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Improvisation for Agricultural Communicators: Investigating the Effect of Paired Role-Play Discussions On Students' Empathy Development Using a Quasi-Experiment

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Improvisation for Agricultural Communicators: Investigating the Effect of Paired Role-Play Discussions On Students' Empathy Development Using a Quasi-Experiment

Abstract

Empathy is integral to effective civil discourse because it enables people to understand others' perspectives (cognitive) and feel concern toward others' feelings (affective). Although no studies have empirically investigated agricultural communications students' empathy development, scholars in other disciplines have identified improvisational role-play exercises as effective means to develop students' empathy skills. Therefore, we sought to determine how paired role-play discussions affected agricultural communications students' empathy development when compared to class-wide discussions during the course of one semester using a quasi-experimental pretest-posttest control group research design. The pretest-posttest survey instrument included Reniers et al.'s (2011) Questionnaire of Cognitive and Affective Empathy. Using Kolb's (1981) experiential learning cycle as a guide, we developed study materials (i.e., lectures, case studies, readings, discussion exercises) focused on relevant skills needed to meet industry demands (i.e., brand assimilation, consumer engagement, public relations, content marketing) and implemented the materials during four class periods. We only facilitated active experimentation through role-play with students in the treatment group. After analyzing the data from 53 usable pretest-posttest responses using a mixed design repeated measures ANOVA, we found that paired role-play discussions and class-wide discussions, both focused on recognizing and affirming opposing perspectives, statistically significantly improved students' cognitive empathy and total empathy, but not affective empathy. Therefore, we recommend instructors facilitate the type of discussion that would suit their teaching style, classroom dynamic, and students' learning style best. If an improvement in affective empathy is also desired, then adapting the materials to include a focus on emotion contagion is necessary.

Keywords

affective empathy, agricultural communications, cognitive empathy, mixed design, quasi-experiment

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Introduction

Agricultural communicators take on many roles (Qu et al., 2017) and communicate about topics ranging from agricultural production and marketing to food consumption and health (Qu et al., 2017; Zumalt, 2008). Issues associated with these topics (e.g., climate change, gene editing, animal welfare, pesticide use, food irradiation) can be polarizing and divide public opinion. As a result, agricultural communicators must acquire and implement a unique and precise set of skills when communicating with diverse audiences (Harsh et al., 2018; Ruth et al., 2019; Shaw, 2018). One of the skills critical to communicating with diverse audiences about controversial topics is the ability to engage in civil discourse, or communicate respectfully and productively with non-science audiences about complex and polarized issues (Baker et al., 2021; Qu et al., 2018). Civil discourse can be difficult, though, especially when discussing emotionally charged or politically fraught issues. Often, an individual's opinions about and responses to such issues tend to be dominated by emotions, creating the potential for tension (Alda, 2017; Baker et al., 2021; Parrella et al., 2022).

Empathy is integral to effective civil discourse (Alda, 2017; Garner & Rossmanith, 2021; Valente, 2016). Martinez (2004) defined empathy as "the ability to sense others' feelings and perspectives and take an active interest in their concerns" (p. 35). An empathetic person is attentive to others' emotions, comprehends non-verbal communications (e.g., body language, tone of voice), listens actively, and seeks to understand differing perspectives (Martinez, 2004). Thus, people who have empathy should be able to engage effectively in civil discourse. As future industry professionals, it is important that students studying agricultural communications have opportunities to develop empathy during their degree program (Harsh et al., 2018).

There are two dominant empathy types: cognitive and affective. Cognitive empathy involves reflective processes that include an individual's ability to take the perspective of others, understand the emotional state of others, and distinguish others' feelings from their own (Michaels et al., 2014; Leshem & Schober, 2020). Intentional and controlled (Hodges & Wegner, 1997), cognitive empathy guides an individual's interpersonal behavior by enabling them to integrate their perspective-taking skills and social knowledge (Michaels et al., 2014). Thus, cognitive empathy contributes to social expertise and helps people facilitate conversations (Smith, 2006). Affective empathy, on the other hand, involves relatively automatic processes (Michaels et al., 2014) and is more immediate and uncontrolled when compared to cognitive empathy (Hodges & Wegner, 1997). It refers to an individual's tendency to feel concern toward others' feelings (Leshem & Schober, 2020) and behave altruistically (Smith, 2006). Affective empathy is accessed when perceived social cues trigger an individual's emotional response (Bernhardt & Singer, 2012; Michaels et al., 2014). Similar to cognitive empathy, affective empathy also improves the efficiency of social interactions by helping people relate to one another (Müller, 2016). Coordinated interaction between the reflective processes associated with cognitive empathy and automatic processes associated with affective empathy enable someone to empathize accurately (Michaels et al., 2014; Smith, 2006).

Despite agricultural communications scholars having acknowledged that empathy is critical to students' success in industry careers (e.g., Chenault, 2008; Corder & Irlbeck, 2018) and that agricultural communications curriculum should foster students' empathetic development (e.g., Easterly et al., 2017; Martinez, 2004), none have empirically investigated how certain pedagogical exercises impact agricultural students' empathy. Therefore, the study described

herein sought to determine how engaging in an improvisational exercise affects agricultural students' cognitive and affective empathy development.

Literature Review

In our review, we synthesized the educational literature that bridges four concepts: improvisation, role-play, empathy, and student learning.

The Effects of Improvisation on Student Learning

Improvisation, defined as "the conception of action as it unfolds, drawing on available cognitive, affective, social and material resources," has been linked to student learning over time (Cunha et al., 1999, p. 1). To perform improvisation, people must put themselves in the position of others, cognitively or emotionally, and as a result, connect with that person's state of mind (Alda, 2017). Therefore, when improvisational exercises are used as teaching methods, they can promote critical thinking (Ponzio et al., 2018) and encourage students to think creatively in new ways (Lewis, 2012). Toivanen and Komulainen (2011) explained that improvisation increases students' awareness of their own mind, body, and voice, and their awareness of others through interaction and collaboration while promoting knowledge gains of the subject at hand (e.g., agriculture, history). Ultimately, improvisation activities engage a deeper level of cognitive processing that results in a higher level of cognitive performance (Lewis, 2012).

