn by doing. They emphasized how investing in professional development opportunities and participating in professional associations allows them to enhance their skillset and become more effective communicators of science. Beatrice said, "I do try to take some professional development in basic educational principles. That is not my area of expertise."

Technology Use

Participants discussed using technology and its impact on their communication frequently throughout the interviews. They noted how technology helped them communicate and deliver content during the COVID-19 pandemic. Beatrice said, "Because of COVID we've gone to online training, and surprisingly, our clientele really embraced it. So, we've been fairly successful with online education." Many recognized how technology has changed their programming and helped reach new audiences. Gladys said, "Last year we did a lot of synchronous and asynchronous programming. So, we have a lot of videos, and we did a lot of

online workshops." Frank noted the transition online afforded them the opportunity to include more people "who wouldn't join otherwise." In contrast, interviewees also discussed how reliance on technology during the pandemic created a barrier to access, especially for their rural constituents. Sue said, "Zoom has been challenging for some of our group because there's not great rural broadband access to all parts of Idaho—and there's not great cellular access to all parts of Idaho." To navigate this, interviewees discussed the importance of knowing their audience base and tailoring their programming depending on their demographics or needs. Mabel said, "Different groups have different needs. There are groups I work with and it's good just to email or [conduct] Zoom meetings. And then there's others, you just have to reach out to with a phone call, or text, or something else." Frank noted it's usually a different audience "that's willing to come into a workshop or class."

Participants discussed technology as an area with significant potential for personal and professional growth. Participants talked about using storytelling, social media, and other innovative technologies to communicate science more effectively. Albert said, "I think there's a lot of room to draw people's attention to fieldwork or experiments that may be running." Ernest also had ideas for how to increase his skills. "I want to be trained on how to be a better storyteller of different topics." He saw value in knowing how to translate scientific information into engaging content. Ernest said, "I want to be able to take that, and I want to learn how to make a thirty second video that can go on Instagram, Facebook, or TikTok. Ultimately, Albert said, "one of the things last year has taught us is we all need to be much more effective communicators on an online platform."

Research Dissemination

The research dissemination theme was a multi-faceted concept commonly mentioned. Within this theme, participants discussed being a hub for information, framing information, how to present information, and barriers. This theme also included discussion of where information should come from and how to determine reliable sources. Interviewees discussed in-depth the concept of UI Extension faculty and educators being a channel or source where constituents can receive science-based information. Shirley said, "The University of Idaho is doing all this research, and then there is the public who needs the information. So, our job is to connect those two by getting the information out to them in each county." They also discussed presenting digestible information for constituents as well. Beatrice said, "I think our role is to take all the science speak, if you will, and turn it into lay speak so it's useful and understandable to people." Participants talked about transparency and emphasized sharing information from reliable sources to build and maintain trust with their constituents. Shirley said, "My responsibility when communicating with the public is making sure I'm giving out research-based information that is honest and true and up-to-date." She also said, "I also include the resources I used to get that information so that if they have further questions or if I didn't portray something in a way they understood, they have the information and where I got it from"

Many interviewees discussed challenges they experienced when disseminating research, particularly when communicating with individuals who are not open to hearing new information. Albert noted, "I think that the general public sees us sometimes as gatekeepers… there's a lot of mistrust. Especially when we're talking about new approaches or new ways to handle old issues. Many said they often overcome this by building relationships with their audience and being

honest with their stakeholders. Albert said, to overcome this, "You have to be consistent about admitting your shortcomings, not highlighting them."

Evaluation and Motivation

Participants described the need for both formal and informal evaluations of their efforts to develop sound programming and become the most effective science communicators possible. They emphasized the need to learn from the evaluations and feedback from stakeholders so they can adapt their communication to have a greater impact. Frank said, "In Extension, we need to have feedback from them so that we know what's happening out there and so there's not a disconnect between the scientific community, the clientele, and the stakeholders out in the state of Idaho." Participants discussed how their responsibilities as science communicators and UI Extension professionals lead them to continually provide programming to their communities based upon their needs. Elmer said, "that's my responsibility… is to develop and deliver these programs based on what people need, based on the identified need." They also discussed personal motivation for impacting their communities in this theme. Participants stated information found during these evaluations can help them have a greater impact on their communities. Shirley said, "I have my own passion and teaching about [my program area], so when there are things that I am passionate about learning, I want to make sure that others are getting the information that I'm learning as well."

