

# Exploring Communication in Agricultural and Environmental Science Graduate Student Recruitment: A Media Richness Approach

Allison R. Byrd<sup>1</sup>  
Alexa J. Lamm<sup>2</sup>

## Abstract

*Demand exists for a workforce with graduate degrees in agricultural and environmental sciences. However, research on effective graduate student recruitment into colleges of agricultural and environmental sciences (CAES) is limited. Prospective graduate students consider distinctive factors when selecting an institution, necessitating further examination of their communication channel use. Media richness theory posits communication media are on a continuum of leanness to richness, and agricultural communicators can select the proper medium for an audience based on the message and its richness. The purpose of this study was to explore the effects of media richness during the recruitment of prospective graduate students. Nineteen graduate students representing 10 departments within a CAES participated in semi-structured interviews. Qualitative inductive coding revealed three prominent communication channel themes: online, indirect, and direct. Findings indicated participants began their journey using indirect and online channels with less personalization and moved into richer media with the capacity for immediate feedback as their interest increased. Participants expressed disappointment at online channels with outdated information because they felt impersonal. Participants preferred phone or zoom calls as rich media to understand institutional culture, valuing personalization and immediate feedback from current students.*

## Introduction

The demand for college graduates with experience and expertise in agricultural and environmental sciences is expected to exceed the number of graduates in these areas from 2020-2025 (Fernandez et al., 2020). Recruitment of capable students into colleges of agriculture and environmental science (CAES) is essential for industry advancement and has thus been researched from various angles (Baker et al., 2013; Beyl et al., 2016; Westbrook & Alston, 2007).

However, existing studies have centered on attracting undergraduate rather than graduate students into CAES. In 2013, major life science companies anticipated hiring more than 1,000 agricultural scientists in the U.S. between 2013 and 2015. Companies indicated 46% of these scientists would need to have doctorate degrees (Coalition for a Sustainable Agricultural Workforce, 2013). In a subsequent survey, 16% of agricultural employers agreed they preferred hiring M.S. or Ph.D. candidates over those with only bachelor's degrees, demonstrating the need and preference for well-trained graduate students with interdisciplinary industry experience (Chakraborty et al., 2017). In the 2020-2021 academic year, 11.2% of doctoral degrees (6,936) and 3.7% of master's degrees (15,700) awarded in the United States were in biological and agricultural sciences (Zhou, 2022).

---

<sup>1</sup> Allison Byrd recently completed her Ph.D. in Science Communication in the Department of Agricultural Leadership, Education and Communication at the University of Georgia, 145B Four Towers, Athens, GA 30602, [afortner@uga.edu](mailto:afortner@uga.edu). ORCID#0000-0002-1112-7483

<sup>2</sup> Alexa Lamm is a Professor of Science Communication in the Department of Agricultural Leadership, Education and Communication at the University of Georgia, 132 Four Towers, Athens, GA 30602, [alamm@uga.edu](mailto:alamm@uga.edu). ORCID# 0000-0003-1999-8803

The graduate degree experience is wholly different than the undergraduate experience. Graduate students consider distinctive factors in selecting an institution and degree program including the availability of funding or graduate assistantships, the opportunity to conduct research, the faculty member with whom they will work, or the availability and variety of courses (English & Umbach, 2016; Poock & Love, 2001; Shellhouse et al., 2020). Program choice is also influenced by degree level pursued. For example, Shellhouse et al. (2020) found doctoral students were more likely to consider research when entering a graduate program than master's students. The flexibility of offered coursework and applicability to current careers also played a role in graduate program choice for working professionals pursuing graduate education (Shellhouse et al., 2020). Additionally, prospective graduate students are motivated by professional goal achievement, advancement in their current field, or because a graduate degree is required for their desired career, among other reasons (Hardré & Hackett, 2015). The process of recruiting and admitting graduate students is also complex and often segmented across various offices and departments, governed by a complex set of policies at each university and low on the priority list of administration (Balayan et al., 2022). Previous studies have examined precise aspects of graduate student interests within specific CAES disciplines including animal science (Serão et al., 2021), horticulture (Arnold et al., 2014), agricultural social science (Shellhouse et al., 2020), and natural resources (Copenheaver, 2020). However, broad recruitment of graduate students into programs within CAES has not been thoroughly explored to attract the number and quality of graduate students needed to fulfill the needs of a growing agricultural workforce (Chakraborty et al., 2017).

### Theoretical Framework

The theoretical framework for this study was media richness. Media richness theory began as a method to examine inter-organizational communication media because human systems are far more complex than machine systems (Daft et al., 1987). Media richness posits communication media are on a continuum of leanness to richness, and communicators can select the appropriate medium for audiences based upon the message and its richness (Ledford, 2012). Four factors determine the richness of a communication medium including “the medium's capacity for immediate feedback, the number of cues and channels utilized, personalization, and language variety” (Daft & Lengel, 1986, p. 560). Face-to-face communication, considered the richest communication medium, can provide immediate feedback, deliver cues through body language and tone of voice, has capacity for personalization to the audience, and can adjust language to be more natural (Daft & Lengel, 1986). Rich communication media can be used to convey information ambiguous in nature, while less rich media, such as unaddressed flyers, can be used for more straightforward communication because feedback is slow, physical cues are absent, and it is not addressed to any person in particular (Daft et al., 1987).