By increasing awareness and cognitive performance, improvisational exercises can improve students' listening and observational skills, communications skills (Higgins & Nesbitt, 2021), collaboration and teamwork skills (Thompson & Stetzler, 2019), and professional skills (Misluk-Gervase & Ansaldo, 2022). They can also improve uncertainty tolerance because the nature of improvisation is ambiguous and can increase anticipatory anxiety (Reid-Wisdom & Perera-Delcount, 2020), thereby improving students' empathy skills (Douglas & Coburn, 2009; Koblar et al., 2018; Poorman, 2002; Walther et al., 2019). Specifically, Bayne and Jangha (2016) found improvisational exercises "can enhance many of the cognitive and behavioral qualities associated with empathetic communication" (p. 253). Thus, improvisation can be a valuable pedagogical exercise to promote student learning in different contexts.

Role-Play as an Improvisational Exercise for Empathy Development

One of the most interactive improvisational exercises is role-play, or "participation in simulated social situations that are intended to illustrate the roles and contexts that govern 'real life' social episode[s]" (Latiff et al., 2018, p. 131). Traditionally, role-play has been associated with perspective-taking, or cognitive empathy (Bell, 2018). In classroom contexts, role-play helps facilitate learning because students are prompted to realistically mimic characteristics and mannerisms of the role(s) they portray (Latiff et al., 2018). Rao and Stupans (2012) found that improvisational role-play can influence student learning in the affective, cognitive, and behavioral domains because, during role-play exercises, students practice communicating, empathizing, and adopting perspectives (Latiff et al., 2018). As a result, they learn to recognize their strengths and weaknesses through reflection (Westrup & Planander, 2013).

Much of the literature documenting role-play as an effective pedagogical tool has been published by scholars who investigated its effect on improving medical students' communication

and empathy skills (e.g., Gelis et al., 2020; Koblar et al., 2018; Latif et al., 2018; Nair et al., 2019; Nestel & Tierney, 2007). For example, Koblar et al. (2018) found that a role-play stroke experience increased medical students' empathy and recommended role-play be implemented more frequently in clinical education. Scholars have also investigated the effect of role-play on improving empathy skills of students who study a variety of other disciplines (e.g., engineering, law, psychology; Douglas & Coburn, 2009; Goosse & Willems, 2020; Guerra & Shealy, 2018; Poorman, 2002; Walther et al., 2019). For example, Guerra and Shealy (2018) found that civil engineering students could better recognize stakeholder perspectives after participating in a role-play exercise involving a collaborative planning process. As another example, Goosse and Willems (2020) found that a role-play discussion with an elderly woman increased psychology students' cognitive empathy. Evidence suggests role-play, as a classroom exercise, is adaptable and can effectively develop students' empathy across disciplines and situations (e.g., Douglas & Coburn, 2009; Goosse & Willems, 2020).

Several scholars have anecdotally discussed role-play as an effective means to develop different skills of agricultural students (Baker et al., 2021; Intarachaimas, 2012; Malviya, 2021). As examples, Intarachaimas (2012) explained how role-play can be used to enhance agricultural students' creativity, and Malviya (2021) discussed the use of role-play to improve agricultural students' command of language skills. Baker et al. (2021) also implemented role-play exercises with agricultural communications students and observed perceived gains in empathy. However, scholars have yet to investigate empirically how role-play affects agricultural students' empathy development—a need our study sought to address.

Theoretical Framework

We used Kolb's (1984) experiential learning theory to guide the study, which posits that students gain knowledge through a recursive process of abstract conceptualization (e.g., thinking), active experimentation (e.g., doing), concrete experience (e.g., feeling), and reflective observation (e.g., reflecting). Importantly, all four phases of the cycle involve experiences (Kolb & Kolb, 2017). Abstract conceptualization and concrete experience involve "grasping experience," whereas reflective observation and active experimentation involve "transforming experience" (Kolb & Kolb, 2017, p. 12).

To achieve abstract conceptualization, students think about a new idea or modify existing beliefs (McLeod, 2017). Activities commonly used to practice abstract conceptualization include concept mapping and theory critiques (Young et al., 2008). As a result of engaging in these activities, students integrate new theories and concepts into their learning (Young et al., 2008). Active experimentation involves students applying their ideas to real-world contexts (McLeod, 2017). Fieldwork, projects, case studies, and simulations enable students to experiment with theories, concepts, or processes actively in real-world contexts and create practical outcomes (Young et al., 2008). A concrete experience occurs when students encounter a new experience or have the opportunity to reinterpret a previous experience (McLeod, 2017). Such experiences are intended to motivate and evoke students' feelings toward the experience (Young et al., 2008). Activities like demonstrations, lectures, videos, and discussions are considered concrete experiences and bridge the gap between students' academic learning and the real world (Young et al., 2008). Students use reflective observation to reflect on a new experience or knowledge (McLeod, 2017). Through reflective observation, they concentrate on what the experience means to them and how it can be integrated into

previously acquired knowledge (Young et al., 2008). Activities that encourage reflection include personal journals, writing prompts, structured classroom discussions, and other self-assessment exercises (Young et al., 2008).

Baker et al. (2005) explained that conversational learning, "a process whereby learners construct new meaning and transform their collective experiences into knowledge through their conversations," is key to successful experiential learning (p. 412). In our study, we used conversational learning as the mode for students to achieve concrete experience and active experimentation. After listening to a lecture, students in the control group reviewed readings that supported opposing perspectives of an agricultural case study and applied lecture concepts (abstract conceptualization), engaged in a class-wide discussion about the opposing case study perspectives (concrete experience), and responded to reflection questions (reflective observation). Thus, students in the control group did not engage in active experimentation as a separate exercise. Students in the treatment group, however, did complete Kolb's experiential learning cycle by 1) reviewing readings that supported opposing perspectives of an agricultural case study and applied lecture concepts (abstract conceptualization); 2) participating in a paired role-play discussion by personifying characters who held opposing perspectives in regard to the case study (active experimentation); 3) engaging in a brief class-wide discussion about their role-play experience (concrete experience); and 4) responding to reflection questions (reflective observation). Thus, students in the treatment group achieved active experimentation through role-play.

