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From the Executive Editor

“The Only Constant in Life Is Change.”- Heraclitus

The concept of change being continuous is rampant throughout the pages of the *JIAEE* since its inception. Much of the work explored throughout its pages are focused on how to encourage, manage or influence change and based in change theory. Therefore, it is with great excitement I share the *JIAEE* is about to go through a major change as we move the journal to a new online platform: New Prairie Press. We can guarantee this change will bring many opportunities for current and future authors including the elimination of page fees, the ability to see and use metrics capturing the impact of your work, and increased streamlining of the editorial process alleviating pressure on the Association for International Agricultural and Extension Education (AIAEE), the professional organization that sponsors and provides oversight for the *JIAEE*.

Given all of these benefits, the *JIAEE* editorial board and the AIAEE executive board have been extremely supportive as the editorial team has worked through the details associated with this change. That being said, there will be some growing pains as we, as a group of scholars - reviewers and authors, transition to the new system. I encourage you to pay attention to the messages you will receive from Dr. Todd Brashears, Managing Editor of the *JIAEE*, over the next few months. He will detail how to create new accounts in the New Prairie Press system, new submission protocols, and will provide detailed instructions for reviewers.

It is because of this transition some of the reviews in the FastTrack system have been delayed. We have decided to delay assigning reviewers to new submissions until after the transition that will be occurring the first week of September. We appreciate your patience during this time and assure you the review process will be expedited once we are in the system. In addition, it is the reason the August issue is slightly shorter than most issues of the *JIAEE*.

Despite its length, the current issue is full of interesting studies and make it worthy of reading from cover to cover. The Research Note explores USAID’s recent release of the comprehensive policy named “The Journey to Self-Reliance” and its impact on how land-grant institutions frame international development. While exploratory in nature, the critical discourse analysis used is intriguing and provides a foundation for questioning the role of policy in the food security conversation.

Silvert et al. also explore self-reliance; specifically, its role in the commercialization behaviors of coffee farmers. Their findings imply the self-reliance concepts being employed in diverse contexts may have implications for extension and offer some solid recommendations as we think about ourselves as development facilitators. Lu et al. compared the critical thinking styles of students from different parts of the world. Their findings imply cultural differences, mainly those from individualistic versus collectivist societies, impacts critical thinking style and should be taken into consideration when educating agricultural students from different parts of the world.

Strategies for assessment were also explored in several studies in this issue. Lamm et al. developed a scale for measuring information and communication technology use capacity. The findings imply strategic measurement and planning can lead to improved capacity and operations in many parts of the world. Finally, Pigg et al. took a long-term perspective on measuring the impacts of a study abroad course on student outcomes. Measuring long-term impact is always
intended but rarely carried through in this capacity. Their findings imply academic maturity plays a role in outcomes, the experience resulted in a deeper recognition of power and privilege, and students engaging in study abroad experiences were more likely to engage in advocacy for global experiences after returning from their trip. They encourage further exploration of these results and make a call for long-term measurements of change resulting from educational experiences.

Once again, we thank you all for reading the JIAEE and appreciate your patience as we move forward with our transition this fall. Please feel free to contact us at any time if you have questions. We continue to wish you all peace, safety and health.

Sincerely,

Alexa J. Lamm, PhD
Executive Editor, Journal of International Agricultural and Extension Education
Whose Journey to Self-Reliance? Participation in the Journey to Self-Reliance and the Land-Grant Imaginary

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Abstract

Land-grant university and civil society development actors have long partnered with local and global communities to eliminate food insecurity. Despite the common aim of addressing food insecurity as a wicked problem, their approaches and designs differ in scope and scale. Similarly, levels of local stakeholder participation in agricultural development historically vary reflecting the complexity in relinquishing hierarchal decision-making power. In this pilot study, we investigated how participation is framed within the United States Agency for International Development’s (USAID) policy, “The Journey to Self-Reliance”. Subsequently, we sought to understand the implications of this framing on land-grant universities’ agricultural development aims in addressing global food security. We drew upon Fairclough’s Critical Discourse Analysis and Pretty’s typology of participation in sustainable agriculture to analyze the inaugural speech launching the policy framework by the former USAID administrator. We also held two focus groups with development actors at two land-grant universities. Findings indicate local participation of governments, citizens, and civil society to be important. However, governmental participation may be contingent on accountability to both USAID and the private sector indicating an increased commitment to neoliberal ideology. The focus group themes identify self-reliance and its journey as prescriptive and at times, neocolonial, raising questions about participatory possibilities. The final theme illustrates land-grant praxis from participants as they advance visions for centering local partner needs through more equitable decision-making and resource sharing. We conclude with considerations for future research to more deeply understand the implications of “The Journey to Self-Reliance” policy through a CDA lens.

Keywords: Agro-ecology, Extension, Theory and Practice, Qualitative Research, Community Development

Introduction

Few extension and development practitioners would likely dispute the global imperative to address food insecurity. Since their inception, land-grant universities (LGU) have sought to increase food production and economic development locally and more recently, globally (Hudzik & Simon, 2012; Peters, 2006). The strengths of LGUs in agricultural development led to a long-standing partnership between the federal government’s United States Agency for International Development (USAID) and universities (Hudzik & Simon, 2012). For USAID, agriculture and food insecurity continue to be priorities as they spent 900 million dollars on agricultural projects globally in 2019 to combat the continued global crisis of food insecurity (United States Agency for International Development, 2020).
The persistence of food insecurity and how to solve it varies among development actors as problems and solutions are framed differently. Anderson and colleagues (2021) introduce a continuum of these frames according to how they enable or disable agroecology. At one end of the spectrum is food sovereignty, a rights-based frame challenging the inequities of the current food system by asserting the human right to food, ecological protection, and community decision making over the food system (Anderson et al., 2021; Holt-Giménez et al., 2012; Jarosz, 2011; Patel, 2010; Wittman et al., 2010). The other end of the spectrum is “feed the world” promoting increased production and trade without centering human, social, or ecological protections (Anderson et al., 2021; Holt-Giménez et al., 2012; Jarosz, 2011).

Like others, we identify food insecurity as a wicked problem because its complexity means it cannot be solved by a single technical intervention (Rittel & Webber, 1973). Instead, wicked problems require multiple disciplines, knowledges, and approaches—especially participatory ones (Ravetz, 1999). Since gaining prominence in the 1990s, participatory approaches have been widely adopted by mainstream development agencies. Many argue that participation has been flattened and largely separated from its origins of stakeholder liberation and empowerment (Arnstein, 1969; Chambers, 1997; Krause, 2014; Kumba, 2003; Pretty, 1995). In response, some development scholars advocate for a shift in recognizing how Western scientific knowledge and localized, situated, and indigenous knowledges together play a crucial role in addressing global food security (Collins & Mueller, 2016; Coolsaet, 2016; Fraser, 2017; Martínez-Torres & Rosset, 2014; Pimbert, 2018; Rajasekaran et al., 1994).

Notions of self-reliant development are also increasingly common as is evidenced by the USAID’s recent release of the comprehensive policy called “The Journey to Self-Reliance” (J2SR). This guidance spans all of USAID’s program areas and is intended to end the need for development aid once self-reliance is achieved (Green, 2018). In this pilot study, we sought to understand how participation is operationalized in J2SR, and what the implications of this representation are on land-grant university agricultural development praxis. Specifically, this research is framed by the following questions: Within the announcement of the Journey to Self-Reliance, how are social actors represented? How is participation framed? What ideologies inform these representations? What are the implications of these ideologies on international development through land-grant institutions?

**Theoretical Framework**

We organized this pilot research using Critical Discourse Analysis (CDA) by Norman Fairclough (1992, 2003) and Jules Pretty's (1995) typology of participation for sustainable agriculture. CDA was employed because of its utility in uncovering invisible and embedded power relations in specific instances of practice (Fairclough, 1992). Fairclough’s theory views discourse as three levels of textual, discursive, and social practice. The textual level focuses on the linguistic elements of grammar, word choice, verb tense, and word associations as modes of power. The second layer of discursive practice addresses how actors consume, interpret, modify, and reproduce text. The final level focuses on discourse as reflections of larger social forces such as ideology or social movements of resistance (Fairclough, 1992, 2003). Pretty’s (1995) typology conceptualizes participation along a continuum of power distribution. He defines participation as power over decision-making, and so each step on the continuum represents the degree to which local actors hold power in agricultural development projects. The continuum ranges from participation as a pretense at the start to community control at the end.
**Methods**

This pilot project proceeded in two steps. First, we analyzed the transcript of USAID Former Administrator Mark Green’s speech announcing “The Journey to Self-Reliance” at the Concordia Summit. The Concordia Summit is a non-partisan, cross-sectoral event focusing on global issues (Concordia, 2018). It is common in CDA to analyze a small selection of text because of the analytical depth, and we chose a speech because it represents embedded power relations between governmental agents and the targeted audience (Fairclough, 1996, 2003; Luke, 1997). The CDA focused on how actors and their participation are represented. Every statement was coded according to modal and evaluative language. Modality is a linguistic scheme conveying obligations and expectations (deontic) and truth or predictive statements (epistemic). We used Halliday and Matthiessen (2013) modality schema to code statements according to three epistemic levels of high (certainly), medium (probably), and low (possibly) and three deontic levels of high (must), medium (will), and low (may). Evaluation focuses on underlying values conveyed through the use of desirable or undesirable language (Fairclough, 2003).

Secondly, we convened two focus groups with nine international food security practitioners from two land-grant universities. Of the nine participants, five hold formal extension roles with others engaged in community development or research elsewhere. Each focus group lasted 90-minutes and followed an open-ended approach. The focus group began by asking participants about their general perceptions of “The Journey to Self-Reliance” followed by a brief presentation of the Critical Discourse Analysis results from the speech. Participants were then asked for their reactions, implications for their own work, and implications for land-grant universities at large.

We also followed the criteria of credibility, transferability, dependability, and confirmability as outlined by Lincoln and Guba (1985). Credibility was maintained through data triangulation through the use of focus groups. Participants were invited to read the selected policy text in advance, and at the focus group, we presented the analysis of the discourse which included direct quotations. Through this framework, we argue the focus groups in tandem with the CDA analysis serve to triangulate the findings. Transferability is maintained through “thick description” that connects the data to other contexts such mechanisms include a diverse sample (Lincoln & Guba, 1985). We employed thick description through the use of explicit methodological steps as well as direct quotations for the analyses. Moreover, our sample crossed eight units at two land-grants. Dependability and confirmability are maintained through the explicit documentation of methodological and paradigmatic decisions (Lincoln & Guba, 1985).

**Results**

We present five key themes from our pilot study. The first two themes primarily stem from the textual analysis of the speech. The remaining three themes derive from the focus group data. The first theme points toward the importance of local government involvement to USAID’s policy as Mark Green’s Speech (MGS) mentioned governments 47 times compared to other actors at less than 17. While their participation is important, it may be viewed as a desire rather than a right. This point is illustrated here:

> Development, instead, is done country-by-country. We need to understand where a country has been, how [it’s] gotten to today. But more importantly, we need to understand where a country **wants to go**. What does the future look like? What do they **want it to look like**? (MGS)
Moreover, the participation of local governments may be conditional based on upward accountability measures. More specifically, these measures may be checked against the private sector in addition to USAID itself. The following segment illustrates this point:

So, as countries progress, when we take a look at the various metrics, a big part of it is how they treat opportunities for engagement with the private sector. And in terms of the tools that we provide, constantly talking with our private partners. (MGS)

The second theme is that the policy may epistemologically privilege citizens and civil society as important participants through the lens of respectability. That is, local citizens as stakeholders were explicitly mentioned in the speech using desirable adjectives illustrating prescribed mainstream standards of acceptable behavior. For instance:

And I remember walking along and coming across a wonderful Ethiopian lady who came up to me... And she said, ‘I have a question.’ She said, ‘First off, I really appreciate this food. We need this grain. But the question I have is, "can you help me with irrigation so that I never have to ask you for food again?’” (MGS)

As we take a look at some of the most thoughtful voices around the world, over and over again we see this spirit expressed, the need to be independent, the need to be self-reliant. And it's that spirit that led us at USAID to craft a framework that we call the Journey to Self-Reliance. (MGS)

Citizens and civil society, and all of them with their leaders; clear-eyed, sober-minded, talking both about all the achievements that have been brought, but also what lies ahead and what needs to be taken on. (MGS)

In response to this framing, one focus group participant observes:

The language is kind of couched in respectability politics, and if you're not deemed as respectable, then you're not worth listening to. And that's really kind of dangerous when thinking about like self-reliance and wanting to rebuild nation-building, which is also just kind of kind of cringy, to begin with and thinking about, like, what is civilized and what is self-reliant, and all of that just has me thinking a lot, a kind of about what this program was intended to do.