Carlson and Zmud (1999) further extended media richness to include social influence and individual experience with a communication medium to explain how they influence preferences for use of a communication medium. As communication media have evolved in the digital age, empirical studies have sought to determine the role of media richness in rapidly emerging and quickly evolving technologies to determine their influences on education, friendship, and organizations (Ishii et al., 2019). The digital age has informed media richness related to recruitment because traditional lean mediums, such as websites, can be personalized and made richer according to the preferences of prospective employees (Frasca & Edwards, 2017). One study examined the interactivity of online recruitment sites and found information recall was higher for participants who used a leaner site with less interactivity than a richer site, indicating retention of information about an organization was not always associated with a more interactive online interface, possibly due to cognitive load (Badger et al., 2014). Another study examined elements of media richness of a recruitment website, Facebook page, and YouTube video all containing the same information. Findings revealed respondents viewed the YouTube video to obtain the most information and Facebook to obtain the most language variety, both factors that influence the affective feelings and informational credibility jobseekers associate with a prospective company (Frasca & Edwards, 2017).

While studies have examined media richness as it relates to employee recruitment from a hiring perspective, literature related to media richness and university recruitment is limited. In order to adequately determine the communication medium and its richness necessary for a particular message, communicators should first explore the audience's existing media use patterns (Waters et al., 2009). Therefore, this study sought to identify the media use of prospective CAES graduate students when searching for graduate programs to assess the richness of each medium for their intended use and inform future communication strategies.

### **Purpose and Research Question**

The purpose of this study was to explore the influence of media richness in the recruitment process for prospective CAES graduate students. The following research question guided the study: What communication channels are prospective CAES graduate students using to interact with graduate programs during the recruitment process?

### **Methodology**

This study sought to examine the communication preferences of successful CAES graduate students. The University of Georgia (UGA) CAES was a convenience sample because the researchers were located at the university. At the time of data collection, the University of Georgia was classified in the top 10 college of agriculture in the United States (Niche, 2022) with a diversity of departments within its CAES. Because the study was sponsored by the Associate Dean for Research within UGA CAES, this qualitative study was focused on students who engaged in graduate research and were successful within their research pursuits in an effort to better understand their communication experiences. To identify successful graduate students, University of Georgia CAES administrators requested the name and contact information of two successful graduate student researchers from the ten CAES department heads. Names and contact information of one domestic and one international student from each department were requested because this effort was part of a larger study using the same students which sought to understand communication preference differences of graduate students based on national versus international perspectives. Using Institutional Review Board (IRB)-approved language, the primary researcher emailed each of these students and invited them to participate in the study. A total of 23 CAES students were invited to participate in the study, with some being invited to participate after other students within their department declined participation or did not respond. Nineteen students participated in the study. Nine participants were international students, and 10 were domestic students. There were an odd number of participants because the international student within one department did not respond to a voluntary interview participation request. By the time nine international students were interviewed, the researchers felt they had reached saturation; therefore, a final international student from the unrepresented department was not recruited. All participants were full-time graduate students receiving assistantship funding and conducting research on either the primary university campus or on a satellite university campus. Students at satellite campuses were included because their areas of study required them to complete their research at a satellite campus location.

Semi-structured interviews were selected because they allowed the researchers to elicit deep conversations with participants about personal and social experiences (DiCicco-Bloom & Crabtree, 2006). The recruitment process and interview guide were reviewed by experts external to the research team in graduate student recruitment, learning strategy, and science communication. The protocol was approved by the University of Georgia IRB (Protocol # 00004686).

One interviewer conducted all interviews to ensure consistency. The interviewer first questioned participants about their personal and educational backgrounds and current research. With the principles of media richness in mind, the second portion of the interview guide prompted participants to reflect on their

communication practices and preferences in their search for prospective graduate programs, not limited to the University of Georgia. Follow-up prompts were used to encourage participants to reflect further on their experiences, allowing researchers to gain a deeper understanding (Seidman, 2006). A list of communication channels was not provided, but participants could ask the interviewer to provide examples for further clarification. Each interview lasted an average of 60 minutes and was audio recorded. Thirteen interviews were conducted in person, and six were conducted over Zoom with video enabled. The interviewer offered to meet with each participant in person, but Zoom participants ultimately elected the online video interview option. Participants were ensured only the audio portion of the interview would be retained in order to maintain confidentiality issues associated with online video-recorded interviews based on IRB-mandated online data collection protocols. Participants were assigned a pseudonym for their personal protection and confidentiality (Coffelt, 2017).