Purpose of Study and Research Questions

The purpose of our study was to determine how paired role-play discussions affected students' empathy development when compared to class-wide discussions during the course of one semester. Table 1 displays the research questions and hypotheses that guided our quasi-experiment:

Table 1

Research Questions and Supporting Hypothesis Tested in the Current Study

Research Questions and Hypothesis	
RQ1	How does participating in paired role-play discussions and class-wide discussions affect students' Cognitive, Affective, and Total Empathy development over the course of the semester?
H_1	Students who participate in paired role-play discussions and class-wide discussions will both demonstrate significant gains in Cognitive Empathy over the course of the semester.
H_2	Students who participate in paired role-play discussions and class-wide discussions will both demonstrate significant gains in Affective Empathy over the course of the semester.
H_3	Students who participate in paired role-play discussions and class-wide discussions will both demonstrate significant gains in Total Empathy over the course of the semester.
RQ2	Does participating in paired role-play discussions affect students' Cognitive, Affective,

and Total Empathy development over the course of the semester differently than participating in class-wide discussions?

- H_4 Students who participate in paired role-play discussions will demonstrate greater gains in Cognitive Empathy over the course of the semester compared to students who participate in class-wide discussions.
- H_5 Students who participate in paired role-play discussions will demonstrate greater gains in Affective Empathy over the course of the semester compared to students who participate in class-wide discussions.
- H_6 Students who participate in paired role-play discussions will demonstrate greater gains in Total Empathy over the course of the semester compared to students who participate in class-wide discussions.

RQ3 Is there an interaction between students' participation in paired role-play discussions and class-wide discussions and their Cognitive, Affective, and Total Empathy development over the course of the semester?

- H_7 There is an interaction between students' participation in paired role-play discussions and class-wide discussions and their Cognitive Empathy development over the course of the semester.
- H_8 There is an interaction between students' participation in paired role-play discussions and class-wide discussions and their Affective Empathy development over the course of the semester.
- H_9 There is an interaction between students' participation in paired role-play discussions and class-wide discussions and their Total Empathy development over the course of the semester.

Method

Study Design

We used a quasi-experimental pretest-posttest control group research design to achieve the study's purpose (Mertler, 2020). Quasi-experiments are similar to true experiments with the exception of participants being assigned randomly to groups (Mertler, 2020). Because we conducted our study in a classroom setting, we were unable to achieve true randomization as a select group of students registered for the courses. However, because pretest-posttest control group designs statistically control for threats to internal validity, they are often considered true experiments (Joyce, 1975). Quasi-experimental, pretest-posttest control group designs are advantageous because they are versatile (Joyce, 1975) and designed to fit real-world settings (Koh & Owen, 2000). They are also valuable when one is looking for a change over time or making comparisons between groups (Koh & Owen, 2000; Maciejewski, 2020).

Setting

Our study took place at Texas A&M University, a large land-grant institution in the Southwest. Texas A&M University is home to one of about 40 agricultural communications programs in the country (Cartmell & Evans, 2013; Miller et al., 2015). Of these, Texas A&M University hosts the largest agricultural communications program and awards the most degrees annually (Data USA, n.d.). We conducted our study across two semesters using students enrolled

in the undergraduate *Sophomore Seminar* and *Senior Seminar*. During the Fall 2021 and Spring 2022 semesters, these courses were offered in a traditional face-to-face format and enrolled 117 students. Each semester, one class was 50 minutes and one was 75 minutes. We consistently implemented the study during 50-minute class periods across both semesters as a control mechanism. We selected these courses because the content delivered focuses on real-world applications of agricultural communications to prepare students to be industry professionals.

Participants

We randomly selected students in the *Sophomore Seminar* and *Senior Seminar* to be part of the control and treatment groups. Of 117 students, 93 agreed to participate in data collection. However, we received 53 usable pretest-posttest survey responses, achieving a 56.99% response rate. Most participants were seniors (*f* = 32, 60.38%) who identified as 22 or 23-year-old (*f* = 29, 54.72%) females (*f* = 42, 79.25%; see Table 2).

Table 2

Demographic and Academic Characteristics of Participants (N = 53)

Variable	Category	*f*	%
Age	19	4	7.55
	20	8	15.09
	21	9	16.98
	22	12	22.64
	23	17	32.08
	24	2	3.77
	>24	1	1.89
Course	Sophomore Seminar	25	47.17
	Senior Seminar	28	52.83
Classification	Freshman	7	13.21
	Sophomore	10	18.87
	Junior	4	7.55
	Senior	32	60.38
Gender	Female	42	79.25
	Male	11	20.75

Intervention Description

We implemented the study in four phases which took place during four class periods, scheduled approximately every four weeks, throughout the semester (see Table 3). At the end of each phase, students in the control and treatment groups spent the last five to eight minutes of class completing four reflection questions: 1) What do you think was the purpose of this lecture/discussion?; 2) What did you learn from this lecture/discussion?; 3) How do you think the knowledge/skills you gained from class today will benefit you in your future career?; and 4) Is

there anything else you would like to share with us about your experience in class today? Students submitted their reflections prior to leaving class.

Table 3

Dates of Study Implementation During the Fall 2021 and Spring 2022 Semesters

	Sophomore Seminar			
	Phase 1	Phase 2	Phase 3	Phase 4
Fall 2021	September 17	October 15	November 5	December 3
Spring 2022	January 25	March 10	March 29	April 26
	Senior Seminar			
Fall 2021	September 16	October 5	November 4	December 2
Spring 2022	January 26	March 9	March 30	April 27

The instructor of record for each class (one for *Sophomore Seminar* and one for *Senior Seminar*) stayed in the original classrooms with students in the control group, and a doctoral student (lead author), moved students in the treatment group to a reserved classroom. To align the study with course learning objectives, we designed the study's phases to focus on agricultural communications skills (i.e., brand assimilation, consumer engagement and risk communication, public relations, content marketing) needed to meet industry demands. In the next few sub-sections, we explain each of the study's phases and the experiences of students in the treatment group. At the of the section, we explain the experiences of students in the control group.

Phase One

For phase one, we lectured about the role of science communication in brand assimilation. During the lecture, we defined science communication, a brand, brand assimilation, and explained the importance of brand assimilation. We selected a variety of companies (e.g., Chick-fil-a, Tyson, Bayer, Beyond Meat) and asked students to share what came to their mind when they thought about each companies' brand. Next, we shared a case study focused on Bayer with students. We provided a profile of Bayer and its three divisions (i.e., crop science, pharmaceuticals, consumer health) as well as a brief history of the 2016 binding merger agreement between Bayer and Monsanto and Bayer's 2018 acquisition of Monsanto for $66 billion. We explained that since Bayer acquired Monsanto, it has taken on the responsibility of lawsuits filed against Monsanto for claims against Roundup, a glyphosate-based weedkiller.