No other actor is described in the ways civil society and citizens are. The only comparative might be how the work of USAID, the private sector, and India are described as a successful model because they are no longer receiving food aid. For example, “India, of course, is one of the great success stories in development in modern times, a country that not so long ago was receiving traditional food aid” and later when describing Indian water ATMs “created largely by private investment” as “proof of model” and ‘…the inspiration for where we hope we can all go in that journey to self-reliance” (MGS).

The third theme illustrates how the JSR framework might be reflective of a historical top-down and technical-rationalistic approach to development based on the perceptions of focus group participants responding to the CDA findings. Focus group participant 15 describes:

But that doesn't necessarily translate into the sort of process I see laid out here, which is intensely linear, intensely rationalistic. Looking for specific targets and outputs, as opposed to thinking a little bit more broadly and deeply about the contextualized conditions.

Participant 10 echoes this sentiment by incorporating the land-grant university specifically, so, while I'm a huge fan of land grants when they're at their worst, they're actually too top-down and too focused on technical rationalistic scientific solutions to problems that
they probably don't have the right assumption frame about because they're coming from non-localized position.

The fourth theme elucidates additional critique of Mark Green’s Speech through the possibility that self-reliance is a newly branded form of neocolonialism. For example, focus group participant 15 offers “it seems to me to just more generally, that this is kind of old wine in new bottles”. In support of this, participant six notes: the language being couched to speak to a demographic that almost, it's a neocolonialism having lived in West Africa and seeing the influence that happens. You know, it's very much, you know, pushing an agenda that is not necessarily needed for the respective country…changing them from a traditional nation into a westernized nation, usually at their behest or detriment, so I find it, you know, challenging, I found a lot of challenges, a lot of language challenging and just how academics look at these nations, in terms like underdeveloped and third world.

The final theme centers on focus group participant concerns for the redistribution of functional and epistemic power between land-grant universities, USAID, and aid beneficiaries. For example, participant 10 noted, “So it's about really ceding power, ceding material resources…. where the land grant is a subprime you know, as a sub awardee, and does everything at the behest of that local institution”. Of redistributing epistemic power, participant two asked: Who and what are we putting at the center of discussion in terms of this research whose voices are being centered whose ideas are being centered? And whose understanding and definition of self-reliance are we leaning upon and is it the way that's really intentional in terms of supporting the countries that it's quote on quote designed to support? Meanwhile, another participant offers a less radical view where power is redistributed but not entirely ceded “how can we as a university or institution, be that for our partners and not continue to center our ourselves [university name] at the forefront, but where are we can serve as coaches or just mentors?”

Conclusions, Implications, and Recommendations

This pilot study sought to understand how USAID’s current policy toward self-reliance frames participation in agricultural development, and how these framings are perceived by land-grant actors focused on international food security development. Our analysis indicates the participation of citizens, civil society, and local governments are important although they vary. The framing of local government accountability as checked against the perceptions of the private sector may represent a form of upward accountability where aid compliance is evaluated against the funding agency and the capital interests driven by the private sector. This implies a likely increase to neoliberal ideology as a form of “good governance” wherein failure to demonstrate market-centered progress can result in discipline by an aid organization (Zanotti, 2011). Subsequently, where land-grant universities fit within this paradigm is uncertain and requires further investigation.

Secondly, we note promise in the framing of citizens and civil society as important participatory stakeholders. We caution, however, that this framing is at risk of falling trap to respectability politics, revealing how racism and behavioral expectations may work together to make participation contingent on the exhibition of behaviors deemed respectable or polite (Harris, 2003). The implication is that individuals who might not agree with the construction or
application of self-reliance could be labeled as not thoughtful and not sober-eyed, which may subsequently exclude their voices from participation.

Third, our study illustrates how land-grant actors contend with the idea of self-reliance as a recycled form of neocolonialism. This consideration addresses the tensions between the policy’s described participatory importance by country-wide actors to determine their development trajectory and the predetermined concept of self-reliance by the agency. This same tension is reflected in the related theme of self-reliance as a technical and rationalistic approach rather than one of participatory nimbleness. Collins’ (2017) work on development labs reinforces these tensions illustrating how universities are at risk of neocolonialism by perpetuating the technical prescriptions of development agencies. Finally, our research underscores tensions embedded in power imbalances inherent in university-community projects. This theme speaks to both the ceding of material power, including financial and formal project leadership, to local institutions. For extension and development practitioners, these findings reinforce the need for greater attention to participation and power (Roberts & Edwards, 2017). To this end, our pilot study challenges scholar-practitioners to reflect on their roles, the contexts within which they operate, and the everyday ways in which they may be complicit in the replication of injustices as they work toward building self-reliance through their global food security praxis. To build upon this work, we recommend expanding this research to include a critical analysis of a broader corpus of JSR texts and additional land-grant university stakeholders.

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Information and Communication Technology Use Capacity Within Extension Networks: Development and Preliminary Validation of an Empirical Scale

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Abstract

Advancing information and communication technologies (ICTs) has become central to international agricultural and extension development efforts. ICTs are crucial in facilitating information transfer, ensuring stakeholder access to information, and increasing the decision-making capacity of smallholder farmers. The research presented here introduces an instrument developed to quantify perceptions of ICT use capacity within international extension networks. The aggregate scale was verified for content validity, response process validity, internal structure validity, and consequential validity informing its use. The instrument was administered to network members (n = 122) associated with the Global Forum for Rural Advisory Services. An exploratory factor analysis (EFA) was conducted with measures of correlation and reliability analysed. Six factors were extracted and analysed further. The resulting Perceptions of ICT Use scale and factors can be used as reliable instruments for quantifying perceptions of ICT use capacity, enhancing international extension network needs assessments, and informing policies and practices which maximize ICT capacity.

Keywords: information communication technology (ICT); scale development; rural advisory services; international extension; capacity assessment

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Introduction

Access to information is a critical factor in socio-economic transformation (Asenso-Okyere & Mekonnen 2012). However, failure to link innovative agricultural research to farming communities significantly affects global agricultural development (Davis & Sulaiman, 2014; Lamm et al., 2019; Maningas, 2006). Agricultural sectors in the global South consist primarily of smallholder farmers with limited access to infrastructure and information. Lack of access affects decision-making capacity (Levine et al., 2019b; Taragola & van Lierde, 2010) and creates barriers to production associated with high transaction costs, limited production, and decreased marketing choices (Aker et al., 2016; Nakasone et al., 2014).

The advancement of agricultural information and communication technologies (ICTs) has emerged as a field of inquiry focused on enhancing rural agricultural development (Mahant et al., 2012). In this study, ICTs refer to “technology used for creation, acquisition, processing, storage, and dissemination of vocal, pictorial, textual, and numerical information by micro-electronics-based combination of computing and telecommunications” (Nair & Devi, 2011, p. 4). Modern ICTs facilitate efficient information transfer and increase decision-making capacity (Ekbia & Evans, 2009; Narine et al., 2019a) by reducing the cost of communicating information on a large scale, not always possible through traditional interpersonal communication channels (Aker et al., 2016). Effective ICT use provides critical connections between farming communities in the global South and emerging research (Aarts et al., 2014; Lamm et al., 2019; Swanson & Rajalhti, 2010). For international extension networks, there is a demonstrated need to evaluate network capacities for ICT development and implementation (Lamm et al., 2019).

Traditional forms of ICTs (e.g., radio and television) have a history of use in international extension (Aker, 2011). With the growth of mobile phone coverage, traditional ICTs have evolved rapidly to include voice, SMS, apps, and internet-based services (Aker et al., 2016; Nakasone et al., 2014). Expansion of technology has increased interest in understanding effective facilitation of ICTs in rural agricultural areas (Nakasone et al., 2014). Extension networks face information dissemination challenges related to scale, sustainability, relevance, and responsiveness; therefore, ICT-based services are positioned to fundamentally change the diffusion of information in the global South (Aker, 2011). It is imperative the effectiveness of extension efforts striving to provide information to rural farmers globally be assessed to ensure best practices are followed (Aker, 2011). Conducting a needs assessment for ICT information and interventions in global agriculture may offer insights to effective extension-based information dissemination (Aker et al., 2016).

Responding to this gap in the literature, Lamm et al. (2019) conducted a Delphi study of international extension experts to determine the needed capacities for effective ICT use in international extension networks. Their findings were consistent with previous literature (see Dhaka & Chayal, 2010; ITU, 2011; Patra et al., 2016; Richardson, 2003; Warren, 2002) in demonstrating how a variety in ICT modalities can address the agricultural information and telecommunication needs in rural areas in the global South. A key finding from Lamm et al. (2019) was that international extension networks have a unique set of needs and criteria, precipitating a need for the development of ICT systems and processes most appropriate for the clientele of the specific network.

A logical next step for ICT capacity building within international extension would be to develop a scale for capacity assessment. A framework and methodological recommendations directly addressing identified needs for international agricultural development would benefit practitioners and researchers in international extension networks (Lamm et al., 2018). Building
on previous findings, this article introduces a scale to promote reliable data collection for ICT capacity evaluation in international extension networks.

**Conceptual Framework**

Although ICTs can be leveraged to ensure information sharing, many barriers to adoption exist, including lack of effective communication-intermediation tasks required for ICT use, underestimation of network member roles and capacity for innovation, and lack of network support and communication for implementing knowledge obtained from ICTs (Sulaiman et al., 2012). To provide a framework for scale development, several ICT network capacities were examined: (1) ICT access, (2) ICT use, and (3) context in relation to Roger’s (2003) diffusion of innovation theory.

**ICT access** for international extension networks includes network ability to support use and respond to access issues (Lamm et al., 2019). ICTs increase access to information and financial services, link buyers and sellers, and facilitate agricultural data collection (Aker et al., 2016). However, ICT initiatives vary in the institutional support, information, and services provided. Extension personnel are aware of the potential to engage with farmers via ICTs but lack the necessary policy support and network administration to increase adoption and use (Narine et al., 2019b). ICT capacity development needs include financial, technological, and administrative support (Narine et al., 2019b; Taylor, 2015). Historically, ICTs have not been accessible to all (Aker & Mbiti, 2010). Challenges to widespread access include issues of trust, information quality, resource and geographical limitations, gender, social class, and ethnicity, (Aker et al., 2016; Taylor, 2015). While ICT-based services may increase market efficiency and productivity, the disparities between those with access may exacerbate resource distribution issues (Blumenstock & Eagle, 2012). ICTs should be accessible to all network members (Lamm et al., 2019); however, different regions have unique contexts, which must be considered to ensure ICT diffusion and adoption does not accelerate inequality among network members.

**ICT use** refers to an extension network’s perception of ICTs, promotion of ICT use, and active use of ICTs (Lamm et al., 2019). Extension network members should understand the advantages associated with ICTs and receive proper training for ICT use (Narine et al., 2019b; Taylor, 2015). Therefore, network support of ICTs is critical in facilitating social acceptance of new technologies (Lamm et al., 2019; Narine et al., 2019b). Several studies have demonstrated how limited perceptions of peer and administrative support impedes use of ICTs by extension personnel (see Ganpat & de Frietas, 2010; Narine et al., 2019b; Strong et al., 2014). Network support can occur directly or indirectly through policies and managerial support (Narine et al., 2019b; Rogers, 2003). Member training and network support can impact member attitudes toward ICT tools and influence the success of ICT adoption (Lamm et al., 2019).

**Context** refers to network support of multiple channels for information exchange, idea sharing, and communication (Lamm et al. 2019). A shift from the traditional view of farmers as passive recipients of knowledge toward interactive, two-way communication between extension officers and farmers allows for the incorporation of farmers’ opinions, experiences, and knowledge into these messages. This collaboration is necessary for the current global landscape (Masambuka-Kanchewa et al., 2020) and requires network members to transition from technology promoters to dialogue facilitators (Abdu-Raheem & Worth, 2016; Masambuka-Kanchewa et al., 2020; Masangano et al., 2017). Many ICT initiatives fail to increase knowledge share among farmers, which affects an extension networks’ ability to receive feedback and local knowledge (Hudson et al., 2017; Masambuka-Kanchewa et al., 2020). Emerging user-driven
ICTs (e.g., blogs, Twitter, and Facebook) may be leveraged to overcome existing challenges (Sulaiman et al., 2012). Increased investment in ICTs may also enhance dissemination of agricultural information (Ajani, 2014; Masambuka-Kanchewa et al., 2020; Okediran et al., 2018). Governments and business networks represent two entities that can support ICT adoption and develop policies favorable to ICT use and adoption (Narine et al., 2019b; Taylor, 2015).