At the completion of data collection, audio recordings were transcribed verbatim using a third-party service and imported into MAXQDA, a data analysis software, for thematic analysis. Data were analyzed using inductive analysis which categorizes text in a data-driven manner, identifying patterns and themes within the data, allowing for the emergence of relationships between the patterns (Creswell, 2007). A single coder (the interviewer) coded each of the interviews manually and created an audit trail along the way to establish confirmability (Lincoln & Guba, 1985). The coder participated in peer debriefing with the second author who had expertise in social science and science communication in order to establish credibility (Lincoln & Guba, 1985), decrease bias, and ensure rigor (Barber & Walczak, 2009). Based on the peer debriefing sessions, the lead coder consolidated the codes into groups, resulting in the themes and subthemes discussed.

Bias may exist in qualitative analysis. To increase trustworthiness, bracketing in the form of subjectivity statements was used to acknowledge the backgrounds of researchers and how they may have influenced analysis (Creswell, 2007). The first author, sole interviewer, and sole coder was a graduate student at the University of Georgia enrolled in CAES and recruited into her program by her advisor after the two worked together in a professional capacity. A resident of Georgia her entire life, the first author considered her own graduate recruitment experience when conducting the qualitative analysis. The second author, second coder and peer debriefer, had been a faculty member for 12 years, five at the current university and seven at a previous institution deemed as aspirational. She had advised master's and doctoral students at both universities and served on committee/as a co-advisor with students in four CAES departments outside her own. She reflected upon her own graduate school search as well as the recruitment of the 50+ graduate students she advised.

## **Results**

Throughout the interviews, participants recalled a multitude of communication channels that fell into three primary themes: online, indirect, and direct communication channels. For the purpose of this article, themes are organized from lean to rich, but the emergence of the themes does not reflect hierarchy of one theme above another. Online channels were those that existed exclusively online and were listed according to the usefulness of their digital features and consisted largely of one-way communication, while indirect communication channels involved sources that had online components due to the nature of technology increasingly integrated in scholarly activities but were not valued specifically for their online features. Direct communication channels were those associated with rich communication engagement with specific individuals and were often discussed for their capacity to connect and form relationships with individuals in certain positions.

### **Online Communication Channels**

Online communication channels were a prominent theme. To qualify as online communication channels, these channels were explicitly recognized as existing exclusively online and touted for their digital features, as opposed to other indirect communication channels discussed in subsequent themes. Items in the online communication channels theme largely consisted of one-way communication channels with which students interacted to gain information while not directly engaging with other individuals. Subthemes included departmental websites, lab websites, and research databases and social media.

### *Departmental Websites*

First, participants cited deep dives into departmental websites in their searches to identify graduate programs, promising departments, and faculty researchers who shared research interests. Sara emphasized a departmental website's importance:

The department website is the most authentic source [of information] ...because you see it as the most legit source of knowing about what's going on with the department, with professors, what kind of student is making progress, and this and that.

Participants found graduate expectations outlined on the websites useful. They mentioned browsing graduate handbooks and course offerings published on websites to achieve a firm grasp on the shape of a graduate program. Kimberly was worried about the transition to graduate school. She said, "I looked a lot at the graduate handbook and checklists just to kind of see... I didn't really know what would be expected of me."

Participants were especially interested in the setup of departmental websites to gain information about faculty research interests. Eli said,

When I choose a field of interest, it means that I want to be a scholar in it, and I want a superior that is already in that field that will guide me. It is important for me to identify that there are at least three professors doing that kind of work so that they can guide me.

Assisting Eli in his search for faculty mentors were lists of faculty research interests on departmental websites, followed by the faculty biographies, listing their specific interests and publications. Participants repeatedly mentioned faculty biographies as solidifying their choices to reach out to those faculty members based upon the contents of a faculty curriculum vitae (CV).

The format of the website was repeatedly mentioned as useful (or frustrating) in the program search, with several participants praising specific departmental sites for user friendliness and detailing beneficial web formats. Lorelai stated her preference for the ideal website workflow:

I think the most efficient website that I prefer is that you have this departmental website and then you have a column where it's about the research interest or say the research group within this department. And then you go down to the list to look at those different sections of the research group or the research areas. They are normally pretty general. Probably four or five sections. And then you chose one of the sections that you're specifically interested in and click into that.

Finally, advertisement of funded positions on departmental websites convinced some participants to apply to programs. Allie confessed her exploration of funding opportunities solidified her application decision. "I, on the department website, saw that master's students were funded like Ph.D. students in many cases, which is very rare. So that was my hook of being like, 'I'm definitely going to apply here.'" Charles said, "If the department homepage has information about who has a funding or who's looking for a student, then definitely a student is going to apply."

### *Lab Websites*

To learn more about the research of faculty members, several participants listed, as Natasha said, "independent lab websites, which were usually listed on the university's website under that particular PI."