We provided students several readings, two of which supported the use of Roundup and detailed how it is an efficient and cost-effective weed control used in modern agriculture that does not pose risks to the health of humans, animals, or the environment (i.e., Bayer Global, 2022; United States Environmental Protection Agency, 2022). The other reading condemned the use of Roundup and detailed how it is inconsistent with sustainable agriculture and poses risks to human, animal, and environmental health (i.e., Krimsky, 2021). After students read key portions of the readings we highlighted, we posed the following scenario: *You were recently hired as the marketing coordinator for Bayer's Crop Science Division, representing the Roundup Herbicide Account*.

Students in the treatment group found a partner and decided who would personify Bayer's Roundup Herbicide's account executive and who would personify the new marketing coordinator hire. The account executive used the readings supporting Roundup to inform their perspective in conversation, and the new hire used the reading unsupportive of Roundup to inform their perspective. The account executive was challenged to communicate science effectively and help the new marketing coordinator assimilate to Bayer's brand by becoming a brand representative inside and outside of the organization. With their partner, students engaged in a role-play discussion personifying these identities for five minutes. We then introduced students to the *yes, and…* science communication technique, requiring them to eliminate "no" or similar terms/phrases from the conversation and replace it with affirming language (Baker et al., 2021). After conversating with the same partner, for another five minutes using the *yes, and…* technique, the partners engaged in a class-wide discussion prompted by reflection questions focused on their role-play experience and industry application.

Phase Two

For phase two, we lectured about the role of science communication in consumer engagement and risk communication. During the lecture, we defined science communication, discussed the importance of healthy and proactive consumer engagement, and explained the need to anticipate, recognize, and respond to a crisis as an agricultural communicator. We also examined Irlbeck et al.'s (2013) pre-crisis, crisis, and post-crisis model and discussed how social media have become critical to effective crisis communications. We shared two case studies in which agricultural organizations effectively or ineffectively used social media to respond to consumers during a crisis. The first involved the American Museum of Agriculture's board of directors who purchased and euthanized two elderly mules and added them to an exhibit of a 19th century reaper to improve its authenticity. Museum personnel deleted the museum's Facebook account due to customers' overwhelmingly negative response. We discussed opposing perspectives (i.e., museum's board of director's perspective; angry customer's perspective) and then asked students how museum personnel could have responded to the crisis more effectively.

The second case study focused on Blue Bell Creameries' 2015 listeria outbreak. We provided details of the crisis and closely examined Blue Bell's response and consumer engagement before, during, and after the crisis via Facebook, as examined in Opat et al. (2013). We provided students numerous readings, two of which supported Blue Bell and included scientific facts about listeria (i.e., U.S. Food and Drug Administration, 2020) and themes demonstrating their effective consumer response via Facebook (i.e., Opat et al., 2013). Three other readings condemned Blue Bell and included information about the victims who died as a result of the outbreak and how Blue Bell failed to improve their sanitation despite knowing listeria was present in a factory earlier (i.e., Abrams, 2015; Boldt, 2015; Quijano, 2015).

Students in the treatment group found a partner and decided who would personify a Blue Bell representative and who would personify a consumer negatively affected by the listeria outbreak. The representative used highlighted portions of the readings supporting Blue Bell to inform their perspective in conversation, and the consumer used readings condemning Blue Bell to inform their perspective. The Blue Bell representative was challenged to engage with the consumer and incorporate science communication into their risk communication. With their partner, for five minutes, students engaged in a role-play discussion personifying these identities. Then, they engaged in a class-wide discussion prompted by reflection questions focused on their

role-play experience and industry application. Students in the treatment group concluded the class by responding to and submitting the reflection questions.

Phase Three

For phase three, we lectured about the role of science communication in public relations. During the lecture, we defined science communication and public relations and explained various roles of public relations in agricultural organizations. We also discussed the importance of research in agricultural public relations and how agricultural public relations efforts often function as science communication. We then examined two case studies involving agricultural organizations that used public relations to improve their public image.

The first case study focused on Coca-Cola's 1985 decision to discontinue the classic Coca-Cola recipe after Pepsi-Cola's "Pepsi Challenge" campaign revealed, through blind taste tests, that consumers preferred the taste of Pepsi-Cola over Coca-Cola. Despite Coca-Cola using consumer research to inform their decision, the company underestimated the attachment their now furious, brand-loyal consumers would have to the classic recipe. The company implemented a public relations campaign to issue a public apology and bring back the classic Coca-Cola flavor that once again made it the top-selling sugar cola and strengthened the company's market position. We asked students how the company used research to inform their public relations efforts and what additional research they should have conducted and why.

The second case study involved Cargill and its 2019 public dispute with the environmental advocacy group Mighty Earth. Cargill agreed "to a landmark moratorium on buying soybeans grown on deforested land in the Amazon rain forest" and, as a result, was on good terms with environmental advocacy groups (Yaffe-Bellany, 2019, para. 1). However, environmental advocates became angry because Cargill would not agree to a similar moratorium that pertained to a different environmentally sensitive region in Brazil (the Cerrado) and failed to meet certain anti-deforestation targets. Mighty Earth publicly called Cargill "the worst company on Earth" and criticized it for pollution, meat contamination, and deforestation. We provided students one reading that contained information supporting Cargill and the decision not to exit the Cerrado because the company would be replaced by the competition and create tension with local farmers (i.e., Yaffe-Bellany, 2019). The same reading also contained information supporting Mighty Earth who believed Cargill was being deceitful by saying one thing and acting differently and prioritizing deforesters in the supply chain more than the climate and customer's sustainability demands.

Students in the treatment groups found a partner and decided who would personify a Cargill public relations professional and who would personify a Mighty Earth representative. The Cargill public relations professional used highlighted portions of the reading supporting Cargill to inform their perspective in conversation and the Mighty Earth representative used other highlighted portions supporting Mighty Earth (condemning Cargill) to inform their perspective. The Cargill public relations professional was challenged to communicate science effectively and improve the company's image from Mighty Earth's perspective. With their partner, for five minutes, students engaged in a role-play discussion personifying these identities. Then, they engaged in a class-wide discussion prompted by reflection questions focused on the role-play experience and industry application.