**Diffusion of Innovations**

Extension networks are critical in information and innovation dissemination (Gido et al., 2015; Kibet, 2011). Rogers’ (2003) diffusion of innovations (DOI) theory notes how innovations are “communicated through certain channels over time among the members of a social system” (p. 5). The five characteristics of an innovation include relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). Additionally, individuals follow stages of the innovation-decision process before deciding whether to adopt an innovation (Rogers, 2003). These stages, along with innovation characteristics, individual adopter characteristics, organizational structure, and external factors, influence network innovativeness and technological adoption (Rogers, 2003; Taylor, 2015). Communication messages and strategies for agricultural innovations should be tailored to the needs of extension personnel and their clients (Moyo & Salawu, 2017).

Historically, DOI has been the primary model for agricultural extension and development. Therefore, the theory provides a viable framework for studying ICTs within international extension networks through innovations, adoption-decision processes, and interpersonal contexts (Taylor, 2015). However, the theory is not amenable to examining the complex social and relational dimensions that affect ICT adoption (Taylor, 2015). The traditional one-way method of information diffusion may not improve agricultural productivity, due to the exclusion of local farmer knowledge, skills, and resources (Masambuka-Kanchewa et al., 2020). The diffusion of local and indigenous innovations and knowledge, along with traditionally scientific technologies, is critical to ICT development appropriate for local needs. Considering the environmental and social contexts in ICT capacity, conducting a capacity assessment may increase the success of extension efforts (Taylor, 2015).

**Scale Development**

Considering the framework of DOI theory, developing a scale for ICT capacity assessment within international extension networks allows stakeholders to determine the local needs and directions of ICT development situated within the characteristics of an innovation, the innovation-decision process, and the environmental and social contexts of the surrounding area. These considerations are critical due to the gap between theory and practice for ICT development (Sulaiman et al., 2012). Multi-strategy approaches and stakeholder analysis may increase the adoption and productivity of agricultural-related ICT use (Sulaiman et al., 2012). Through a Delphi approach (Lamm et al. 2019) and the development of a standardized instrument for capacity assessment within multiple international extension network settings (Girard & Girard, 2015; Lamm et al., 2020), the current framework provides a robust foundation for assessing the content validity for an ICT capacity instrument.

**Purpose and Objective**

The purpose of this study was to develop and validate an empirical instrument which could be used to measure perceived ICT capacity of international extension networks. The
objective of the study was to establish content validity, response process validity, internal structure validity, and consequential validity of the proposed instrument.

**Methods**

The data included for this research were collected as part of a global extension network capacity assessment project completed on behalf of Global Forum for Rural Advisory Services. The project included the measurement of network capacities across a range of focus areas, ICT use being one of them. The current study focuses on ICT use with the purpose of developing and validating an instrument that quantifies ICT use capacity in extension networks. Data were also collected from the same set of respondents regarding a variety of other network characteristics. This disclosure is made to provide clarity regarding multiple publications from a common dataset (Kirkman & Chen, 2011).

The data were collected from a purposive convenience sample from representatives from diverse extension networks around the globe. Specifically, the population examined in this study consisted of the extension network leaders (e.g. Secretariat members and staff) and board members of nine extension networks including: regional (4), sub-regional (1), and country-level (4) networks. Participating networks included the African Forum for Agricultural Advisory Services, the Caribbean Agricultural Extension Providers Network, the Pacific Islands Rural Advisory Services, the Latin American Network for Rural Extension Services, the West and Central Africa Network for Agricultural and Rural Advisory Services, the Kenya Forum for Agricultural Advisory Services, the Malawi Forum for Agricultural Advisory Services, the Nigerian Forum for Agricultural Advisory Services, and the Uganda Forum for Agricultural Advisory Services.

**Instrument Development**

A series of researcher-developed ICT items were included in the scale to measure the hypothesized factors of ICT use within extension networks. Items were primarily based on the results of the previous Delphi analysis conducted by Lamm et al. (2019). Additionally, the items were informed by an extensive review of the relevant literature. The results of the previous Delphi research and literature review resulted in 25 total items with hypothesized loadings on seven ICT factors. The hypothesized factors were generally framed within Rogers’ (2003) proposed factors influencing the adoption of an innovation, specifically: 1) how the network addresses ICT access issues (complexity), 2) whether the network has a positive perception of ICT use (relative advantage), 3) network member usage of ICT tools (trialability), 4) network support for ICT use (compatibility), 5) ICT use promotion by the network (observability), 6) network support for multiple channels of information exchange, idea sharing, and communication (compatibility), and 7) performance for ICT use (relative advantage). Item responses were rated on a four-point, Likert-type scale with possible responses (1 = little to no capacity, 2 = some capacity, but very limited, 3 = good capacity, but could still be improved, 4 = exceptional capacity, no need for improvement). Respondents could also rate an item as N/A = not applicable or no knowledge if they had no knowledge of the item.

**Data Collection**

The data were collected in two phases between June 2016 and December 2016 using a combination of surveys administered in person and online. The in-person data collection served as a pilot for instrument. Using a paper-based instrument, 12 were obtained from African Forum...
for Agricultural Advisory Services secretariat members, 16 from Kenya Forum for Agricultural Advisory Services members, and five from Latin American Network for Rural Extension Services members.

After the pilot test confirmed face validity of the instrument, data were collected online using the using Qualtrics following the Tailored Design Method (Dillman et al., 2014). Prior to the beginning of the process, a pre-notice message was sent to those invited to participate by their respective regional or country contact person or champion. Approximately two days later, an invitation to complete the survey was sent to all potential respondents. Additionally, invited respondents received a series of at least three reminder messages which were sent every three to five days until the closing of the survey.

Between the pilot, and primary online data collection, 128 individuals were invited to participate in the survey. Completed survey were received from 122 individuals resulting in a 95% response rate. Due to incomplete responses, individual items or indices may have lower response rates.

Instrument Validity
Several methods were implemented to establish scale validity (Crocker & Algina, 1986; Messick, 1995; Lamm et al., 2020). Specifically, 1) content validity, 2) response process validity, 3) internal structure validity, and 4) consequential validity were examined.

Content Validity
To establish content validity, a thorough review of the literature was conducted prior to and during the development of the individual scales. Additionally, the majority of the proposed items were directly associated with previous research specifically identifying the capacities necessary for extension networks to effectively use ICTs. Once a final list of proposed items was developed, a panel of experts reviewed the instrument to establish content validity. The experts represented expertise in international extension, evaluation, and scale development and had role titles such as Professor, Executive Secretary, and Program Manager. Experts were located in either the United States or Europe; however, all experts had direct experience working with extension networks around the globe.

Response Process Validity
Response process validity was established during in person data collection as a part of the pilot phase. Following completion of the survey, a series of focus group debriefs were held with each set of participants to gauge insights and obtain feedback concerning the survey. There was consensus among focus group participants across the three locations that the pilot survey was too long. In addition to assessing the ICT capacity within extension networks, the pilot survey also assessed additional extension capacity foci. Nevertheless, the overall feedback regarding the ICT survey confirmed the content and items within the instrument were appropriate and understandable amongst intended respondents. Minor wording updates were made to individual items following the focus group feedback, additionally a N/A-Not applicable or no knowledge option was added, which allowed respondents to appropriately rate an item for which they had no knowledge. Overall, the intent of the items remained consistent from the pilot version to the final version of the survey. Therefore, to increase the statistical power available for analysis, the data obtained during the pilot administration was included in the overall dataset.

Internal Structure Validity
To establish internal structure validity a series of analyses were undertaken as recommended in the literature (e.g. Lamm et al., 2020). First, descriptive statistics, including
response frequency counts, skewness, and kurtosis, were calculated for each proposed item in the scale. The individual item analysis was completed to evaluate item normality and to screen for potential outliers. All 25 items were observed to have acceptable response distributions with observed skewness values ranging from -0.620 to +1.142 and observed kurtosis values ranging from -0.654 to +3.236. These values were deemed to be acceptable given existing thresholds (see Fabrigar et al., 1999; West et al., 1995).

Next, an exploratory factor analysis (EFA) was performed to examine the nature of the observed data within the factors and determine the factor structure of the aggregate scale and individual factors. The EFA was conducted to first determine the factor structure of the instrument relative to the hypothesized structure. Several criteria were used to determine the appropriateness of factor analysis for the proposed ICT use scale. First, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was examined. Values greater than or equal to 0.500 were deemed acceptable according to established thresholds and indicated suitability for factor analysis (Kaiser, 1974). Second, Bartlett’s test of sphericity was performed to examine whether the items within the instrument were related and warranted factor analysis. A chi-squared value was determined to be statistically significant if the associated p-value was less than .01, indicating further analysis was warranted (Dziuban & Shirkely, 1974). The Kaiser criterion, which recommends an eigenvalue threshold of 1.0, was employed to determine the number of factors retained after factor analysis (Kaiser, 1974). Additionally, Cattell’s (1966) scree test was conducted to identify potential factors. Both unrotated and rotated models were analyzed.

Specifically, a varimax rotation was completed to aid in the identification of extracted factors as “[Varimax] Factor scores generated for each individual are also more interpretable because the explained variances among the factors do not overlap and are therefore independent of each other” (Pett et al., 2003, p. 143).

Factor loadings with an absolute value greater than 0.500 were retained. Based on the Furthermore, any items which loaded onto multiple factors were removed to avoid issues with cross-loading across factors, and improve parsimoniousness of the proposed scale. Although there were seven hypothesized factors, the results of the EFA extracted six latent variables. Therefore, the subsequent validation and analysis was conducted on the six extracted latent variables, not the hypothesized seven.

Following the EFA, the extracted factors were analyzed using descriptive statistics including: means, standard deviations, skewness, and kurtosis. Additionally, the Cronbach’s alpha coefficient was calculated for each factor to measure internal consistency and further establish internal structure validity. All data were analysed using SPSS v26.

**Consequential Validity**

In April 2017, a follow-up survey was distributed to extension network leadership who participated in the study to evaluate the proposed ICT instrument and establish consequential validity. Respondents were asked to provide their input regarding the overall ICT data, not factor level details. Of the 15 potential respondents, 14 elected to complete the survey resulting in a 93% response rate. Consequential validity was established through two main areas: the usefulness of the ICT information, and whether respondents intended to use ICT information to modify their networks. Respondents were asked to indicate their agreement with the two questions using a five-point Likert-type scale (1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree, and 5 – strongly agree).
Results

Overall Instrument Exploratory Factor Analysis

Following the EFA, six factors were extracted accounting for 70.558% of the total variance. As recommended in the literature (see Pett et al., 2003) a table of extracted factors of the unrotated and rotated models are presented in Table 1. All subsequent results are presented based on the rotated analysis.

Table 1
Total Variance Explained by the Six Extracted Factors of the ICT Scale

<table>
<thead>
<tr>
<th>Factor</th>
<th>Initial Eigenvalues</th>
<th>Extracted Rotated Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% Variance</td>
</tr>
<tr>
<td>3</td>
<td>1.816</td>
<td>7.264</td>
</tr>
<tr>
<td>4</td>
<td>1.421</td>
<td>5.683</td>
</tr>
<tr>
<td>5</td>
<td>1.263</td>
<td>5.051</td>
</tr>
<tr>
<td>6</td>
<td>1.048</td>
<td>4.191</td>
</tr>
</tbody>
</table>

An EFA was conducted on the aggregate ICT scale consisting of 25 items. The resulting factor structure of the scale is displayed in Table 2. The KMO value associated with the aggregate ICT scale was 0.790 and the Bartlett’s test statistic was significant ($\chi^2 = 1264.984, p < .00$), which indicated factor analysis was justified. Following the EFA of the aggregate scale, the underlying structure of the aggregate ICT scale was found to be different than the hypothesized structure that seven latent variables would emerge. The items in the aggregate scale loaded onto only six factors. There were two items which were dropped based on cross-loadings, and one item which did not meet the minimum loading threshold of 0.500. Based on the structure of the aggregate scale, six new ICT factors were proposed and additional analysis on each conducted. New factor names were created based on the nature of the items associated with the extracted factors, including: Factor 1 - network integration of ICTs, Factor 2 - ICT accessibility, Factor 3 - network use and support of ICTs, Factor 4 – ICT logistics, Factor 5 - network promotion of ICTs, and Factor 6 - network perception of ICTs.