Participants continually raised conversations about lab websites of faculty members in which they were interested. Lacy said, “Maybe it's because I'm a millennial and grew up in the digital era, but I do like getting a sense of what the lab prioritizes by what they have on their website.” Matt mentioned that he was interested in certain technologies and found the lab website was useful tool for determining if the lab offered innovative opportunities, while Allie said she searched on the lab websites because she wanted a specific type of researcher within her program who would help her continue to study area she was already enjoying. Allie recalled that on the lab websites, “You could look at what they're working on now or what they were looking for grad students to work on with.”

### ***Research Databases and Social Media***

However, participants were willing to search for faculty research interests beyond those listed on lab or departmental websites. Karter said, “So as someone who's interested in research, I looked at those avenues like ResearchGate and Google Scholar, departmental websites, people's CVs.” Participants regularly listed Google Scholar as an information source about prospective faculty mentors. They also mentioned LinkedIn or Twitter. For example, Jack said to gain more information about the department and school he was considering, he looked at “both the departmental as well as the school's actual social media feed.” Older participants mentioned their specific use of Facebook. Leah said,

Because I'm a Gen X, I only have Facebook, I don't have Instagram. I looked on the [Department] Facebook, and then the professors'. Some professors have a Facebook account, too. I looked on their accounts, making sure that they're okay.

Participants indicated they found the videos created by the university or by CAES on departmental websites or social media to be useful in painting a picture of research culture. Nate stated, “From what the video showed, it seemed like UGA professors and students were really on the leading edge in all fields of what they're researching. That's where I wanted to be – beyond the frontlines of what's coming out.”

### **Indirect Communication Channels**

Participants consistently identified the theme of indirect channels they used to communicate with prospective faculty and departments. Each of these channels were generally related to academia and may have included online components due to the evolving nature of digital channel use in academia.

### ***Professional Networks and Societies***

The first prominent indirect communication channel was professional networks. Josh recalled his experience in finding assistantship funding as one directly related to an academic society, “It was just an email that was sent to a lot of students from the Society of [Discipline] with this job opportunity or graduate assistantship opportunity. And so I decided to apply.” Professional networks and organizations also played a role through indirect communication channels because of their ability to provide information about university rankings and reputation. Eli said, “The communication most useful is the ranking of the department.” Charles echoed this sentiment. He said, “If the university itself has a reputation, it doesn't matter. Whatever you do, even they don't advertise their program at all, everyone just comes.”

### ***Journal Articles***

Participants used journal articles and information databases to explore faculty research interests, university research priorities, and research methods. Charles said, “Definitely reading an article is the way... a graduate student usually starts their degree with their interest. Therefore, it's really necessary to read their potential advisor's manuscript or a general article before they join.” Participants mentioned becoming familiar with faculty members thanks to reading their work in the field. When speaking of a prospective advisor, Oliver said, “I know the name from the papers, and he is one of the most popular guys

in the area.” In some cases, participants used journal articles to evaluate the quality of the research and methodology the faculty members were using. Rachel said, “So if they are publishing to high impact journals, or if I think they had good research methods, that's something that I'm looking for to see would they be a valuable source to help me build my research projects.”

### ***External Community News***

Participants mentioned the use of external sources to explore the surroundings of the university community and the benefits or pitfalls of joining it. Jack said of his external media search,

I did do a lot of internet searches just to check out everything in the area, as well. So not just the university, but Athens, what was Athens like? What was the temperature like? I had to check the temperature 'cause I'm coming from a tropical country. It's a little bit too cold for me sometimes.

Participants used indirect news communication to learn about the public recognition of departmental research. Natasha said news articles about departmental faculty impressed her.

There's one faculty member here in our department...She's very well known. And so, she's all over social media, the news, et cetera. So just reading that gave, I guess, some presence of UGA in the news and seeing that was really cool.

### **Direct Communication Channels**

Finally, the theme of direct communication channels emerged, encompassing interpersonal connections participants used to explore potential graduate programs. These channels were those in which participants would directly reach out to key players within the target departments or those who had firsthand experience or knowledge of target departments to gain more information about the graduate program.

### ***Professional Network Connections***

Participants recognized connections from previous institutions as instrumental in their choice of faculty advisors to pursue. Nate said, “Different managers and bosses would know people in the areas ... The same names started popping up overall. So those were the ones that I wanted to really seek after.” Eli identified the use of personal networks to find strong faculty advisors after vetting potential programs. Eli said of the process,

So once a potential applicant restricts the list of people they're interested in, then they usually talk to their own professors just to ask if those professors that they're potentially interested in are known...It's just that you want some validation, 'Oh, have you heard about these people? I think that in this school they're this.'

The reputation of the department preceded itself in Yvette's experience. She heard from professors at her previous institution who encouraged her to apply because of the research reputation of her advisor and the department. “They said it's a really good opportunity because UGA has a good facility, a large farm, which is really rare for a lot of universities to have this size.... And it's a really good opportunity for applying science and also for research science,” Yvette said.