Phase Four

For phase four, we lectured about the role of science communication in content marketing. During the lecture, we defined science communication and content marketing and explained the role of content marketing in agriculture. Then, we discussed opportunities for content marketing in agriculture, the function of content marketing as science communication, and the importance of audience research in content marketing. We then examined three case studies involving agricultural organizations using content marketing effectively. Instead of readings, we showed content marketing, through videos, implemented by John Deere, the Illinois Beef Association, and 4R Plus, which MorganMyers developed. First, we played a video of John Deere's *The Furrow*—the company's iconic 127-year-old content marketing magazine that shares information about agricultural production and people working in the industry (i.e., Content Marketing Institute, 2016). Second, we played a video that was part of a content marketing digital campaign designed to raise awareness of and build trust in Illinois beef farmers among Chicagoland parents (i.e., Illinois Farm Families, 2021). After playing the second video, we asked students which values they assumed were most important to Chicagoland parents based on the underlying message in the video. Third, we played a video that was part of 4R Plus's educational content hub designed to "inspire Iowa farmers to learn more about the adoption of on-farm practices to improve soil health and water quality" (4R Plus, 2018, para. 2).

After playing the video, students in the treatment groups spent three to four minutes writing down five core values held by 4R Plus and PR Plus's primary target audience (Iowa farmers) based on the underlying message in the video. Students found a partner and decided who would personify a 4R Plus representative and who would personify an Iowa farmer. They adopted their respective persona using the values they and their partner identified for each role as a guide. The 4R Plus representative was challenged to communicate science effectively and encourage the Iowa farmer to use their services. With their partner, for five minutes, students engaged in a role-play discussion personifying these identities. Then, they engaged in a class-wide discussion prompted by reflection questions focused on their role-play experience and industry application.

During all four phases, students in the control group received the same lecture and were introduced to the same case studies. Unlike students in the treatment group, students in the control group skimmed the highlighted portions of all provided readings to understand opposing perspectives of the case study of focus (phases one, two, and three) and watched the same videos (phase four). They engaged in a class-wide discussion prompted by reflection questions focused on industry application, but they did not participate in a paired-role play discussion and did not discuss, as a class, their role-play experience.

Survey Instrument

We developed a survey instrument containing Reniers et al.'s (2011) Questionnaire of Cognitive and Affective Empathy (QCAE). Reniers et al. conducted two studies to validate the QCAE using a principle components analysis and a confirmatory factor analysis. They also used Cronbach's alpha to assess reliability of the QCAE and confirmed the scale, and its subscales, were reliable with coefficients of .70 or higher. In our study, we verified the reliability of the QCAE as data we collected from the scale, and its subscales, yielded Cronbach's alpha

coefficients ranging from .65 to .87—traditionally acceptable values in science education (Taber, 2018; Ursachi et al., 2015).

The QCAE contains 31 items that respondents rate using a 4-point Likert scale (*strongly agree* to *strongly disagree*). It also contains five subscales. Two subscales—Perspective-Taking and Online Simulation—measure cognitive empathy and their items combined create a Cognitive Empathy measure, which assesses one's ability to understand the emotional state of others. Perspective-Taking "involves intuitively putting oneself in another person's shoes to see things from his or her perspective" (Reniers et al., 2011, p. 90), or intuitively putting oneself in the position of others to see their perspective. Online Simulation involves "an effortful attempt to put oneself in another person's position by imagining what the person is feeling" and "is likely to be used for future intentions" (Reniers et al., 2011, p. 90). Three subscales—Emotion Contagion, Proximal Responsivity, and Peripheral Responsivity—measure affective empathy and their items combined create an Affective Empathy measure, which assesses one's ability to experience the emotional state of others. Emotion Contagion "assesses the automatic mirroring of the feelings of others" (Reniers et al., 2011, p. 90). Proximal Responsivity "addresses the responsiveness aspect of empathic behavior, illustrated by the affective response when witnessing the mood of others in a close social context" (Reniers et al., 2011, p. 90). Lastly, Peripheral Responsivity is similar to Proximal Responsivity but represents a detached context rather than a close social context. The subscales combined generate a Total Empathy measure (Reniers et al., 2011).

In addition to the QCAE, the survey instrument included demographic and academic-related questions. Students were asked to select if they were enrolled in *Sophomore Seminar* or *Senior Seminar* and indicate their classification, gender identity, and age. They also provided their name to pair pretest and posttest responses, but these were deleted prior to data analysis.

Data Collection and Analysis

During the first week of the semester in both courses during Fall 2021 and Spring 2022, we introduced the project to students and distributed an informed consent document. Because we integrated project materials into the structure of each course, students were required to participate in the project itself (e.g., lectures, case studies, discussions). However, they could choose not to participate in data collection. If students chose to participate, they signed the informed consent document and returned it to us. That same day, we distributed an email to students containing a link to the pretest survey and asked students to respond during class. We implemented the four project phases as described above. During the final week of the semester, we distributed an email to students containing a link to the posttest survey and asked students to respond during class. As a result, we collected 53 usable pretest-posttest survey responses—21 from students in the control group and 32 from students in the treatment group.

First, we conducted a descriptive analysis to examine pretest and posttest means, standard deviations, and mean changes. Second, we calculated Pearson product-moment correlation coefficients to determine the relationships between students' empathy types using their posttest means. Because Perspective-Taking and Online Simulation scores are combined to measure Cognitive Empathy, we did not examine the relationships between Perspective-Taking and Cognitive Empathy or Online Simulation and Cognitive Empathy. For the same reason, we did not examine the relationships between Emotion Contagion and Affective Empathy, Proximal Responsivity and Affective Empathy, or Peripheral Responsivity and Affective Empathy, nor did we examine the relationships between Total Empathy and any subscales. Third, we used a mixed

design repeated measures ANOVA of empathy types to examine trial (pretest-posttest) effects, treatment (role-play vs. class-wide discussion) effects, and interaction (treatment * trial) effects.

Limitations

Our study has three limitations. First, despite 93 students agreeing to participate in data collection, we only received 53 usable pretest-posttest responses. Even though we distributed the survey links to all students, if students did not attend class, they were less likely to respond on their own time. Second, results can only be generalized to students enrolled in the *Sophomore Seminar* and *Senior Seminar* at the time we conducted the study. Third, we did our best to keep all variables, apart from the treatment, constant between groups. However, three instructors (i.e., one for the *Sophomore Seminar* control group, one for the *Senior Seminar* control group, one for the *Sophomore* and *Senior Seminar* treatment groups) implemented the project. Consequently, a lack of control in this context may influence the validity of results. Still, we controlled for project implementation by following detailed lecture notes.