Table 2
Exploratory Factor Analysis of Aggregate ICT Scale

<table>
<thead>
<tr>
<th>Scale Items</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information and communication technologies are used as a way to leverage partnerships (ICT16)</td>
<td>0.825</td>
</tr>
<tr>
<td>Information and communication technologies are used to enhance networking (ICT17)</td>
<td>0.761</td>
</tr>
<tr>
<td>Systems are in place to help select appropriate information and</td>
<td>0.736</td>
</tr>
</tbody>
</table>
communication technology tools (ICT14)
The network integrates information and communication technology into reaching the larger objectives of the network (ICT13)
Network members have the communication skills needed to use information and communication technology tools (ICT09)
Network officers are able to source information (ICT11)
Evidence of information and communication technology literacy amongst RAS professionals is available (ICT08)
Information and communication technology tools are used to disseminate information (ICT15)
Information and communication technologies are accessible by clientele (ICT02)
The network provides an effective platform for asynchronous online opportunities (ICT20)
The network provides an effective platform for synchronous online opportunities (ICT19)
The network establishes and uses virtual networks (ICT21)
The network communicates via distance (ICT01)
Processes are in place to reach individuals without internet access (ICT03)
The network uses information communication technology tools effectively (ICT24)
Sufficient funding to support information communication technologies activities is present (ICT23)
Information communication technology tools are used to benefit clientele (ICT25)
Success stories about using information and communication technology tools are shared within the network (ICT18)
The network provides sources of information that are adaptable for different users (ICT04)

RAS professionals trust the information systems in use (ICT06)

Information and communication technology tools are seen as user-friendly (ICT07)

The network has a positive attitude towards information and communication technology tools (ICT05)

*Network officers have access to information and communication technology information (ICT12)

*The network uses social media (ICT22)

**The network uses information and communication technology tools to link stakeholders to RAS professionals (ICT10)

Note: Principal Component Factors. Blanks represent absolute loading values < 0.500. Item identifiers in parentheses. RAS – Rural Advisory Service. * - Cross loaded item, ** - Item failed to reach minimum threshold for factor loading.

Descriptive and Internal Consistency Analysis

The descriptive statistics and measures of internal consistency for the six factors that emerged and an overall ICT index scale score are displayed in Table 3. For each factor subscale and the overall index scale, skewness values were less than two and kurtosis values were less than seven. Based on established thresholds (see Fabrigar et al., 1999; West et al., 1995; Lamm et al., 2020), the results indicated an acceptable internal structure validity. For the overall instrument and the factor subscales for factors one, two, three, four, and five, Cronbach’s alpha coefficient was greater than 0.70, indicating acceptable internal consistency given established thresholds (see Cortina, 1993; Schmitt, 1996; Streiner, 2003). The network perception of ICTs subscale had an alpha coefficient less than 0.700; however, the observed value of 0.698 was deemed acceptable for further analysis following recommendations within the literature regarding exploratory analysis (DeVellis, 2017).

Table 3
 ICT Scales: Descriptive Statistics and Scale Reliability

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration of ICTs</td>
<td>105</td>
<td>2.648</td>
<td>0.596</td>
<td>-0.012</td>
<td>-0.183</td>
<td>0.859</td>
</tr>
<tr>
<td>ICT accessibility</td>
<td>103</td>
<td>2.676</td>
<td>0.532</td>
<td>-0.08</td>
<td>-0.182</td>
<td>0.818</td>
</tr>
<tr>
<td>Use and support of ICTs</td>
<td>102</td>
<td>2.735</td>
<td>0.661</td>
<td>-0.326</td>
<td>-0.092</td>
<td>0.849</td>
</tr>
<tr>
<td>ICT logistics</td>
<td>91</td>
<td>2.324</td>
<td>0.602</td>
<td>0.156</td>
<td>-0.256</td>
<td>0.808</td>
</tr>
<tr>
<td>Promotion of ICTs</td>
<td>104</td>
<td>2.337</td>
<td>0.702</td>
<td>-0.041</td>
<td>0.019</td>
<td>0.704</td>
</tr>
<tr>
<td>Perception of ICTs</td>
<td>112</td>
<td>2.958</td>
<td>0.590</td>
<td>0.074</td>
<td>-0.111</td>
<td>0.698</td>
</tr>
<tr>
<td>Overall</td>
<td>76</td>
<td>2.574</td>
<td>0.449</td>
<td>0.082</td>
<td>0.136</td>
<td>0.915</td>
</tr>
</tbody>
</table>
The correlations between the ICT factors and the overall index scale are displayed in Table 4. Each of the factors and the index scale were statistically significantly correlated with one another \( p < .05 \), indicating content coherence.

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Integration of ICTs</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ICT accessibility</td>
<td>.648**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Use and support of ICTs</td>
<td>.553**</td>
<td>.515**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ICT logistics</td>
<td>.620**</td>
<td>.492**</td>
<td>.663**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Promotion of ICTs</td>
<td>.548**</td>
<td>.626**</td>
<td>.540**</td>
<td>.631**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Perception of ICTs</td>
<td>.252*</td>
<td>.377**</td>
<td>.246*</td>
<td>.271*</td>
<td>.400**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7. Overall</td>
<td>.773**</td>
<td>.798**</td>
<td>.756**</td>
<td>.833**</td>
<td>.770**</td>
<td>.464**</td>
<td>-</td>
</tr>
</tbody>
</table>

\*\( p < .05 \),  **\( p < .01 \)

**Extracted Factor Exploratory Factor Analysis**

The first extracted ICT factor was comprised of four items. Based on the nature of the items associated with the factor, the factor was named *Network Integration of ICTs*. Among the seven items there were two which cross-loaded on a second extracted factor. The EFA extracted one factor which accounted for 70.8% of the total variance and was associated with an eigenvalue of 2.833. The KMO value was 0.772 and the Bartlett’s test yielded significant results \( \chi^2 = 202.583, p < .010 \), thereby indicating further factor analysis was warranted.

The second extracted ICT factor consisted of five items. Based on the nature of the items, the factor was named, *ICT Accessibility*. The subsequent EFA of the five items resulted in one extracted factor, which accounted for 58.5% of the total variance. The extracted factor was associated with an eigenvalue of 2.926. The KMO value was 0.793 and Bartlett’s test yielded significant results \( \chi^2 = 172.825, p < .010 \). Both values indicated further factor analysis was warranted.

The third extracted ICT factor was comprised of five items. The factor was named, *Network Use and Support of ICTs*, based on the items retained. One factor was extracted following the EFA, which accounted for 69.1% of the total variance and was associated with an eigenvalue of 2.765. The KMO value was 0.791 and the Bartlett’s test yielded significant results \( \chi^2 = 172.252, p < .010 \), justifying further factor analysis.

The fourth extracted factor consisted of four items and was named *ICT Logistics*. The EFA resulted in one extracted factor, which accounted for 64.2% of the total variance and was associated with an eigenvalue of 2.566. The KMO value was 0.700 and Bartlett’s test yielded significant results \( \chi^2 = 148.473, p < .010 \), indicating further factor analysis was warranted.

The fifth extracted ICT factor consisted of two items and was named *Network Promotion of ICTs* based on the included items. The EFA resulted in one extracted factor which accounted for 77.3% of the total variance and was associated with an eigenvalue of 1.546. The KMO value was 0.500 and Bartlett’s test yielded significant results \( \chi^2 = 35.964, p < .010 \), which both justified further factor analysis.

The sixth extracted ICT factor consisted of three items and was named *Network Perception of ICTs* based on the included items. The EFA resulted in one extracted factor which
accounted for 62.4% of the total variance and was associated with an eigenvalue of 1.871. The KMO value was 0.622 and Bartlett’s test yielded significant results ($\chi^2 = 64.799, p < .010$), which both justified further factor analysis.

**Consequential Validity**

Of the 14 respondents, 100% indicated the overall ICT information was useful or very useful. Additionally, intent to use the overall ICT information had a high mean score ($M = 4.42, SD = 0.65$), indicating an intention to use the information received in the capacity assessment to modify their extension networks. These results were used to establish consequently validity of the ICT information.

**Conclusions, Implications, and Recommendations**

The purpose of this study was to develop and validate an empirical instrument which quantified perceptions of ICT use capacity in extension networks. The purpose was accomplished by verifying the instrument’s content validity, response process validity, internal structure validity, and consequential validity. An initial hypothesis indicating the 25 items of the aggregate ICT scale would load onto seven latent variables framed with Rogers’ (2003) DOI theory: 1) how the network addresses ICT access issues (complexity), 2) whether the network has a positive perception of ICT use (relative advantage), 3) network member usage of ICT tools (trialability), 4) network support for ICT use (compatibility), 5) ICT use promotion by the network (observability), 6) network support for multiple channels of information exchange, idea sharing, and communication (compatibility), and 7) performance for ICT use (relative advantage). The results of the EFA revealed the 22 retained items loaded onto six latent variables, not seven. Therefore, the underlying factor structure was different than hypothesized, prompting the proposal of six new factor subscales. These subscales measured: 1) network integration of ICTs (compatibility), 2) ICT accessibility (complexity), 3) network use and support of ICTs (observability and complexity), 4) ICT logistics (compatibility), 5) network promotion of ICTs (trialability), and 6) network perception of ICTs (relative advantage).

The disparities between the hypothesized factor structure and the resulting factor structure suggest the distinctions between the network addressing ICT access issues, network member use of ICT tools, network support of ICT use, and network promotion of ICT use are not as rigid as previously hypothesized. For example, the newly proposed subscale measuring network integration of ICTs contained items originally hypothesized to belong to the network can support ICT use and network promotes ICT use factors. Additionally, the newly proposed network promotion factor included items originally hypothesized to belong to factors measuring the network addressing of ICT access issues, network member use of ICTs, and network promotion of ICT use. The only subscale that remained the same as originally hypothesized was the one measuring network perception of ICT use. However, the name was updated from Network has a positive perception of ICT use to Network perception of ICT use to be more inclusive of potential negative perceptions.

During the instrument construction process the hypothesized factors were framed within the main characteristics affecting adoption of an innovation (Rogers, 2003). The results were somewhat unexpected when fewer factors emerged, and within the factors multiple influences for adoption (Rogers, 2003) appeared to co-exist within one of the extracted factors. Specifically, network use and support of ICTs was associated with both observability and complexity. The remaining five extracted factors generally aligned with expectations. Nevertheless, the results...
indicated opportunities for additional analysis. The study should be replicated with a new population to see whether similar results are observed. Additionally, a recommendation would be to examine other items which may contribute to the network promotion of ICTs factor. Although the factor was observed to have satisfactory internal structure validity characteristics, adding additional items beyond the existing two may make the factor more robust for analysis.

Although the compositions of the proposed factors are different than initially hypothesized, they underscore the importance of access to ICTs and network use, promotion, integration, and perception of ICTs. Equitable access to ICTs is imperative as disparities in access can magnify resource distribution issues (Aker et al., 2016; Blumenstock & Eagle, 2012). Having accessible ICTs was identified as an important need for ICT capacity development (Lamm et al., 2019). In addition to access, promotion of ICT use is imperative because individuals with positive perceptions of ICTs were more likely to adopt them (Narine et al., 2019b).

Based on the findings, ICT adoption should be encouraged using a top-down approach where network administrators and officers promote ICT use and integrate ICT use into daily extension operations, increasing both observability and demonstrating relative advantage (Rogers, 2003). To facilitate social acceptance, extension network members and administration must be willing to promote ICT use (Narine et al., 2019b) and demonstrate compatibility with existing approaches (Rogers, 2003). If network administrators adopt ICTs, they can model social acceptance of new technologies and encourage network officers to do the same, increasing and promoting trialability (Rogers, 2003). Similarly, extension network officers can model acceptance and user-friendliness of ICTs, while addressing and resolving logistical issues, to extension network members and clientele, minimizing perceptions of complexity (Rogers, 2003). These actions should help to promote favorable perceptions regarding ICT use (Rogers, 2003).

Since data were only collected in international extension settings located in the global South (i.e., Africa, Latin America, the Caribbean, and the Pacific Islands), there is limited generalizability of results. Therefore, future studies should be conducted with larger, diverse samples to improve scale robustness and inform additional insights to ICT use capacity assessments of international extension networks. In addition, confirmatory factor analyses (CFA) should be conducted on the aggregate ICT scale and the proposed factors to confirm the construct structure. A larger sample would provide the power necessary to complete a CFA and would be strongly recommended. A further recommendation would be to replicate the EFA analysis with a larger data set, the varimax rotation procedure is dependent on sample size, therefore a more robust sample may provide further insights and potential validation. Additionally, it must be acknowledged for the consequential validity and intended use of the scale to be upheld that the instrument measures perceptions of ICT use capacity not objective ICT use capacity. An associated recommendation would be to consider extending the scope of the proposed scale to include not only perception data, but objective ICT use capacity data as well.

Along with practical and research implications, specific policy implications can be drawn from the findings. Rogers (2003) found that relative advantage, compatibility, and complexity characteristics of an innovation had greater effects on overall adoption than trialability and observability. Therefore, international extension networks should emphasize the benefits of a technology, consistency with cultural values, and user-friendliness when focusing on adoption of ICTs (Lamm et al., 2019). For example, Narine et al. (2019b) found extension officers were more likely to adopt SMS messaging when they had favorable perceptions of complexity,
relative advantage, and trialability. The emergence of factors associated with ICT accessibility and network use and support of ICTs undergird this recommendation.