Participants also leveraged existing connections to find faculty members who could be a match. As a student who had also obtained her undergraduate degree at UGA, Kimberly recalled her experience emailing with a professor with whom she had worked in the past, “I initially asked him if I could work with him. He said he was retiring and pointed me in the direction of my current PI. And I emailed him.” Victoria, a student looking to expand upon her undergraduate degree and needing further expertise in the field, found her industry mentors helpful. She recalled, “I definitely asked [my mentors] whether they thought it was a good idea to pursue a graduate degree, and also a little bit of what their personal experiences were.”

Participants mentioned the interpersonal connections formed at research conferences, thanks in part to existing faculty relationships. Nate was searching for graduate programs with little luck hearing back from other schools but had a conversation during a conference graduate fair with a UGA faculty member, who in turn had him fill out an interest form. In the early hours of the morning, he heard back from a professor with interest and funding information. Nate said, “At 3:00 AM the next morning I got an email from Dr. [Faculty Advisor] stating, ‘I’ve got a spot. I’ve got a position. What are you looking at doing? Here’s what I can offer. Let’s talk.’” He was especially influenced by the speedy nature of the communication from his now-advisor.

### ***Conversations with Existing Students and Alumni***

Participants enthusiastically recalled the importance of personal conversations with fellow students to gain information through interpersonal communication – online, over the phone, or in person. Rachel detailed her conversation with a current student about a potential faculty advisor. “I went to the graduate student I was working with at the time and she had some experience with [Faculty Advisor], said that he was a great option. I think I just took her word for it,” Rachel said. However, it was not simple for many students to find current or recent alumni who would provide helpful insights. This problem presented a particular obstacle for those who had never visited the university’s campus. Allie said of her experience,

I did reach out to current students, just based on their emails on the web pages of the department websites for several programs after I applied...just to learn more about the schools... I’d email students and sometimes I’d get one response and then drop off or something like that. So it was harder to get in touch with current students, I found.

Further challenges arose when departments did not list the names or email addresses of current graduate students, leading some determined participants to dive headlong into creative contact methods. Sara detailed her process:

It was actually a little tortuous. So what I would do is go to the department website, look at the professor’s publications and there I would see which student’s name appears on the paper or the article. And then I would use that name to find them on the social media.

While social media was utilized as an online communication tool as mentioned in the previous subtheme, participants also employed social media to establish initial contact with current students to gather information from them about the prospective institutional fit in a manner that was more in line with the direct communication subtheme. Lacy, who searched for Facebook groups of current grad students at prospective universities, said, “You can’t really get the feel of it until you’ve talked to someone who’s actually worked there...And you only really get that by talking to people, or at least watching what they post.”

### ***Email Communication***

The communication channel overwhelmingly repeated by participants was email communication. Participants spoke about emailing with faculty advisors, lauding open communication and fast replies as the most valuable, followed by emails useful in providing basic information about the program application process. Kimberly emailed the graduate coordinator to gain direction in her faculty advisor search. She said, “That was nice to have the graduate coordinator actually email me back and say, ‘If this is what you’re interested in, here are three people to reach out to.’”

Participants most frequently spoke about their emails with potential faculty advisors. Nate said, “It was primarily just the email communication back and forth. I could tell he really wanted me to come down here and visit and that he really was concerned about my future.” Email was especially impactful for the international participants who were not able to easily call and navigated time zone differences. Lorelai mentioned her diligence in replying to all emails within 24 hours because of the time difference between

the United States and China. Matt, also an international participant, appreciated email's convenience and lack of expense.

So since I was back home, [email] was the best way to communicate. And I used to get a bunch of responses from different professors and then I used to narrow it down whether I would apply to that program or not and then push the communication forward.

### ***Phone or Video Calls***

Participants were likely to utilize phone or video calls to further relationships with prospective advisors after establishing an email connection. Tonya remembered she first spoke with professors in her undergraduate department, then emailed her current advisor when she discovered the graduate research opportunity, recalling that digital technology did not, in her opinion, play a prominent role in her decision to attend the graduate program. Tonya said, "And then after that, it was all phone calls." Other participants used a combination of phone and video calls to gain information about their programs. Victoria said, "Maybe a little bit of phone call too, depending on, I think, whether they were responsive to the email or whether I had additional questions that would be easier to answer over the phone." Yvette also cited using phone calls as a measure after making an initial connection with current students or recent alumni of the department. She said, "Social media and Facebook Messenger is how I get in touch with them. And after that, I just say, 'Hey, can I call you really quick?'"

Leah said Zoom video conferencing was the most useful tool to gain information about the program. "I asked [the professors] personally if they aligned to what I want to happen in the future," Leah said. Allie recalled utilizing Zoom calls to keep in communication with potential faculty members following her campus visit.

I got to get on a Zoom call with one [professor] after the visit, really right before I ended up making the decision, at which point she offered me more funding to work on this research with her. And then right after making the decision I got on a Zoom call with them to learn just more about the project I'd be on in general.