Results

Students in the control group demonstrated the largest positive change in their Perspective-Taking (pretest, *M* = 3.15, *SD* = .59; posttest, *M* = 3.32, *SD* = .59; mean change = +.17) as did students in the treatment group (pretest, *M* = 3.28, *SD* = .40; posttest, *M* = 3.39, *SD* = 0.35; mean change = +.11; see Table 4). In addition, students in the control group demonstrated the largest negative change in their Emotion Contagion (pretest, *M* = 3.13, *SD* = .54; posttest, *M* = 3.05, *SD* = .66; mean change = -.08) as did students in the treatment group but to a lesser extent (pretest, *M* = 3.04, *SD* = .63; posttest, *M* = 3.01, *SD* = .72; mean change = -.03).

Table 4

Descriptive Statistics Representing the Control and Treatment Groups' Empathy Development

Empathy Type	Student Groups									
	Control Group					Treatment Group				
	Pretest		Posttest		Mean Change	Pretest		Posttest		Mean Change
	M	*SD*	*M*	*SD*		*M*	*SD*	*M*	*SD*	
CE	3.11	0.45	3.26	.48	+.15	3.27	.35	3.35	.32	+.08
PT	3.15	.59	3.32	.59	+.17	3.28	.40	3.39	.35	+.11
OS	3.07	.44	3.20	.47	+.13	3.25	.41	3.30	.39	+.05
AE	2.96	.33	2.92	.39	-.04	2.97	.38	2.96	.41	-.01
EC	3.13	.54	3.05	.66	-.08	3.04	.63	3.01	.72	-.03
PXR	3.12	.54	3.07	.74	-.05	3.16	.58	3.18	.54	+.02
PR	2.64	.39	2.64	.56	.00	2.70	.44	2.70	.43	.00
TE	3.05	.32	3.13	.35	+.08	3.15	.29	3.20	.27	+.05

Note. CE = Cognitive Empathy; PT = Perspective-Taking; OS = Online Simulation; AE = Affective Empathy; EC = Emotion Contagion; PXR = Proximal Responsivity; PR = Peripheral Responsivity; TE = Total Empathy.

We found statistically significant positive correlations, moderate in strength, between Cognitive Empathy and Proximal Responsivity ($r = .48$, $p < .001$), Perspective-Taking and Proximal Responsivity ($r = .43$, $p = .002$), Online Simulation and Proximal Responsivity ($r = .41$, $p = .002$), and Emotion Contagion and Proximal Responsivity ($r = .35$, $p = .009$; see Table 5). Therefore, the more students respond empathetically to the mood of others in close social contexts (Proximal Responsivity) the better they are at putting themselves in the position of others to see their perspective (Perspective-Taking), putting themselves in the positions of others to imagine what they are feeling (Online Simulation), mirroring the feelings of others (Emotion Contagion), and understanding the emotional states of others (Cognitive Empathy). We also found a statistically significant positive correlation, substantial in strength, between students' Perspective-Taking and Online Simulation ($r = .54$, $p < .001$). Therefore, the more students can put themselves in the position of others to see their perspective (Perspective-Taking), the better they can put themselves in the positions of others to imagine their feelings (Online Simulation).

Table 5

Pearson Product-Moment Correlations Between Students' Empathy Types

	CE	PT	OS	EC	PXR	PR
CE	1					
PT	--	1				
OS	--	.54*	1			
AE	.16	.07	.23			
EC	-.09	-.18	.04	1		
PXR	.48*	.43*	.41*	.35*	1	
PR	-.08	-.12	-.01	.08	-.02	1

Note. * $p < .01$. Negligible association = .01–.09; Low association = .10–.29; Moderate association = .30–.49; Substantial association = .50–.69; Very strong association = .70 or higher (Davis, 1971). CE = Cognitive Empathy; PT = Perspective-Taking; OS = Online Simulation; AE = Affective Empathy; EC = Emotion Contagion; PXR = Proximal Responsivity; PR = Peripheral Responsivity.

Students in the control and treatment groups both demonstrated statistically significant differences between their pretest and posttest Cognitive Empathy ($F(1, 51) = 12.06$, $p = .001$, $\eta^2 = .19$), Perspective-Taking ($F(1, 51) = 7.10$, $p = .010$, $\eta^2 = .12$), Online Simulation ($F(1, 51) = 7.42$, $p = .009$, $\eta^2 = .13$), and Total Empathy means ($F(1, 51) = 6.35$, $p = .015$, $\eta^2 = .11$; H_1 and H_3; see Table 6). According to Cohen's (1988) criteria for interpreting partial eta squared effect size values (i.e., small effect = .01; medium effect = .06; large effect = .14), the main effects of the within-subjects factor for Cognitive Empathy (and associated subscales) and Total Empathy were medium and large. We found no significant main effects for the within-subjects factor for Affective Empathy or associated subscales (H_2). Additionally, we found no significant main effects for the between-subjects factors (H_4, H_5, and H_6) and we found no significant interaction effects for any of the dependent variables (H_7, H_8, and H_9).

Table 6

Results from the Mixed Design Repeated Measures ANOVA of Empathy Types

Source of Variance	Sum of Squares	*df*	Mean Square	*F*	*p*	η^2
Cognitive Empathy Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.36	1	.36	1.30	.259	.03
Error	13.99	51	.274	--	--	--
Cognitive Empathy Within-Subjects Effects						
Trials (pretest-posttest)	.34	1	.34	12.06	.001*	.19
Interaction (treatment * trials)	.03	1	.03	1.10	.299	.02
Error	1.43	51	.03	--	--	--
Perspective-Taking Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.26	1	.26	.68	.415	.01
Error	19.23	51	.38	--	--	--
Perspective-Taking Within-Subjects Effects						
Trials (pretest-posttest)	.48	1	.48	7.11	.010*	.12
Interaction (treatment * trials)	.02	1	.02	.31	.582	.01
Error	3.47	51	.07			
Online Simulation Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.49	1	.49	1.48	.229	.03
Error	16.93	51	.33	--	--	--
Online Simulation Within-Subjects Effects						
Trials (pretest-posttest)	.21	1	.21	7.42	.009*	.13
Interaction (treatment * trials)	.04	1	.04	1.59	.214	.03
Error	1.43	51	.03	--	--	--
Affective Empathy Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.01	1	.01	.05	.824	.00
Error	13.75	51	.27	--	--	--
Affective Empathy Within-Subjects Effects						
Trials (pretest-posttest)	.01	1	.01	.50	.485	.01
Interaction (treatment * trials)	.01	1	.01	.29	.591	.01