Following findings outlined in Lamm et al. (2019), international extension networks should coordinate with their national and global organizations to share strategies of adoption. Extension networks should prioritize sharing strategies which emphasize the ease of use associated with ICTs as well as the benefits of using ICTs over alternative communication methods (e.g. speed and cost). Both Lamm et al. (2019) and Narine et al. (2019b) found a lack in policies encouraging ICT adoption and a need for administrative support of ICT. Therefore, the leadership of international extension networks should encourage local governments to develop policy supportive of adoption and use of ICTs.

ICTs provide a powerful entry point for the harmonization of information availability within extension networks (Asenso-Okyere & Mekonnen 2012); however, the implementation and use of ICTs should be done with a deft touch and with sufficient care and planning. As Rogers (2003) has found, implementing technological innovations without adequate preparation, can produce undesirable results. The use of a consistent, valid instrument to support such endeavors should provide a common lexicon and understanding to help facilitate the adoption and perception of ICTs within international extension networks.

References


[https://openknowledge.worldbank.org/handle/10986/23993](https://openknowledge.worldbank.org/handle/10986/23993)


Building Self-reliance: A Framework to Evaluate Smallholder Coffee Farmers’ Pursuit of Commercialization

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Abstract
This study examines the application of a self-reliance framework for practitioners and evaluators to better understand the capacities and intrinsic factors impacting smallholder coffee farmers’ commercialization behaviors. We surveyed 40 smallholder coffee producers in Peru using a quantitative instrument. Data were analyzed to determine if statistical relationships exist between farmers’ self-reliance (measured via knowledge and skills, attitudes, and aspirations) and their commercialization behaviors. Findings indicate the self-reliance framework effectively illustrates relationships between farmers’ aspirations, knowledge and skills and their commercialization behaviors, while future, additional studies are needed to better measure and understand the role of commercialization-related attitudes. Practitioners can leverage the study’s findings by using a self-reliance framework to infer farmers’ likeliness to pursue sustainable commercialization practices and align their trainings and design interventions based on evaluation findings. The conceptual self-reliance framework is the first of its kind applied for smallholder coffee commercialization. The findings demonstrate that self-reliance concepts employed recently in other contexts may potentially be used similarly by extension and development facilitators.

Keywords: coffee, commercialization, external facilitator, Peru, self-reliance, smallholder

Acknowledgement: Logistical and intellectual support for this study were provided by partners in Peru from the Universidad Peruana de Ciencias Aplicadas and the Shared-X company: Ivan Loyola, Joel Barboza, Rosalina Cuchca, and Jimy Lovato. Additionally, Dr. Glenn Israel, Vanessa Campoverde, and Francisco Rivera of the University of Florida contributed to the development and translation of the instrument.
Introduction

Smallholder farmers manage the vast majority of the world’s farms and produce a substantial portion of the world’s food on small plots of land (Food and Agriculture Organization [FAO], 2014a). However, many of the 800 million people internationally who go to sleep hungry each night belong to smallholder households (United States Agency for International Development [USAID], 2019a; World Bank, 2013), and 65% of the world’s poorest adults have been employed through agriculture (World Bank, 2016). Expectedly, to address the foreseen challenges of the world’s population reaching 9 billion by 2050, investments in smallholder farming and markets are critical (USAID, 2019a).

Lifting rural households from poverty through sustainable livelihood opportunities in small-scale agriculture has become increasingly complex and difficult in a globalized world and food system. While commercialization is often considered an important development opportunity, smallholder farmers’ lack of access to improved agricultural technologies and methods, coupled with infrastructural constraints, often reduces farm productivity and the capacity to produce adequate quantities to sell profitably in markets (Arias et al., 2013). Limited access to input markets, including extension and finance, can also affect productivity and commercialization outcomes (Arias et al., 2013). Moreover, extension, provided by the government in many developing countries, is frequently under-resourced, with constrained mobility to reach rural clients and communities (Swanson & Rajalahti, 2010), and microfinance organizations and input dealers commonly perceive too great a risk in offering loans or credit to small farmers (Agribusiness Commercial Legal and Institutional Reform Diagnostic [AgCLIR], 2016; Mpuga, 2010). Finally, transaction costs (e.g., costs of transportation to output markets), especially selling small quantities of produce, further present risks and barriers for smallholder farmers and constrain commercialization opportunities (Arias et al., 2013).

This study explored the factors driving smallholder coffee farmers’ commercialization behaviors in Peru, who face similar issues to those cited above. Most of Peru’s coffee farmers are smallholders who cultivate small plots of land (average of three hectares/7.4 acres) (United States Department of Agriculture Foreign Agricultural Service [USDA], 2018). Additionally, small coffee producers may suffer from volatility of the international market, and along the coffee value chain, small farmers disproportionately experience reductions in incomes (Talbot, 1997). According to Borella et al. (2015), smallholder coffee farmers who struggle to diversify and access market information and credit are also more vulnerable to environmental degradation and pests and diseases such as coffee leaf rust. Withstanding such challenges, peer mobilization and collective actions have demonstrated potential to improve commercialization outcomes for small coffee producers: when smallholder coffee farmers have successfully formed associations or cooperatives, they often received better prices, improved their post-harvest methods and handling, and mobilized to develop collective marketing strategies (USDA, 2018; Wollni & Zeller, 2007). More established and organized associations have facilitated farmers’ access to agricultural loans and linkages directly with consumer markets (USDA, 2018).

Despite the risks and low agricultural output frequently associated with smallholder farmers, international development organizations and researchers have generally agreed that investments in agricultural development are crucial for poverty reduction (Fanzo, 2017; International Fund for Agricultural Development [IFAD], 2016). The private sector has also increased investments in smallholder farmers, often supported by collaborations with donors or governments (Amadu et al., 2017; USAID, 2019b). A partner for this study, Shared-X, a Peru-based company, has implemented a model with social and economic ambitions for specialty crop
production and marketing, including coffee. The company (Shared-X, n.d.) defined their Impact Farming model as facilitating “…access to modern technology and specialty markets for smallholder farmers, ultimately creating empowerment in global communities while promoting renewable sustainable environments” (p. 1).

In advancing commercialization, often these public, private, or nonprofit external facilitators are critical to catalyze collective action, provide technical assistance (TA), and build capacities of farmers to engage in marketing activities (Best et al., 2006; Devaux et al., 2017). However, over-dependency on such external support, especially financially, can diminish opportunities for small-scale farmers to become self-reliant and continue improving their practices (e.g., using new marketing techniques) (Bebbington et al., 1996; Community Empowerment Network [CEN], 2010). Therefore, research indicates external facilitators should be intentional in their efforts to ensure smallholder farmers are positioned and aspire to implement long-term changes with limited outside assistance.

**Conceptual Framework**

The conceptual framework for this study was developed based on previous research and applications related to self-reliance and external assistance in development contexts, which will now be reviewed before introducing the model. Research on self-reliance in rural development has commonly focused on communities and community-level projects (Binns & Nel, 1999; Jamieson & Chisakala, 2016). However, the present study focuses on individual farmers’ self-reliance in commercialization, rather than community-level self-reliance, to align with research claiming significant heterogeneity among rural households’ agricultural systems, including in their market access (De Janvry et al., 1991; Steinke et al., 2019).

The self-reliance concept explored in this study integrates components from a USAID theory of change that proposed self-reliance is determined by a country’s commitment and capacity to its own development (USAID, 2018). The agency has aimed to use self-reliance metrics to reposition aid programs and country-level relationships to reduce long-term dependency. Indicators have been applied to map the positions of countries on the development spectrum to inform intervention and partnership strategies and ultimately make decisions about transitioning countries away from donor funding based on self-reliance achievements (USAID, 2018).

Nongovernmental organizations (NGOs) have also promoted self-reliance to achieve sustainable development. For instance, the Hunger Project, an NGO committed to ending hunger, claims self-reliance is determined by community members’ capacity and confidence to operate as agents of their own development (The Hunger Project, n.d.). The organization draws a contrast between self-reliance and self-sufficiency by claiming self-sufficiency often implies needing no external support for one’s basic needs, while self-reliance is accomplished by having limited outside help with links to local resources and services. Finally, another NGO, CEN (2010), claimed dependency is a “learned helplessness,” while self-reliance is the capacity to think and act independently (p. 1). CEN suggests that often a project’s volunteers or consultants work with communities to solve development problems and leave the people unable (and lacking self-reliance) to continue without their support (CEN, 2010).

The researchers integrated these conceptual definitions of self-reliance to create this study’s conceptual model (see Figure 1). To guide practitioners’ evaluation of self-reliance and commercialization, this synthesis was framed using modified components from the Targeting Outcomes of Programs (TOP) evaluation model (Rockwell & Bennett, 2004), which expanded
upon the original Bennett’s Hierarchy model (Bennett, 1975). The TOP model proposes that evaluation begins in the first stages of program planning, and specific intended outcomes and measurable changes should be explicit in the design of interventions. In this study, the model’s intended change is smallholder coffee farmers’ improved commercialization behaviors achieved via enhanced self-reliance, and the survey instrument, developed from the model, aimed to measure and predict smallholder farmers’ advancement in commercialization methods.

**Figure 1**  
*Conceptual Model Illustrating How Building Self-Reliance is Posited to Improve Commercialization Outcomes*

As demonstrated in the model, the change in farmers’ self-reliance is proposed as a prerequisite to improving commercialization behaviors. Self-reliance is directly determined by sub-variables, capacity and commitment (USAID, 2018). Further, capacity is proposed as a function of farmers’ knowledge and skills, and commitment as a function of attitudes and aspirations (Bennett, 1975). Not visible in the model are specific modes of action (individual variables measured in the study), based on existing literature relating to commercialization capacity and commitment, such as pooling produce, access to credit, and peer-to-peer cohesion and mobilization (see Table 1) (Catholic Relief Services, 2013; Lowitt et al., 2015). The model posits that smallholder farmers can adopt the modes of action to mitigate environmental barriers or risks impacting their commercialization pursuits. Finally, to examine relationships between self-reliance and the commercialization outcomes, the researchers also measured farmers’ engagement in a variety of commercialization behaviors.

**Purpose and Objectives**

The purpose of the study was to understand how building self-reliance may influence smallholder coffee farmers’ advancement in their commercialization. The research objectives were to:
1. Describe smallholder farmers’ recent experiences with different sources and types of extension and technical assistance.
2. Explore whether relationships exist between smallholder farmers’ self-reliance and their coffee commercialization behaviors.
Methods

Data Collection and Participants
We trained Peruvian agribusiness students with previous survey and data collection experience to administer oral questionnaires in the local language (Spanish) using culturally-appropriate techniques. Data collection was not impacted by the 2020 coronavirus disease (COVID-19) pandemic and occurred before international travel restrictions were enacted between Peru and the United States in March 2020.

Forty adult (18+) smallholder coffee farmers \((N = 40)\), based in three central highland communities in the Junín and Pasco regions of Peru, participated in this study. We conducted purposive, multi-stage sampling by initially partnering with the Shared-X company to recruit volunteer farmers for the study. We also employed snowball sampling in the field when coffee farmers suggested additional participants to survey. Some farmers previously sold coffee or had current arrangements to produce for Shared-X while others operated fully independent of Shared-X. Shared-X and representatives from the farming communities were asked to help recruit a diverse, representative sample of participants resulting in 57.5 % men and 42.5 % women farmers spanning in age from 20 to over 60.

Instrumentation
We developed the instrument (self-reliance questionnaire) to measure variables of interest using primarily Likert-type scales. Separate indices were constructed for the knowledge and skills, attitudes, and aspirations variables framed similarly to previously proposed constructs by Bennett (1975). Additional Likert-type items pertaining to farmers’ commercialization behaviors were included as outcome variables. Finally, we also asked farmers questions pertaining to their demographics, formal education level, and recent external and technical support.

The self-reliance questionnaire integrated concepts from the previously discussed USAID (2018) framework that proposed self-reliance is determined by development commitment and capacity. Participants assessed their perceived commercialization knowledge and skills, attitudes, and aspirations (KSAA) with indices comprised of items found in Table 1, which were derived from research on modes of action a smallholder farmer may demonstrate related to capacity and commitment in commercialization. For the KSAA indices, the five-point response scale was 1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly agree. The scale indicated farmers’ self-reported level of agreement with affirmative statements (see Table 1).
## Table 1

*Study Variables and Descriptions*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Description and no. of items</th>
<th>$M$</th>
<th>$post-hoc$ Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and skills</td>
<td>I know how to transport my produce to my desired buyer (i.e. where to source/arrange transportation). I know how to access buyer and market information to help me sell my produce for a good price. I know how to create a business plan for my production/farming. I know how to follow a business plan for my production/farming. I know how to create a business plan for my marketing. I know how to follow a business plan for my marketing. I know how to access an agricultural loan or credit. I know how to manage a loan properly, so I don’t default on the loan. I know what coffee varieties will be most productive and give me the best harvests. I know how to mobilize a group of farmers to work together.</td>
<td>3.48</td>
<td>.78</td>
</tr>
<tr>
<td>Attitude</td>
<td>Selling my coffee at market is the best way to support my family. Using fertilizer on my coffee will improve my harvests and yield. Selective harvesting practices will improve the quality of my coffee. Growing my farming business will generate more money to support my household in the future. Working together with other farmers will help me make more money. Taking some risks is necessary in order to grow my business and market my produce.</td>
<td>4.17</td>
<td>.36</td>
</tr>
<tr>
<td>Aspiration</td>
<td>I hope to invest more in my farming business for it to grow. I hope to work to build trust with other farmers to strengthen group work or association. I hope to learn from peer farmers here who produce and market to make good money. I hope to explore new marketing opportunities.</td>
<td>4.63</td>
<td>.65</td>
</tr>
</tbody>
</table>
I am committed to pursuing commercialization to gain more income for my household.