Community Relationships

UI Extension faculty and educators identified themselves as assets to their communities and established how strong relationships are critical in their work. Participants noted that maintaining positive, personal relationships with their clientele can increase the impact and reach of Extension and their work. Ester said, "People need to know you care before they care how much you know." The group emphasized how important relationships are when forming connections and gaining trust of people in their community, which many indicated takes time and maintenance. Albert said, "In a lot of ways, we get access to people's lives and operations that other professionals may not get access to. And… there's trust involved with that, and we need to be very careful about maintaining that trust."

Interviewees also discussed building relationships for problem solving and having a deeper impact in the community. Participants shared how important it is to understand their constituent's problems. Ester said, "it's me taking the time to truly listen and trying to understand my client's situation and then give them the best information they have to make the decision that is best for them." An Extension professionals' ability to connect community members to external experts contributed to an increased capacity to fix problems and help constituents improve their operations or otherwise positively impact their lives. Florence said, "That voice is sometimes heard louder than our own local voice. So, leading from the middle is important." Along that same thread, participants mentioned working together to reach more individuals. Sue said, "I just find that we don't all have the same skill levels, or the same passions. And so if we can work together, [we can] disseminate information so that everybody has equal opportunity to learn the same things." Ernest said, "I see it as my job to empower others to go out there and be science communicators because I am only one guy. But I can train

over a hundred people. I have over a hundred volunteers to go out and teach kids and science concepts."

Research Question 2

We mixed the data collected from the survey and interviews to find what degree of influence the most frequently used communication type had on participants' views on science communication identity. We compared the responses from the five common themes based on the three communication types self-identified by participants: individual, group, and mass.

Table 2

Comparison of Emergent Themes to Most Used Communication Type

Themes	Communication Type Most Commonly Used		
	Individual	Group	Mass
Continual Development	No significant influence	No significant influence	No significant influence
Technology Use	Technology provides an opportunity for expansion	Technology has provided barriers, but provides room for growth.	Insufficient data
Research Dissemination	Utilizing UI and land-grant university resources	Acting as a reliable source to disseminate research-based information	Connecting constituents to experts
Evaluation and Motivation	Visual observations and understanding	Evaluation for community impact and needs	Data and evidence for impact
Community Relationships	Personable connections and collaboration	Relationships provide opportunities	Insufficient data

Note. We considered data insufficient if less than 60% of the interviewees from the communication type were not represented.

Technology and Communication Type

Respondents who most used individual communication said technology has been beneficial in programming throughout the last year. However, this group of individuals recognized technology as an area for expansion for Extension and themselves. They indicated a major opportunity to grow their skills to help to increase the reach and visibility of Extension programming. Respondents who most used group communication indicated that while they have adapted to an increase in technology use during COVID-19, it proved to be a barrier for some of their constituents and the delivery of information. They recognized the importance of technology in delivering content, but also saw an opportunity to be more technologically savvy and increase their skills. There was not enough information provided in the technology theme from those who utilize mass communication to make reliable associations.

Research Dissemination and Communication Type

Respondents who use individual communication the most emphasized the importance of research-based information coming from UI or other land-grant universities. They use their backgrounds or ties to the university to help emphasize their reliability. This group of individuals highlighted how they act as both *sources* to disseminate information and *teachers* of that information. This includes making sure the information is presented in a way that is easily understandable, while verifying that the information is helpful and understood.

Respondents who use group communication the most also emphasized the importance of research-based information. However, these individuals continually discussed the responsibility of being seen as a reliable and trustworthy source. Their main role was to disseminate information to their constituents. However, they noted that it was vital to continually be backed up by credible sources. They discussed their role as being the one to find the information and communicate it to their constituents.

Individuals who utilize mass communication discussed the need and benefit of directly connecting individuals to other content experts to help answer their problems. They noted that while their role was to provide information, sometimes connecting their constituents to an individual or bringing an individual into the community was impactful. This included collaboration with other researchers or Extension professionals, where they present their current research and findings for the community, instead of individuals having to seek that information out on their own.