Table 6 Continued

Source of Variance	Sum of Squares	*df*	Mean Square	*F*	*p*	η^2
Error	1.32	51	.03	--	--	--
Emotion Contagion Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.11	1	.11	.15	.700	.00
Error	36.66	51	.72	--	--	--
Emotion Contagion Within-Subjects Effects						
Trials (pretest-posttest)	.08	1	.08	.69	.412	.01
Interaction (treatment * trials)	.02	1	.02	.14	.708	.00
Error	6.19	51	.12	--	--	--
Proximal Responsivity Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.16	1	.16	.25	.620	.01
Error	32.17	51	.63	--	--	--
Proximal Responsivity Within-Subjects Effects						
Trials (pretest-posttest)	.00	1	.00	.12	.914	.00
Interaction (treatment * trials)	.02	1	.02	.27	.605	.01
Error	4.17	51	.08	--	--	--
Peripheral Responsivity Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.08	1	.08	.24	.624	.01
Error	16.88	51	.33	--	--	--
Peripheral Responsivity Within-Subjects Effects						
Trials (pretest-posttest)	.00	1	.00	.01	.945	.00
Interaction (treatment * trials)	.00	1	.00	.01	.945	.00
Error	4.16	51	.08	--	--	--
Total Empathy Between-Subjects Effects						
Treatment (role-play vs. class-wide discussions)	.17	1	.17	1.01	.320	.02
Error	8.58	51	.17	--	--	--
Total Empathy Within-Subjects Effects						
Trials (pretest-posttest)	.10	1	.10	6.35	.015*	.11
Interaction (treatment * trials)	.01	1	.01	.36	.553	.01
Error	.79	51	.02	--	--	--

Discussion

We hypothesized that students who participated in role-play discussions and class-wide discussions would both demonstrate significant gains in Cognitive Empathy (H_1), Affective Empathy (H_2), and Total Empathy (H_3). Paired role-play discussions and class-wide discussions both statistically significantly improved students' ability to put themselves in the position of others to see their perspective (Perspective-Taking) and put themselves in the position of others to imagine what they are feeling (Online Simulation). Because Perspective-Taking and Online Simulation are both Cognitive Empathy subscales, both types of activities also statistically significantly improved students' ability to understand the emotional state of others (Cognitive Empathy) and behave empathetically overall (Total Empathy). Based on these results, we accept alternative hypotheses H_1 and H_3. We reject alternative hypothesis H_2 and fail to reject the null, which stated that students would not demonstrate significant gains in Affective Empathy based on their participation in paired role-play discussions and class-wide discussions. Neither activity improved students' ability to experience the emotional state of others (Affective Empathy), automatically mirror the feelings of others (Emotion Contagion), respond affectively to the mood of others in a close social context (Proximal Responsivity), or respond affectively to the mood of others in a detached social context (Peripheral Responsivity).

We also hypothesized that students who participated in paired role-play discussions would demonstrate greater gains in Cognitive Empathy (H_4), Affective Empathy (H_5), and Total Empathy (H_6) compared to students who participated in class-wide discussions. Because we found no significant main effects for the between-subjects factors, we reject alternative hypotheses H_4, H_5, and H_6, and fail to reject the null hypotheses, which stated there would be no significant differences in Cognitive Empathy, Affective Empathy, and Total Empathy gains between students who participated in paired role-play discussions and students who participated in class-wide discussions. Importantly, neither class-wide discussions nor paired role-play discussions worked significantly better than the other at improving students' empathy. Instead, the nature of the discussions, which focused on recognizing and affirming opposing perspectives, mattered most.

Last, we hypothesized there would be an interaction effect between students' participation in paired role-play discussions and class-wide discussions and their Cognitive Empathy (H_7), Affective Empathy (H_8), and Total Empathy (H_9) development. Because we found no significant interaction effects for any of the dependent variables, we reject alternative hypotheses H_7, H_8, and H_9 and fail to reject the null hypotheses, which stated there would be no interaction effect between students' participation in paired role-play discussions and class-wide discussions and their Cognitive Empathy, Affective Empathy, and Total Empathy development. Paired role-play discussions and class-wide discussions affected students' empathy development consistently between groups.

We intentionally designed lecture content and exercises for empathy development by emphasizing the importance of civil discourse in effective science communication. Understanding opposing perspectives is key to engaging in civil discourse (Alda, 2017; Garner & Rossmanith, 2021; Valente, 2016). Therefore, results suggest the exercises were effective and targeted students' cognitive empathy skills, specifically (Bell, 2018; Leshem & Schober, 2020). Because cognitive empathy is intentional and controlled (Hodges & Wegner, 1997), it makes sense that students developed Cognitive Empathy in our study by intentionally controlling their implementation of such skills during practice conversations. Cognitive empathy also tends to be

reflective in nature (Michaels et al., 2014), so the reflections students completed at the end of each phase (reflective observation; Kolb, 1981) may have also contributed to the emphasis on students' Cognitive Empathy development rather than Affective Empathy development.

The exercises we facilitated that focused on recognizing and affirming opposing perspectives did not affect students' Affective Empathy. Therefore, similar to Guerra and Shealy (2018) and Goosse and Willems (2020), students in our study experienced gains in Cognitive Empathy as a result of their role-play experience but not in Affective Empathy. We were not surprised to find students' Affective Empathy and associated skills (i.e., mirroring the feelings of others [Emotion Contagion], responding empathetically to the mood of others in close social contexts [Proximal Responsivity], responding empathetically to the mood of others in detached contexts [Peripheral Responsivity]) did not significantly improve over the course of the semester because these were not the focus of the exercises. In general, it may be more difficult to teach affective empathy, especially in forced classroom settings, because it tends to be an automatic, immediate, and uncontrolled response (Hodges & Wegner, 1997). However, we were surprised to find students in the control and treatment groups demonstrated mean decreases in their Affective Empathy, Emotion Contagion, and Proximal Responsivity, with the exception that students in the treatment group demonstrated a small mean increase in Proximal Responsivity. Perhaps too much emphasis on empathy that relies more on cognition influences students to disregard their natural affective responses (Michaels et al., 2014).