**Self-reliance (KSAA)**

Mean of 21 Likert-type scale items. Self-reliance was comprised of all knowledge and skills, attitudes, and aspirations items (listed above) together.

Note. Respondents were requested to indicate their agreement or disagreement with affirmative statements. Likert-type five-point scale response options included Strongly disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly agree (5).

We also surveyed farmers on six items about their commercialization behaviors using this five-point response scale for self-reported frequency performing a certain behavior: 1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always. These distinct behaviors included business record-keeping and planning, collective marketing/pooling produce, accessing prices and market information, and engaging in extension.

Prior to data collection in Peru, the survey instrument was reviewed by a seven-member panel of experts for content and face validity which included survey design specialists, University of Florida and Peruvian extension professionals, and international agricultural development researchers. Additionally, a team of native Spanish speakers, Peruvian extension professionals, and Shared-X employees contributed to the translation of the instrument from English to Spanish and its review for cultural sensitivity.

The accuracy and consistency of the indices used to measure self-reliance were estimated using Cronbach’s alpha coefficient, deemed an appropriate indicator of internal consistency reliability for an index-based survey design (Ary et al., 2019). Using Cronbach’s alpha, a coefficient of .90 or greater is considered high reliability (on a scale of 0 to 1). However, reliability is often more difficult to measure for personality variables and in these instances, coefficients above .60 are generally accepted (Ary et al., 2019). The knowledge and skills, aspirations, and combined self-reliance (KSAA) constructs had acceptable coefficients (see Table 1). The coefficient (.72) for combined self-reliance indicates the overall instrument is reliable. However, the coefficient of the five-item attitude construct was inadequate to infer reliability, even after removing one item.

**Data Analysis**

We applied descriptive analysis to calculate frequencies illustrating farmers’ demographics and previous external support. Then we conducted correlational analysis, using Spearman’s correlation coefficient, to all of the KSAA and behavior variables (combined constructs and individual items) to examine strength and direction of association between pairs. Next, based on strength of association, KSAA and behavior variable pairs were consolidated into a final correlation matrix with nine items. Finally, we constructed three multiple linear regression models to further explore and illustrate relationships found between KSAA and behavior variables. Post hoc measures were employed to follow the assumption of linearity.

**Results**

**Demographics and External Assistance**

Most producers interviewed (85%) were formally educated until the primary or secondary level while only 10% reported tertiary/university schooling. The majority of farmers lacked TA pluralism over the last year: 80% of farmers indicated they received TA from private
sector, 12.5% of farmers via the government and 12.5% from a farmer association (see Table 2). NGOs, donors, and research institutions were the least reported sources. Examining the types of external support in the last year, only 7.5% of all farmers indicated they received assistance or training related to financing or agricultural credit. 52.5% of all farmers received support in the form of exchange or provision of goods or services. 47.5% of farmers received some sort of training or education over the past year. Finally, the majority of farmers (92.5%) indicated receiving no business planning external support or assistance in the previous year.

Table 2
Recent Experience with Technical Assistance and Extension

<table>
<thead>
<tr>
<th>External support</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support in last year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34</td>
<td>85.0</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>15.0</td>
</tr>
<tr>
<td>Provider/sources of support in last year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGO or donor</td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td>Government</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Private sector or input dealer</td>
<td>32</td>
<td>80.0</td>
</tr>
<tr>
<td>Farmer association</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Research institute</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Type of external support in last year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education/training</td>
<td>19</td>
<td>47.5</td>
</tr>
<tr>
<td>Finances or credit</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Exchange of goods or services</td>
<td>21</td>
<td>52.5</td>
</tr>
<tr>
<td>Harvest exchange or split costs</td>
<td>8</td>
<td>20.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>Business planning</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Donor project participant in last 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>20.0</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Note. N = 40

**Relationships Between Self-reliance and Commercialization**

Knowledge and skills had the lowest combined mean ($M = 3.48$) among the three self-reliance indices. The mean of the combined attitude items was 4.17, and the aspirations combined mean was the greatest of the three ($M = 4.63$) (see Table 1). The first correlational analysis procedure (see Table 3) applied Spearman’s correlations ($r_s$) to explore strength and direction of association between pairs of individual behavioral frequency variables and the combined self-reliance construct (KSAA) variables. The correlations in this and other analyses ranged from small (< .01) to large (> .50) (Cohen, 1988). Combined knowledge and skills correlated with taking written marketing records ($r_s = .352$) and combined aspirations correlated with learning and extension ($r_s = .447$). The combined self-reliance (KSAA) construct also had a significant association with engagement in extension ($r_s = .373$).
### Table 3
**Correlation Matrix of Self-reliance Constructs and Producer Behaviors**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Behav. frequency: Market prices before selling</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Behav. frequency: Sell to preferred buyer</td>
<td>-.257</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Behav. frequency: Written production records</td>
<td>.028</td>
<td>.283</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Behav. frequency: Written marketing records</td>
<td>.055</td>
<td>.231</td>
<td>.433**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Behav. frequency: Learning or extension activities</td>
<td>.182</td>
<td>-.068</td>
<td>.252</td>
<td>-.073</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Behav. frequency: Pooling production</td>
<td>.181</td>
<td>.073</td>
<td>.219</td>
<td>.261</td>
<td>-.166</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Knowledge and skills combined</td>
<td>.079</td>
<td>.243</td>
<td>.312</td>
<td>.352*</td>
<td>.226</td>
<td>.008</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Attitude combined</td>
<td>.129</td>
<td>-.042</td>
<td>-.093</td>
<td>-.119</td>
<td>.228</td>
<td>.010</td>
<td>-.015</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Aspiration combined</td>
<td>.070</td>
<td>-.011</td>
<td>-.095</td>
<td>-.001</td>
<td>.447**</td>
<td>-.239</td>
<td>.173</td>
<td>.570**</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Self-reliance combined (KSAA)</td>
<td>.086</td>
<td>.123</td>
<td>.199</td>
<td>.260</td>
<td>.373*</td>
<td>-.061</td>
<td>.840**</td>
<td>.415**</td>
<td>.572**</td>
</tr>
</tbody>
</table>

**Note.** \( N = 34-40. \) Correlation coefficients are Spearman’s correlations. * significant at \( p \leq .05. \) ** significant at \( p \leq .001. \)

A correlation matrix was also constructed to examine correlations between the individual self-reliance (KSAA) and behavior variables, omitting attitude variables due to their unacceptable reliability measurements. From this matrix, with all 22 behavior, knowledge and skills, and aspiration individual variables, a consolidated, final matrix (see Table 4) was created containing only variables with significant associations greater than .400. The three behaviors most strongly correlated with the self-reliance variables were taking written production records, taking written marketing records, and engaging in learning and extension. Three knowledge and skills variables had strong associations with at least one behavior: transport product, access agricultural loan or credit, and know more productive coffee varieties. Additionally, three aspiration variables (invest in my ag business for growth, explore new marketing opportunities,
and committed to commercialization for increase household income) correlated with behavior variables in the consolidated matrix.

### Table 4
*Correlation Matrix with Consolidated Self-reliance Construct Variables*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Behav. frequency: Written production records</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Behav. frequency: Written marketing records</td>
<td>.433**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Behav. frequency: Learning or extension activities</td>
<td>.252</td>
<td>-.073</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Knowledge and skills: Transport product</td>
<td>.225</td>
<td>.238</td>
<td>.487**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Knowledge and skills: Access agricultural loan/credit</td>
<td>.237</td>
<td>.440**</td>
<td>.459**</td>
<td>.420**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Knowledge and skills: Know more productive varieties</td>
<td>.437**</td>
<td>.235</td>
<td>.307</td>
<td>.174</td>
<td>.369*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Aspiration: Invest in my ag business for growth</td>
<td>-.057</td>
<td>.037</td>
<td>.405**</td>
<td>.410**</td>
<td>.319*</td>
<td>.239</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Aspiration: Explore new marketing opportunities</td>
<td>.099</td>
<td>.099</td>
<td>.472**</td>
<td>.319*</td>
<td>.463**</td>
<td>.154</td>
<td>.292</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Aspiration: Committed to commercialization for household income</td>
<td>-.028</td>
<td>-.061</td>
<td>.454**</td>
<td>.211</td>
<td>.321*</td>
<td>.083</td>
<td>.436**</td>
<td>.773**</td>
</tr>
</tbody>
</table>

*Note. n = 35-40. Correlation coefficients are Spearman’s correlations. * significant at $p \leq .05$. ** significant at $p \leq .001$. Variables included were selected by correlation coefficients $\geq .400$.*

Three statistical models were built applying multiple linear regression to better interpret relationships of predictor variables with the criterion variables (Frey, 2016). The first model, the Extension and Learning Model, analyzed farmers’ engagement in extension and learning behaviors predicted by farmers’ knowledge and skills and aspirations (see Table 5). The model, statistically significant ($p \leq .001$), explained approximately 54% of variance in engagement in extension and learning activities. Also notable, knowledge and skills to transport product showed a significant relationship ($p \leq .001$) with engagement in learning and extension activities with a standardized regression coefficient (beta) of .580 (see Table 6).
Table 5
Results of Multiple Regression of Farmers’ Behavioral Frequency Predicted by Self-reliance Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>R</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension and Learning Model</td>
<td>39</td>
<td>.738</td>
<td>.544</td>
<td>.475</td>
<td>7.875</td>
<td>&lt; .001**</td>
</tr>
<tr>
<td>Production Records Model</td>
<td>39</td>
<td>.533</td>
<td>.284</td>
<td>.223</td>
<td>4.626</td>
<td>.008*</td>
</tr>
<tr>
<td>Marketing Records Model</td>
<td>36</td>
<td>.509</td>
<td>.259</td>
<td>.190</td>
<td>3.732</td>
<td>.021*</td>
</tr>
</tbody>
</table>

Note. * significant at p ≤ .05. ** significant at p ≤ .001. Extension and Learning Model = frequency of extension and learning activities predicted by knowledge and skills: create marketing business plan, knowledge and skills: transport product, aspiration: invest in my ag business for growth, aspiration: committed to commercialization for household income, and aspiration: explore new marketing opportunities. Production Records Model = frequency of taking written production records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit. Marketing Records Model = frequency of taking written marketing records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit.

Table 6
Self-reliance Variable Coefficients from Multiple Regression of Farmers’ Behavioral Frequency Predicted by Self-Reliance Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Extension and Learning Model (β)</th>
<th>Production Records Model (β)</th>
<th>Marketing Records Model (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and skills: Create marketing business plan</td>
<td>-.158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and skills: Transport product</td>
<td>.580**</td>
<td>.053</td>
<td>.141</td>
</tr>
<tr>
<td>Knowledge and skills: Know more productive varieties</td>
<td></td>
<td>.451*</td>
<td>-.032</td>
</tr>
<tr>
<td>Knowledge and skills: Access agricultural loan or credit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspiration: Invest in my ag business for growth</td>
<td>.109</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspiration: Committed to commercialization for household income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspiration: Explore new marketing opportunities</td>
<td>.183</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Beta is the standardized coefficient. * significant at p ≤ .05. ** significant at p ≤ .001.

The second model, the Production Records Model, explored farmers’ frequency of taking written production records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit (see Table 5). The model was statistically significant (p ≤ .05) and explained approximately 28% of variance in engagement in taking written production records. Knowledge and skills to know more productive varieties had a significant relationship (p ≤ .05) with taking written production records reflected by its beta coefficient of .451 (see Table 6).
The Marketing Records Model was the final model and examined farmers’ frequency of taking written marketing records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access an agricultural loan or credit (see Table 5). The model explained approximately 26% of variance in engagement in taking written marketing records and was statistically significant ($p \leq .05$). Knowledge and skills to access an agricultural loan or credit had a significant relationship ($p \leq .05$) with taking written marketing records reflected by its beta coefficient of .473 (see Table 6).