### ***In-Person Visits***

Participants were likely to list in-person campus visits as instrumental in their decision to attend the institution. For example, Rachel said her in-person visit to students on campus provided her with personal insights.

I guess when I was talking to students, that was more of what's their perception of their PI? So do they enjoy working in the group? Are they working? Is their work-family balance good? That's something that I value. Does their PI offer them a lot of support or guidance? Less so about the research, but more about the interpersonal relationship.

Several students remembered feeling welcomed by faculty and confident in their decisions to attend the university after campus visits. Karter recalled her campus visit as one that helped her feel valued by the graduate coordinator in the department.

He took me and my partner to lunch and we sat in on one of his classes... And even though I've never taken that class, it was really exciting to feel that a graduate coordinator cared enough to take me and my now-husband to lunch, get to know us, let us sit in on his three-hour class, see part of Athens as well.

## **Conclusions, Implications, and Recommendations**

### **Conclusions and Implications**

Recruiting graduate students into highly specialized programs within CAES is no small task but is necessary given the demand for employees with graduate degrees within the agricultural workforce (Chakraborty et al., 2017). To communicate most effectively with prospective graduate students, it is necessary to first understand their current uses of media (Waters et al., 2009) and the richness which is required to communicate with this audience at different stages throughout the graduate recruitment process. Findings revealed students within this study generally started their graduate program searches with indirect or online channels that were less personalized to their needs and, therefore, lean. Then, students moved into richer media such as email, calls, and in-person visits with capacity for personalized, immediate feedback as their interest in the institution grew. The more interest a student had in an institution, the richer the communication media they sought, aligning with previous media richness findings that implied the importance of using multiple communication channels to achieve a desired outcome (Ishii et al., 2019).

The findings imply there are several practices in which colleges and departments may engage when catering to prospective student preferences. Generally, participants started with lean communication channels to assess the possibility of obtaining a graduate degree. Participants had strong preferences as to the setup of departmental websites, indicating they found the stated research interests of faculty members useful in their searches to narrow down potential advisors. Once participants identified advisors with research interests similar to their own, they were likely to look into faculty biographies, CVs, or lab websites. Therefore, departments within CAES should consider both the structure of their websites and keywords they use to highlight faculty interests. Participants indicated disappointment when the information was not current. Emphasizing the importance of regular maintenance of these pages to attract prospective graduate students may encourage faculty to prioritize upkeep of their web presence. Departmental graduate handbooks were also useful online resources, as they provided students insight into course availability and what to expect from a graduate student experience as they delved deeper into programmatic attributes and sought richer information based on their own personal interests. Therefore, departments should keep current handbook copies on departmental websites to help students best understand the processes of the department – from admission to graduation. However, Badger et al. (2014) found higher information retention when a site was not highly interactive, indicating departments should prioritize keeping sites straightforward and lean to increase information retention for prospective students.

Lab websites were more personalized according to faculty and lab member priorities and, therefore, slightly more rich than departmental websites. Lab websites outlined lab research projects, priorities, and available technologies and were, therefore, categorized as lean information sources. Because students sought aspects of labs that were germane to their personal research interests, future research may examine elements of a website that appeal to prospective graduate students' desire for personalization. Future studies should determine what lab website elements appeal to prospective students with specific career aspirations, degree levels sought, or needs for funding – all of which are influential in graduate program choice (English & Umbach, 2016; Hardré & Hackett, 2015; Shellhouse et al., 2020).

Journal articles, a lean form of media, featured prominently in potential graduate students' searches to inform them about the research interests, research methods, and ethics of potential faculty advisors. Overall, students were pleased when faculty emailed them documents of current faculty work to help the students understand the current research happening in the lab. Often times, these interactions were richer and more personalized to the work the prospective student would be performing in the lab. Therefore, future research should explore the response rates and media richness perceptions of prospective graduate students who receive emails from faculty with current journal articles versus emails without current journal articles. In practice, departments may benefit from training faculty to email current work to prospective students, as well as display a lab's most current journal articles prominently within departmental faculty profiles. While faculty may recognize the need to communicate via email with prospective students, including personal research in the form of current work may save faculty time in forming relationships with prospective graduate students and better streamline the recruitment process.

Popular press articles and general community news – though lean forms of media – were useful in fulfilling students' needs to understand the community in which the university was located. This aligns with the media richness tenet that a lean form of media is often selected for straightforward communication (Daft et al., 1987). Departments may consider focusing on public relations with local media to highlight local importance of departmental research. However, recognizing departments often do not have resources to employ communications professionals with public relations expertise, departments should consider working with communications offices within a college to strategically highlight departmental research and its impact on the community level.