Evaluation and Motivation and Communication Type

Respondents who most frequently used individual communication discussed the use of formal surveys and evaluations the least. Instead, these individuals emphasized asking constituents follow-up questions, checking for understanding, and visual observations. These individuals discussed how programming and activities have long-term impacts on constituents. They discussed making sure their programming and communication truly is understood and impacts their constituents. These individuals said seeing their constituents grasp topics was motivational and important to them. Education philosophy and models were discussed briefly as foundations for programming. These interviewees also referenced the importance of understanding their audience and delivering programming specifically for them. Respondents who most often used group communication noted the use of formal and informal evaluations. This group emphasized using those evaluations as tools to tailor their communication and programs to meet community needs. Evaluations included informal and formal surveys, needs assessments, and conversations with community members. Those in this group noted it is helpful when the constituents make the first initial connection. They described being able to help their constituents most effectively when they knew exactly what the need was. Interviewees indicated they had a passion for their topic area, which helped them continually develop programming. Respondents who most frequently used mass communication discussed the importance of surveys and collecting data to check for understanding and provide concrete data regarding the impact of the programming or communication efforts.

Community Relationships and Communication Type

Individuals who implemented individual communication strategies emphasized the importance of relationship building in forming collaborations and getting information out. Individuals in this group discussed their appreciation for involvement and communication in the community. These individuals noted being personable and reachable within their communities as essential attributes of Extension professionals. Individuals who used group communication most often identified relationships as important to help develop trust. Using relationships they establish within their communities to increase the reach of their programming was important to these interviewees. They shared that they were motivated by the impact they can make in their communities and recognized communication and relationship-building as a two-way street. They also noted it is important for Extension faculty and educators to understand each other. Those who communicated through mass communication the most did not have enough similarities in responses to determine an influence.

Discussion, Conclusions, and Recommendations

In exploring how UI Extension professionals describe their social identities as science communicators, five common themes appeared during the interviews: continual development, technology use, research dissemination, evaluation and motivation, and community relationships. Most of the participants in the interviews explicitly described themselves as science communicators. Only one individual said they did not identify as a science communicator—though this individual's response reflected depictions of the other interviewees. Every participant had their own interpretation of what they thought it meant to be a science communicator. Ultimately, interviews indicated that 'science communicator' was an adaptable and flexible identity shared among these UI Extension professionals. Facets of this identity were grounded in values, attitudes, beliefs, and behaviors found within each of the five themes. Participants conceptualized this identity differently, though many shared the same or similar experiences. Additionally, participants in the study had diverse motivations for communicating science. However, central to this identity for all participants was the value of their role in spreading reliable, research-based information to constituents. All five themes represented a core value, attitude, or behavior central to their identity (Longnecker, 2016) as science communicators in Extension. Additionally, participants revealed barriers to be addressed and opportunities to be capitalized on that could enhance their competency in this role.

Every participant in the interviews discussed the importance of continually growing and adapting for job requirements, to better impact those around them, and for personal growth. This aligns with Longnecker's (2016) model, which posits adept science communicators are interested and willing to learn and apply knowledge and supports existing research. The desire for continual growth also supports developing the communication capacity of Extension professionals (Sanders et al., 2023). Respondents noted by staying up to date on information— either through training, professional organization members, or experiences—they can portray themselves as reliable sources. Individuals said as users of technology, it can act as a barrier or help them become more effective communicators (e.g., help them reach new constituents, respond in times of crisis, provide an opportunity for personal skill development). Here, we heard how technology can help science communicators bring interesting and impactful information to constituents. This aligns with literature that supports Extension's use of technology and digital platforms, like social media, to deliver tailored science and information to the public (Sanders et al., 2023). Technology was also identified as a barrier. Given the lack of

infrastructure and resources, restricting their communication to digital platforms could be problematic for many rural and elderly audiences in Idaho, creating a knowledge gap. This could create challenges, given all participants indicated a key behavior of their role as science communicators is disseminating research to the public.

Most individuals valued sharing research-based information from land-grant universities. Participants emphasized maintaining their own credibility and furthering the reputation of Extension as a trustworthy source, as it has historically been seen. This is noteworthy, as trust and source credibility lay the foundation for effective science communication (Longnecker, 2016). This also aligns with previous research, which revealed that a key role of the Extension system is to provide accurate and reliable information (Davis et al., 2021; Kurtzo et al., 2019). Extension educators and faculty should continue to uphold that role by relying on and disseminating accurate information, rooted in science (Jenkins et al., 2020). Participants noted a major barrier to research dissemination occurs when constituents are unreceptive to new ideas or practices. Participants said they needed to build and maintain relationships with those in their communities to gain trust and have the greatest impact. This helps them better understand the needs and apprehensions of their audiences, which in turn, makes them more effective in science communication. Participants also indicated that by developing these personal relationships, other professional relationships in the community can form, which enhances their visibility as reliable sources of information.