**Discussion**

The self-reliance framework explored in this study can improve practitioners’ and evaluators’ understanding of the capacities and intrinsic factors impacting smallholder coffee farmers’ commercialization behaviors. Findings indicate farmers’ aspirations, knowledge and skills relate with their commercialization behaviors while additional research is needed to better measure and understand commercialization attitudes. The results also infer self-reliance concepts applied recently in other development contexts may be used similarly by extension and development facilitators focusing on the smallholder household commercialization level.

Statistical findings suggest smallholder farmers’ knowledge and skills play a paramount role in shaping their commercialization behaviors. Among the self-reliance variables examined, the three knowledge and skills variables (transport product, access agricultural loan or credit, and know more productive coffee varieties) most strongly associated with farmers’ behaviors encompassed a relatively diverse array of capacity areas. While practitioners have more traditionally addressed such commercialization capacities and knowledge and skills, it is important to highlight this study’s potentially innovative insights pertaining to farmers’ commercialization aspirations. The three aspiration variables (invest in my ag business for growth, explore new marketing opportunities, and committed to commercialization to increase household income), that correlated with commercialization behaviors, concentrated primarily on wanting to invest and grow the coffee business. This suggests farmers who see coffee production as a lucrative venture with opportunities for expansion would pursue more advanced commercialization practices. Contrarily, if farmers do not see coffee farming as rewarding for them or their households, they may invest more time and efforts toward other activities and treat coffee commercialization as a secondary occupation.

Researchers and practitioners should carefully consider how attitudes are incorporated and measured in future evaluations and should not discount inclusion of attitudes in self-reliance frameworks. The dearth of literature empirically examining smallholder household’s commitment to commercialization may have contributed to the low reliability for attitudes in this study. Moreover, FAO (2014b) claimed that most previous research has concentrated on farmers’ assets and education, but a gap exists in understanding how farmers’ attitudes impact their commercialization outcomes. Thus, little experience and literature were available to inform the design of the attitudes construct.

It is important to contrast the novel application of this study’s model with related, previous approaches to inform investments in future inquires and practice. Development organizations have used the terms empowerment, confidence, and motivation to promote self-reliance (CEN, 2010; Hunger Project, n.d.). However, documentation is limited or vague as to whether these organizations actually measure dimensions of attitudes and aspirations to account for intrinsic factors like was done in the present study. Furthermore, while widely used, empowerment is a contested concept, and Calvès (2009) suggested international development
actors often disregard complex social and power dynamics and peoples’ autonomy and address and measure empowerment as a predetermined status they decide another person should work to achieve. Thus, a project may document a farmer’s participation in many trainings, but it should not be assumed the farmer now feels “empowered” to pursue commercialization. Using the self-reliance framework, measuring farmers’ self-reported attitudes and aspirations, can avoid problematically equating farmers’ technical capacities with their intrinsic empowerment or commitment.

This study also builds awareness on potential connections between farmers’ self-reliance and their engagement in extension and learning. The Extension and Learning Model suggests farmers who embody the knowledge and skills and aspirations components of self-reliance engage in more extension and learning activities. It could also be argued inversely, based on the correlational results, that when farmers are more involved with extension, they become more self-reliant. This has implications for targeting farmers who may be deprived of linkages with extension assistance, to build their self-reliance to pursue commercialization. While the study did not directly examine associations between extension engagement and commercialization, research has illustrated that extension is critical to connect smallholder farmers with technologies and markets (Suvedi & Kaplowitz, 2016). Thus, findings would suggest farmers who participate in and seek more extension are better prepared and able to pursue commercialization.

Farmers’ sourcing and types of extension and technical support should also be considered for self-reliance implications. As the global agriculture sector has changed, so has extension, “transitioning from a focus on technology transfer to a focus on facilitating a range of interventions in complex contexts” (Suvedi and Kaplowitz, 2016, p. iii). Additionally, extension systems now often include public, private sector, and NGO services (Norton & Alwang, 2020). One indicator of more sustainable engagement with extension may be pluralistic sourcing which was lacking among the farmers sampled with 80% of farmers’ external support over the last year from the private sector. Farmers who engage with numerous sources of extension, providing different services and benefits, may exhibit greater self-reliance over the long-term (e.g., when one provider discontinues or cannot offer certain types of services). Peer association, collective action, and farmer-to-farmer systems may also be local, sustainable sources for smallholder farmers to diversify access to assistance and extension and in turn increase their self-reliance (Silvert et al., 2021; Simpson et al., 2015). Moreover, research has even indicated farmers may learn more from their peers than outside practitioners (Suvedi & Kaplowitz, 2016; Van den Ban & Hawkins, 2002).

**Recommendations**

In addition to implications for extension professionals, program planners can apply findings from this study to target and screen farmers for participation in commercialization-focused interventions. IFAD (2019) describes targeting as intentional efforts aiming to ensure a specific group of people benefit from a development intervention. Using the variables found to be most important in this study, practitioners can develop a simple survey tool to strategically screen for and target farmers who exhibit self-reliance or identify gaps and needs the intervention should address to boost self-reliance.

Beyond initial targeting and planning, self-reliance evaluation metrics could also infer whether farmers already working with an external partner are effectively shifting toward sustainable, more advanced commercialization. Using evaluation at standardized intervals, findings would suggest whether self-reliance is being achieved or whether approaches by the
external facilitator should be modified to reduce dependency on outside support and promote ownership by farmers. For temporary development interventions, an approach similar to that of USAID (2018) could be used to inform decisions on transitioning smallholders farmers away from donor funding based on measured self-reliance accomplishments.

In addition to practical implications, the study’s findings build a case for researchers to continue exploring linkages between smallholders’ self-reliance and their commercialization. While this study is an important step toward development of a reliable self-reliance construct and instrument, a qualitative or multimethod study could draw additional insights on self-reliance, especially because research has suggested gender and social factors may influence smallholder commercialization behaviors (Tavenner et al., 2019). A qualitative inquiry could dig deeper and better appreciate the rich diversity and household dynamics among smallholder farmers.

Limitations in the present study include the sample size and sampling techniques. Increasing the sample size in future research is recommended as this study’s findings are not generalizable beyond the population examined. A larger sample would also improve the statistical power of analyses (Israel, 2009). Additionally, while the researchers were constrained by logistics and budget, random sampling methods are encouraged in future inquiries.

This study’s findings can contribute significantly to understanding how external facilitators can evaluate smallholder coffee farmers’ needs and provide targeted assistance to promote advancement of commercialization practices. The evaluation of self-reliance accounts for important factors relating to both an individual’s capacity to navigate the constraints of their environment and the intrinsic commitment and motivation to pursue behavior changes. Future studies are encouraged to refine the self-reliance framework based on applications in different contexts.

References


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Cultural Differences in Critical Thinking Style: A Comparison of U. S. and Chinese Undergraduate Agricultural Students

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Glenn Cummins
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Abstract
This study aimed to compare critical thinking styles between students studying agriculture in the U.S. and China. A survey of critical thinking styles was administered to two groups of students in U.S. (n = 104) and China (n = 103). Multivariate analysis of variance (MANOVA) was applied to determine if there were significant differences in critical thinking styles between the two groups. Results indicate that U.S. students tended to prefer an engaging critical thinking style, whereas Chinese students tended to prefer an information seeking critical thinking style. These differences between critical thinking style preferences may be explained by students’ cultural backgrounds. This study can help agricultural educators understand the differences in critical thinking style preferences among culturally-diverse students. Further, it provides empirical evidence to guide agricultural educators seeking to adopt effective pedagogical approaches to cultivate critical thinking among students from diverse cultural backgrounds. This study provides fresh insight into the individualism and collectivism theory by explaining the cross-cultural differences in critical thinking style between U.S. and Chinese agricultural students.

Keywords: agricultural education, critical thinking style, international agricultural student, cross-cultural

Acknowledgement: This study was supported by the Texas Tech University Graduate School Student Research Support Awards.
Introduction

Critical thinking has been identified as one of the most important attributes of students’ success in an era of globalization (Dwyer et al., 2014; Jackson, 2010). Previous research has presented evidence of the crucial role of critical thinking and its contribution to the quality of the education system in many disciplines (Halpern, 2014; Paul & Binker, 1990). Agriculture is a discipline with specific and unique challenges arising from many complicated and controversial issues with global impact, such as food insecurity, water conservation, biotechnology and climate change (United States Department of Agriculture – National Institute of Food and Agriculture, 2014). Considering the significance of the issues pertaining to global sustainable agricultural development, agricultural students around the world should learn to think critically to weigh evidence, make sound decisions, and solve real-world issues (Berkley, 1995; Egege & Kutieleh, 2004; Perry et al., 2014; Telg & Irani, 2005).

Countries worldwide emphasize the need to improve the quality of their education systems to prepare their citizens for the rapidly changing society (Ennis, 2018; Kitot et al., 2010; Pithers & Soden, 2000). The U.S. has been attracting many international students to pursue higher education (Institute of International Education, 2019). Chinese students constitute a great portion, accounting for 33% of all international students in the U.S. (Institute of International Education, 2019). However, cultural differences between the U.S. and China create challenges for Chinese international students’ academic adjustments (Andrade, 2006; Senyshyn et al., 2000). One of the difficulties that Chinese students have encountered stems from different cognitive styles (Han, 2007; Jin & Cortazzi, 2006). Previous researchers argued that cultural differences could explain Chinese international students’ relatively lower levels of engagement in higher-order cognitive styles (Chue & Nie, 2016; Purdie & Hattie, 1996).

The different cultures also proposed challenges for higher educational professionals to cultivate critical thinking in students with different cultural backgrounds (Lee & Rice, 2007; Lun et al., 2010; Tan, 2017). For example, a study conducted by Biemans and Van Mil (2008) at a Dutch agricultural university concluded that the learning strategies Chinese students developed in their home country did not fit the Dutch educational system and caused Chinese students to struggle academically. Biemans and Van Mil (2008) emphasized the importance of understanding students’ culture to help them enhance their learning performance in the classroom. In addition, the Chronicle of Higher Education and the New York Times have been urging higher education institutions to address the academic difficulties faced by Chinese international students studying in the U.S. (Bartlett & Fischer, 2011). Thus, a deeper understanding of how individuals from different cultural backgrounds think could help educators develop appropriate teaching strategies that may correspond better to students’ thinking styles, and then to improve their higher-level cognitive engagement (Biemans & Van Mil, 2008). The present study aims to identify to what extent the critical thinking styles of U.S. agricultural students differ from the critical thinking styles of Chinese agricultural students.

Conceptual Framework

Culture Differences

Hofstede and Bond (1988) describe culture as ‘the collective programming of the mind that distinguishes the members of one category of people from those of another (p. 6)’. According to Hofstede’s (2001) cultural dimension theory, people from different countries and
groups have different cultures, which is developed during early childhood and shaped in schools and organizations. The collective programming of the mind consists of individuals’ basic psychological processes reflect their cultures or country of origin, such as antecedents to behaviors (Segall, 1986; Hofstede, 1984, 1990, 2001). The internationalization of higher education in the U.S. has increased cultural diversity in U.S. colleges and universities (Nieto, 2015; Wang & Machado, 2015). However, the paradigm shift from the Chinese educational system to the U.S. educational system generates academic challenges for Chinese international students (Wan, 2001; Zhang & Xu, 2007a, Zhang & Xu, 2007b).

Analytic cognitive style vs Holistic cognitive style

Western cultures, shared by European countries and Americans, and East Asian cultures (e.g., China, Japan, Korea) are two of the most contrasting cultures in the world (Mote, 2003). Previous cross-cultural psychological research indicated that the two contrasting cultures lead to different cognitive styles (Nisbett & Masuda, 2003; Nisbett et al., 2001). Western cultures emphasize analytic cognitive style, whereas East Asian cultures emphasize holistic cognitive styles (Choi et al., 1999; Peng & Nisbett, 1999). People possessing an analytic cognitive style are concerned with the validity and soundness of an argument. They tend to use logical evaluation or rules to detect or reject invalid arguments (Nisbett et al., 2001). An analytic cognitive style also focuses on breaking ideas down and evaluating the components individually to simplify problem solving (de Oliveira & Nisbett, 2017). People with a holistic cognitive style, on the other hand, focus on broader background and contextual information while they go through the problem-solving process. A holistic cognitive style integrates of multiple perspectives to generate an individuals’ own perceptions (Peng & Nisbett, 1999). In addition, people with a holistic cognitive style are more likely to accept the coexistence of opposites, and they are much more open to the values and perspectives held by others (Littlewood, 2000; Liu, 2001; Peng & Nisbett, 1999; Nisbett et al., 2001).