Research databases and social media helped connect students to current disciplinary research and find prospective faculty advisors. Students mentioned learning more about potential faculty advisors through following Google Scholar coverage. Google Scholar, a semi-rich medium with potential for immediate feedback and personalization (Daft & Lengel, 1986) based on the platform's capabilities to search specific, customizable information, should be utilized by departments to keep faculty research profiles current and be linked to departmental websites for ease of use. Social media platforms were used by participants to gain a clear picture of the university more personalized to their interests. Some participants were also likely to use social media to seek rich communication by reaching out to current students to receive immediate feedback, language cues, personalized information, and natural conversation about their experiences in the graduate program. These findings are in alignment with the importance of rich media in relational contexts (Ishii et al., 2019).

To this end, participants indicated a preference for departmental websites with contact information of current or recently graduated students. This readily available information empowered participants to connect with and understand the experience of students already ensconced in the graduate program, adding to the potential for richer communication through increased interactivity and immediate feedback. Departments must consider the privacy and online communication preferences of the graduate students they serve. There are legal policies, such as the Family Educational Rights and Privacy Act (FERPA), that protect student information. Within legal confines, departments should consider maintaining a list of current and recently graduate students to display their accomplishments and contact information. Future research could track engagement with sites containing current student information against sites without current information to inform the interactions elicited by student profiles.

While professional society emails that shared information about assistantship opportunities were lean and personalized only to prospective students' field of study, professional networks and societies overall provided relatively rich, personalized communication that allowed participants to engage with other scholars throughout their program search processes. Professional societies connected participants with advisors through conferences and served as mechanisms for faculty socialization. These societies work well to engage students who are already in their disciplinary areas and provide in-person connections that may fail to be fruitful over email, but departments should not focus all their communication efforts within traditional societies if they wish to attract students without traditional backgrounds. Future studies would benefit from surveying graduate students about their use of professional societies in identifying graduate programs and the frequency of using professional society resources.

Rich communication with the potential for immediate feedback – over the telephone, through video calls, or in person – was instrumental. Participants tended to use spoken communication channels to gain more confidence in understanding the culture of a university or a lab through asking personalized questions and picking up on language and social cues in these interactions. Participants who spent time in direct contact through phone, video call, or in-person communication were able to gauge the personality of faculty and students to understand their feelings about research and the department, particularly through body language cues and the use of natural language, aligning with the media richness theory suggestion that rich

media is more effective for sharing potentially ambiguous information (Daft et al., 1987). Phone and video calls were inconvenient for students located in other countries because of time zone differences and unreliable internet connections, while resources to travel to the U.S. also inhibited their ability to visit in person. Despite these issues, faculty and students of a current department should make every effort to connect with spoken communication to secure potential graduate student interest using rich communication media.

### Recommendations for Future Research

Participants' descriptions of their unique personal experiences indicated CAES graduate recruitment should be focused on a holistic approach to satisfy multiple, specific needs of prospective students through a variety of communication channels – moving from lean communication media at the beginning of the search to richer and more personalized communication as prospective students make their decisions. However, the study was limited to graduate research students at the University of Georgia and is not generalizable to the larger prospective graduate student population. Additionally, the differences between international and domestic students' preferences for media use and the richness thereof should be further examined to determine if differences exist and how universities must strategically communicate with each of these crucial prospective student populations. Therefore, future research should quantitatively examine frequency of use of communication channels and the nuances that exist depending on demographic, psychographic, and cultural variables of prospective students. The results could be used in the strategic, evidence-based training of faculty members across institutions to create communication materials that meet the variety of needs necessary to recruit prospective graduate students while keeping the principles of media richness in mind.

### References

- Arnold, M. A., Lineberger, R. D., Davis, T. D., Reed, D. W., & McKinley, W. J. (2014). A survey of North American horticulture graduate programs: Demographics, policies, finances, and metrics. *HortTechnology*, 24(2), 241–251. <https://doi.org/10.21273/HORTTECH.24.2.241>
- Badger, J. M., Kaminsky, S. E., & S. Behrend, T. (2014). Media richness and information acquisition in internet recruitment. *Journal of Managerial Psychology*, 29(7), 866–883. <https://doi.org/10.1108/JMP-05-2012-0155>
- Baker, L., Settle, Q., Chiarelli, C., & Irani, T. (2013). Recruiting strategically: Increasing enrollment in academic programs of agriculture. *Journal of Agricultural Education*, 54(3), 54–66. <https://doi.org/10.5032/jae.2013.03054>
- Balayan, A., Connor, C., & LaFave, J. (2022). The evolution of graduate enrollment management. *Strategic Enrollment Management Quarterly*, 9(4), 35–46. <https://www.proquest.com/scholarly-journals/evolution-graduate-enrollment-management/docview/2623908082/se-2>
- Barber, J. P., & Walczak, K. K. (2009, April). *Conscience and critic: Peer debriefing strategies in grounded theory research* [Conference presentation]. Annual Meeting of the American Educational Research Association, San Diego, CA, United States.
- Beyl, C. A., Adams, A. F., & Smith, E. G. (2016). A proactive model for recruiting students into agriculture disciplines. *NACTA Journal*, 60(1), 51–59. <https://www.jstor.org/stable/10.2307/nactajournal.60.1.51>