Interestingly, students' Cognitive and Affective Empathy were not significantly correlated, but their Proximal Responsivity (an Affective Empathy skill) was significantly related to their Cognitive Empathy and associated skills, including Perspective-Taking and Online Simulation. Therefore, despite class-wide discussions and paired role-play discussions not significantly or positively affecting students' Affective Empathy and associated skills (i.e., Emotion Contagion, Proximal Responsivity, Peripheral Responsivity), they can indirectly improve students' Proximal Responsivity by improving the various Cognitive Empathy skills.

Moreover, despite class-wide discussions and paired role-play discussions both statistically significantly improving students' Total Empathy, Cognitive Empathy, Perspective-Taking, and Online Simulation, students in the control group demonstrated greater mean changes in all areas when compared to students in the treatment group even though the difference between most of these changes were small. Thus, it is possible class-wide discussions were slightly more effective than paired role-play discussions, even though the difference was not statistically significant. It is also worth noting that students in the control group had lower pretest means for Total Empathy, Cognitive Empathy, Perspective-Taking, and Online Simulation when compared to students in the treatment group, which may indicate more room for development.

Students learn best when they complete all four stages of the experiential learning cycle (Kolb, 1981). Although we purposefully did not facilitate the active experimentation phase of Kolb's cycle (i.e., role-play) with students in the control group, we believe their extended class-wide discussion may have allowed them to achieve both active experimentation and a concrete experience. Due to the nature of the guiding questions used to facilitate the class-wide discussion, we intentionally prompted students in the control group to consider the same industry application of lecture concepts and case study perspectives as students in the treatment group. In addition, students in the treatment group only read about one perspective of the case study through readings and learned about the opposing perspective from their partner during the role-play discussion. Students in the control group, however, spent more time reviewing the readings supporting both perspectives of the case study, prior to engaging in the class-wide discussion. In

this regard, the two experiences were parallel; students in the control and treatment groups simply obtained and applied knowledge differently. Thus, it is possible students in the control group also managed to complete Kolb's learning cycle, albeit less transparently.

Recommendations for Practice

When teaching Texas A&M University agricultural communications students about engaging in civil discourse and communicating science effectively in the contexts of brand assimilation, consumer engagement and risk communication, public relations, and content marketing, instructors should facilitate the type of discussion they believe would suit their teaching style, classroom dynamic, and students' learning style best. They could even consider alternating between the two discussion types to diversify student engagement. Perhaps, if most students in a particular class are reserved and do not contribute to class-wide discussions, then paired role-play discussions may increase individual student engagement. In contrast, if most students in a particular class actively contribute to class-wide discussions, then continuing them may be more appropriate.

Instructors should also note that some students, especially those who are more reserved, may be uncomfortable participating in paired role-play discussions, not only because it forces them to participate, but also because the nature of the discussion requires them to step outside of their comfort zone due to its ambiguity (Reid-Wisdom & Perera-Delcount, 2020). In this regard, paired role-play discussions may have unintended consequences and not lend to empathy development, or they may improve students' uncertainty tolerance (Reid-Wisdom & Perera-Delcount, 2020). Still, instructors should observe their students and gather feedback to assess their level of comfortability with paired role-play exercises.

If instructors are only interested in developing students' Cognitive Empathy and associated skills (i.e., Perspective-Taking, Online Simulation), then class-wide and paired role-play discussions focused on recognizing and affirming opposing perspectives in the context of science communication are effective. However, if an improvement in Affective Empathy and associated skills (i.e., Emotion Contagion, Proximal Responsivity, Peripheral Responsivity) is also desired, then adapting the discussions and guiding questions to include a focus on emotion-related empathy is necessary. If instructors want to provide students opportunities to develop empathy, in general, they must be deliberate and integrate curriculum into their class(es) that is intended to target such skills, similar to the materials we developed and implemented.

Recommendations for Research

In the future, scholars should investigate if students experience a sustainable change in empathy after engaging in similar exercises throughout their degree program. A longitudinal study using a survey research design could reveal lasting impact and possibly determine how well students perceive such exercises prepared them to demonstrate empathy and engage in civil discourse during their careers. It would also be interesting to determine if students who participated in empathy skill building exercises regularly throughout their degree program believed they implemented related skills during their career more often compared to those who participated infrequently or not at all. Such results could provide insight into empathy-related knowledge, awareness, and real-world application of skills learned as a result of their education.

We also recommend scholars conduct additional quasi-experiments using pretest-posttest control group research designs to determine how participating in other pedagogical exercises affect students' empathy. Because Reniers et al.'s (2011) QCAE has well-established psychometric properties and contains multiple cognitive and affective empathy subscales, which comprehensively assess the nuances of empathy, we recommend it be used as the pretest-posttest instrument. That way, we can develop a better understanding of how participating in a variety of pedagogical exercises affects agricultural students' empathy development through consistent measures. Not only should future quasi-experiments examine the effects of role-play variations on students' empathy development, but they should also test the effects of other experiential, mindfulness, and theatre exercises in agricultural contexts (Bell, 2018).

Finally, we recommend when conducting similar studies, scholars control for extraneous variables. We controlled for extraneous variables through random assignment, but because we collected data from students over the course of one semester, students could have experienced interactions outside of class that influenced their empathy development. Thus, scholars should consider extraneous variables to measure, which we did not do, and account for them statistically by modeling control variable data to remove their effects.

Conclusions

The study described herein is the first of its kind to investigate how participating in role-play affects agricultural students' empathy development. Therefore, it is a novel and important inquiry in agricultural communications research, especially because scholars have acknowledged that empathy is critical to students' success (Chenault, 2008; Corder & Irlbeck, 2018) and should be incorporated into agricultural communications curriculum (Easterly et al., 2017; Martinez, 2004). Although we did not find differences in empathy development between the control and treatment groups in our study, we did determine that paired role-play discussions and class-wide discussions focused on recognizing and affirming opposing perspectives of real-world agricultural case studies statistically significantly increased students' Perspective-Taking, Online Simulation, Cognitive Empathy, and Total Empathy (Reniers et al., 2011) over the course of one semester. It is important to note that these results are specific to the context of our study and the nature of the study's four phases that we designed and implemented. Still, we believe they provide valuable insight into agricultural communications pedagogy and can inform future research and practice at Texas A&M University and elsewhere.

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