To enhance CES in Idaho and ensure the public uses and sees value in its resources, Extension professionals must understand how best to effectively target and reach the right audiences—in how they share scientific information, communicate about their programs, and describe their role to others (Ray et al., 2015). Participants shared the most common way they evaluated the effectiveness of their communication is through formal evaluations. This indicated they value data-driven evidence to exhibit impacts of their programming. Participants also expressed that they are passionate about their role and motivated to ensure they fulfill the expectations of that job. This concept aligns with social identity theory and the value they place on this group expectation (Tajfel, 1974). Participants desire feedback to ensure they are performing effectively and meeting client needs. These individuals also said they are motivated to be science communicators because of the positive impact it could have on their constituents' lives and agricultural operations. Having a group of UI Extension educators and faculty who identity as science communicators can help increase the exposure and relevance of the university, Extension, and CES because they are more likely to carry out science communication responsibilities (Tajfel, 1974).

There were differences between the communication types, their associations with and views on science communication identity. Those who most often used individual communication seemed to focus on individual impact and relationships with their constituents and those around them. Similarly, those in the group communication realm maintained the importance of community impact, community relationships, their role in disseminating information, and a want to increase their skills. These are noteworthy behaviors and beneficial for message framing, signifying a potential strength to find shared values and make information relevant and relatable for their audiences (Jenkins et al., 2020). Those in the mass communication group preferred efficiency, widespread impact backed up by data and concrete evidence. The findings of this study can help UI Extension and CES more effectively communicate with their current constituents and target new audiences to continue advancing their land-grant mission.

Throughout the interviews, participants emphasized the importance of lifelong learning and technology. Since the COVID-19 pandemic, UI Extension has become heavily reliant on technology. The Extension professionals emphasized the value of technology in reaching new audiences and increasing their visibility (Davis et al., 2021). While they previously adapted out of necessity, participants expressed interest in improving their technology skills to become more effective communicators of science. We recommend creating more professional development opportunities in Extension to expand technological competencies. Given their flexibility and alignment with programming they might be asked to deliver—workshops, guest speakers, and online tutorials for creating videos would be beneficial resources for Idaho Extension professionals. Because technology was also described as a barrier, Extension professionals should develop programs and materials in a variety of formats and tailor their approach based on audience need to prevent constituents from being left behind (Curtis et al., 2012).

When discussing research dissemination and community relationships, participants emphasized the importance of maintaining the trust of their constituents and providing only research-based information. We recommend increasing touchpoints between Extension scientists with the science communicators on the ground. This could be done by creating more opportunities for Extension faculty and communicators in higher education to collaborate with county agents and industry communicators on marketing content, social media campaigns, and message development. Further, we recommend streamlining efforts for sharing news and outreach from university scientists to county agents to ensure ongoing research efforts are more readily accessible. While all participants depicted science communication as an identity (skills, attitudes, behaviors), their understanding of science communication as a discipline varied. We recommend developing and implementing science communication curriculum and/or training to enhance awareness of science communication and describe Extension's role in the field. This would provide UI Extension professionals with shared meanings and strategic goals to work toward—to help them become more effective science communicators.

A major limitation in this study was the inclusion of only UI Extension professionals. We recommend researchers adapt and replicate this study to understand the constituent's perspective, which is missing. Research about how constituents prefer to communicate with Extension professionals would help align practices with audience needs. We only interviewed two individuals who primarily used mass communication. This served as a limiting factor and should be further explored to see if other Idaho Extension professionals or those in other states also indicate a higher preference for individual and group communication. In many interviews, participants discussed how COVID-19 restrictions led to changes in programming and communication and many believe those changes are here to stay. A longitudinal research study could be conducted evaluating the impacts of COVID-19 on Extension professionals communicate with their constituents. Finally, we recommend replicating this study in other state Extension systems to identify needs and enhance dialogue around the value of training science communicators in Extension to advance the land-grant mission.

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