- Carlson, J. R., & Zmud, R. W. (1999). Channel expansion theory and the experiential nature of media richness perceptions. *Academy of Management Journal*, 42(2), 153–170. <https://doi.org/10.2307/257090>
- Chakraborty, D., Mulvaney, M., Rowland, D., Bennett, J., Hochmuth, G., & Galindo-Gonzalez, S. (2017). Increasing the disciplinary breadth in graduate training in agricultural science to meet the industry need for addressing global food system complexity. *Natural Sciences Education*, 46(1), 160021. <https://doi.org/10.4195/nse2016.07.0021>
- Coalition for a Sustainable Agricultural Workforce. (2013). *2013 Agricultural science workforce census final report*. <https://www.apsnet.org/careers/Pages/CSAW.aspx>
- Coffelt, T. (2017). Confidentiality and anonymity of participants. In M. Allen (Ed.), *The SAGE encyclopedia of communication research methods* (pp. 227–230). Sage Publications, Inc. <https://doi.org/10.4135/9781483381411.n86>
- Copenheaver, C. A. (2020). Rising expectations: Natural resources graduate student authorship of publications. *Natural Sciences Education*, 49(1). <https://doi.org/10.1002/nse2.20017>
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Sage.
- Daft, R. L., & Lengel. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554–571.
- Daft, R. L., Lengel, R. H., & Trevino, L. K. (1987). Message equivocality, media selection, and manager performance: Implications for information systems. *MIS Quarterly*, 11(3), 355-366. <https://doi.org/10.2307/248682>
- DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, 40(4), 314–321. <https://doi.org/10.1111/j.1365-2929.2006.02418.x>
- English, D., & Umbach, P. D. (2016). Graduate school choice: An examination of individual and institutional effects. *The Review of Higher Education*, 39(2), 173–211. <https://doi.org/10.1353/rhe.2016.0001>
- Fernandez, J. M., Goecker, A. D., Smith, E., Moran, E. R., & Wilson, C. A. (2020). *Employment opportunities for college graduates in food, agriculture, renewable natural resources and the environment, United States, 2020–2025*. United States Department of Agriculture’s National Institute of Food and Agriculture. <https://www.purdue.edu/usda/employment/>
- Frasca, K. J., & Edwards, M. R. (2017). Web-based corporate, social and video recruitment media: Effects of media richness and source credibility on organizational attraction. *International Journal of Selection and Assessment*, 25(2), 125–137. <https://doi.org/10.1111/ijsa.12165>
- Hardré, P. L., & Hackett, S. M. (2015). Understanding the graduate college experience: Perceptual differences by degree type, point-in-program and disciplinary subgroups. *Learning Environments Research*, 18(3), 453–468. <https://doi.org/10.1007/s10984-015-9194-1>
- Ishii, K., Lyons, M. M., & Carr, S. A. (2019). Revisiting media richness theory for today and future. *Human Behavior and Emerging Technologies*, 1(2), 124–131. <https://doi.org/10.1002/hbe2.138>

- Ledford, C. J. W. (2012). Changing channels: A theory-based guide to selecting traditional, new, and social media in strategic social marketing. *Social Marketing Quarterly*, 18(3), 175–186. <https://doi.org/10.1177/1524500412460671>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Sage Publication Inc.
- Niche. (2022). *2023 best colleges for agricultural sciences in America*. <https://www.niche.com/colleges/search/best-colleges-for-agricultural-sciences/>
- Poock, M. C., & Love, P. G. (2001). Factors influencing the program choice of doctoral students in higher education administration. *NASPA Journal*, 38(2), 203–223. <https://doi.org/10.2202/1949-6605.1136>
- Seidman, I. E. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College Press.
- Serão, N. V., Petry, A. L., Sanglard, L. P., Rossoni-Serão, M. C., & Bundy, J. M. (2021). Characteristics of animal science graduate students associated with their professional interest in statistics and career path. *Journal of Animal Science*, 99, 145–145. <https://doi.org/10.1093/jas/skab054.247>
- Shellhouse, J. A., Spratley, S. L., & Suarez, C. E. (2020). Influencing factors on the pursuit of graduate degrees in agricultural social sciences. *Journal of Agricultural Education*, 61(1). <https://doi.org/10.5032/jae.2020.01074>
- Waters, R. D., Burnett, E., Lamm, A., & Lucas, J. (2009). Engaging stakeholders through social networking: How nonprofit organizations are using Facebook. *Public Relations Review*, 35(2), 102–106. <https://doi.org/10.1016/j.pubrev.2009.01.006>
- Westbrook, J., & Alston, A. (2007). Recruitment and retention strategies utilized by 1890 Land Grant institutions in relation to African American Students. *Journal of Agricultural Education*, 48(3), 123–134. <https://doi.org/10.5032/jae.2007.03123>
- Zhou, E. (2022). *Graduate enrollment and degrees: 2011 to 2021*. Council of Graduate Schools.