Individualism vs collectivism

Cross-cultural psychological researchers explained the different cognitive styles through the constructs of individualism and collectivism (Hofstede, 1984; Wang & Machado, 2015). Hofsted (1980) found that people raised in Western developed countries (e.g., the U.S., Canada) have high levels of individualism, whereas people from East Asian countries (e.g., China, Thailand) have high levels of collectivism. Individualism values self-expression and freedom. In contrast, collectivism values harmony and relationships. People seek to maintain group harmony to avoid contradictions (Wang & Machado, 2015). Results from studies pertaining to the Chinese educational system indicated that Chinese students were less encouraged to question teachers’ authority (Coleman, 1996; Li, 2012; Zhou, 2018). Also, Chinese students perceive the critique of peers’ ideas or scholarly articles as disruptions of group relationship and harmony (Carson & Nelson, 1996). In addition, Chinese students have been described as being quiet in classroom (Olaussen, 1999; Paton, 2005), and class debates in Chinese classroom environments might be viewed as hurtful to others (Durkin, 2008; Tan, 2017). Furthermore, researchers reported that Chinese students generally lack critical thinking skills compared to students from Western countries (Ip et al., 2000; McBride et al., 2002; Salsali et al., 2013; Tiwari et al., 2003). In contrast, the classroom environment in the U.S. encourages critical thinking, arguments, and debates (Hamp-Lyons, 1991; Eckstein, et al. 2003; Li, 2012; Nisbett et al., 2011). Researchers also found that people in individualistic cultures exhibited greater self-assurance than those in collectivistic cultures (Markus & Kitayama, 1991; Tafarodi & Swann, 1996; Triandis, 1994). For example, Duncan et al. (2016) found that U.S. students actively engaged in
classroom activities, expressed their opinions, and exchanged ideas freely. Similarly, Wan (2001) found U.S. students were able to confidently communicate their thoughts and ideas by interacting with instructors and peers.

**Critical Thinking Style Inventory**

Critical thinking style ‘describes the way an individual goes about thinking and reaching solutions to a problem (Lamm, 2015a, p. 1)’. Lamm and Irani (2001) developed University of Florida Critical Thinking Inventory (UFCTI) that measures critical thinking styles (Lamm, 2015b). The critical thinking style inventory distinguishes the approach that an individual uses to gather or process information through a continuum between engagement and seeking information (Lamm & Irani, 2011). Each critical thinker has an individual style of processing information regarding a specific issue (Lamm & Irani, 2011). Individuals who have the engaging critical thinking style are called engagers, and individuals who have the seeking information critical thinking style are called seekers. There is no right or wrong critical thinking style. An ideal critical thinker would be able to utilize both critical thinking styles when appropriate instead of operating only in one specific style (Lamm & Irani, 2011).

Engagers confidently communicate their thinking processes with others, or actively show their ability to use reasoning to solve problems when making decisions (e.g., I am confident that I can reach a reasonable conclusion; I present issues in a clear and precise manner) (Lamm, 2015b). Engagers are also aware of their surroundings and anticipate situations to use reasoning skills and research solutions (Lamm, 2015b). Verbal communications and conversations are the preferred approach to gain information for engagers (Lamm, 2015b). Seekers, on the other hand, are open to others’ opinions, even if the opinions contradict their own opinions or beliefs (e.g., I can get along with people who do not share my opinions) (Lamm, 2015b). Seekers actively seek out information or sources by reading and research. They also consistently look for information to improve their knowledge level (e.g., I will go out of way to find the right answers to a problem) (Lamm & Irani, 2011; Lamm, 2015b).

**Purpose and Objectives**

The purpose of this study was to explore to what extent do the critical thinking styles of U.S. students differ from the critical thinking styles of the Chinese students. The research question of this study was to determine if critical thinking style significantly differed between U.S. and Chinese agricultural students. The hypotheses were:

- **H₀**: Students from the U.S. and China have the same critical thinking style (information seeking, engagement).
- **H₁**: Students from the U.S. and China do not have the same critical thinking style (information seeking, engagement).

**Methods**

**Population and sample**

The population of this study was undergraduate students majoring in agriculture in the U.S. and China. Two convenience samples of undergraduate students from Hebei Agricultural University in China and Texas Tech University in the U.S. were included. The data was collected through an online administration method. To recruit participants in the U.S., the lead researcher attended five face-to-face courses and explained the purpose of the study to students in person. Once students agreed to take the survey, the researcher distributed a QR code, which directed them to the Qualtrics survey containing the UFCTI. To recruit participants in China, an email
containing a link to the Qualtrics survey was sent to one instructor who explained the purpose of the research to students enrolled in face-to-face courses. Once students agreed to take the survey, the instructor forwarded them the email containing the link to the Qualtrics survey. The UFCTI is accessed through access codes purchased by the researcher. Each access code allows a participant one-time access to the UFCTI. Therefore, the researcher stopped collecting data when all the access codes were used. As a result, the target sample size was reached.

The Chinese sample included Chinese citizens who have been studying in China to ensure their critical thinking styles have not been changed significantly by exposure to other cultures. A total of 207 \((N = 207)\) students completed the questionnaire. The U.S. sample consisted of 104 \((n = 104)\) students and the Chinese sample included 103 students \((n = 103)\). The U.S. students were 64.4\% female \((n = 67)\) and 35.6\% male \((n = 37)\). The majority of the U.S. students were between 20 and 25 years old \((n = 73, 70.2\%)\). The majority of Chinese students were male \((n = 69, 67\%)\) and between 20-25 years old \((n = 85, 82.5\%)\).

**Instrument**

The UFCTI was used to measure participants’ critical thinking style. The UFCTI has been established for 10 years, and it has sound psychometric properties (Lamm & Irani, 2011). Previous studies have applied UFCTI in the context of integrating critical thinking into agricultural education and extension programs, such as assessing the critical thinking styles of greenhouse growers (Lamm et al., 2019), opinion leaders (Putnam et al., 2017), and international faculties (Barrick & Dibenedetto, 2019). The UFCTI consists of 20 statements assessing individuals’ preferences for critical thinking styles on a five-point Likert-type scale, with 1 representing “strongly disagree” and 5 representing “strongly agree”.

Two constructs (seeking information, engagement) were underlying the UFCTI to measure critical thinking style. Thirteen questions were designed to measure the construct of seeking information, and seven items were used to measure engagement (Lamm & Irani, 2011). Seeking information score was created by summing 13 items, and engagement score was created by summing 7 items. The engagement score was transposed and multiplied by 1.866 to balance the amount between the two constructs (Leal et al., 2017; Putnam et al., 2017). The UFCTI overall score was calculated by seeking score and transposed engagement score. Students with scores 79 or higher were identified as seekers, and those with 78 or lower were identified as engagers (Lamm & Irani, 2011).

To accommodate the Chinese students who may have a lower proficiency in English, the UFCTI was translated from English to Chinese by six Chinese bilingual educators. A two-factor confirmatory factor analysis provided an adequate model fit for the Chinese version UFCTI (comparative fit index \((CFI) = .95\), Tucker–Lewis index \((TLI) = .94\), Root Mean Square Error of Approximation \((RMSEA) = .05\) (Baker et al., 2021). In this study, the two constructs indicated good internal consistency for both the English version and Chinese version. The Cronbach’s alpha for the engagement construct in the Chinese version was .84, the Cronbach’s alpha for the seeking information construct was .92, and the overall reliability of the UFCTI Chinese version was .92. The Cronbach’s alpha for the engagement construct in the English version was .76, the Cronbach’s alpha for the seeking construct was .84, and the Cronbach’s alpha for the overall UFCTI English version was .89 (Baker et al., 2021).

**Data analysis**

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics was used to describe the demographic characteristics of the two groups of students. A multivariate analysis of variance (MANOVA) can be used to test the
significance of group differences with more than one dependent variable (Field, 2018; Mertler & Reinhart, 2016; Tabachnick & Fidell, 2019). In this study, MANOVA was used to determine the significant differences in critical thinking styles between students from the U.S and China. The independent variables were the students’ country of origin (coded as 0 = U.S. and 1 = China). The dependent variables were the two constructs (engagement and seeking information) of critical thinking style measured by the UFCTI.

Results

Each student was assigned an overall score after completing the UFCTI inventory. The overall critical thinking style scores of the U.S. students ranged from 64.71 to 89.57 with a mean score of 77.87 ($SD = 5.05$), indicating that U.S. students tended to be engagers. The mean score of the engagement style construct was 52.26 ($SD = 6.25$), and the mean score of the seeking information construct was 28.21 ($SD = 3.55$). The overall critical thinking style scores of the Chinese students ranged from 68.43 to 93.14 with a mean score of 80.86 ($SD = 4.96$), indicating the Chinese students tended to be seekers. The mean score of the engagement style construct was 45.97 ($SD = 10.19$), and the mean score of the seeking information construct was 23.31 ($SD = 5.30$). Table 1 displays the critical thinking style scores for the U.S. and Chinese students.

Table 1
The U.S. and Chinese agriculture undergraduate students’ critical thinking style ($N = 207$)

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. student</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking information</td>
<td>104</td>
<td>28.21</td>
<td>3.55</td>
</tr>
<tr>
<td>Engagement</td>
<td>104</td>
<td>52.26</td>
<td>6.25</td>
</tr>
<tr>
<td>Overall score</td>
<td>104</td>
<td>77.87</td>
<td>5.05</td>
</tr>
<tr>
<td>Chinese student</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking information</td>
<td>103</td>
<td>23.31</td>
<td>5.30</td>
</tr>
<tr>
<td>Engagement</td>
<td>103</td>
<td>45.97</td>
<td>10.19</td>
</tr>
<tr>
<td>Overall score</td>
<td>103</td>
<td>80.67</td>
<td>4.96</td>
</tr>
</tbody>
</table>

MANOVA was used to test the null hypothesis. Prior to conducting the analysis, data were screened for missing data and outliers. The assumptions of normality, homogeneity, and multicollinearity were also evaluated before analysis. Skewness and kurtosis were used to assess the normality. Box’s M test was used to examine the assumption of homogeneity of covariance matrices. An insignificant Box’s M value meets the assumption (Field, 2018; Mertler & Reinhart, 2016; Tabachnick & Fidell, 2019). In this study, the Box’s M test, $p = 0.11$, revealed no statistically significant violation of the assumption.

Four statistical tests are generated from MANOVA to evaluate group differences on the dependent variable: Pillai’s Trace, Wilks’s $\lambda$, Hotelling’s Trace and Roy’s Largest Root (Table 2) (Field, 2018; Mertler & Reinhart, 2016; Tabachnick & Fidell, 2019). Wilks’s $\lambda$ is the most commonly reported statistic if the assumption of homogeneity of covariance matrices is met (Mertler & Reinhart, 2016). A significance level of $p \leq .05$ was established a priori for MANOVA. Cohen’s (2013) criteria was used to interpret the effect size (partial eta squared). The Wilks’s $\lambda$ statistics test revealed a significant difference of the mean scores in critical thinking style between the U.S. and the Chinese students (Wilks’s $\lambda = .83$, $F(2, 204) = 20.64, p < .001$).
Therefore, the null hypothesis was untenable. The partial eta squared ($\eta^2 = .17$) indicated a large effect (Cohen, 2013).

Table 2
Multivariate Tests for Critical Thinking Style$^a$ Between the U.S. and Chinese Students$^b$

<table>
<thead>
<tr>
<th>Test</th>
<th>$V$</th>
<th>$F$</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pillai's Trace</td>
<td>.17</td>
<td>20.64</td>
<td>2.00</td>
<td>204.00</td>
<td>&lt; .05</td>
<td>.17</td>
</tr>
<tr>
<td>Wilks’ Lambda</td>
<td>.83</td>
<td>20.64</td>
<td>2.00</td>
<td>204.00</td>
<td>&lt; .05</td>
<td>.17</td>
</tr>
<tr>
<td>Hotelling's Trace</td>
<td>.20</td>
<td>20.64</td>
<td>2.00</td>
<td>204.00</td>
<td>&lt; .05</td>
<td>.17</td>
</tr>
<tr>
<td>Roy's Largest Root</td>
<td>.20</td>
<td>20.64</td>
<td>2.00</td>
<td>204.00</td>
<td>&lt; .05</td>
<td>.17</td>
</tr>
</tbody>
</table>

*Note.* $^a$ 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree, $^b$ 0 = U.S. students, 1 = Chinese students

**Conclusion, Implications and Recommendations**

Global agricultural development requires agricultural educators to prepare students as critical thinkers to solve the real-world issues across the world (Quinn et al., 2009). This study investigated the differences in critical thinking styles between U.S. and Chinese agricultural students. We argued the differences in critical thinking style may be explained by students’ different cultural backgrounds. For example, U.S. students in this study tended to be more engaged while thinking critically to process information. The characteristics of engagers (e.g., looking for opportunities to use a more collaborative approach to solve problems, preferring verbal communications) could be the result of an individualistic culture as exhibited in Western countries. As mentioned above, individualistic cultures value self-assurance and self-expression (Wang, 2011). Additionally, people from Western countries often exhibit an analytic cognition mode (Nisbett et al., 2001). Individualistic cultures often influence people within them to depend on logical evaluation to investigate the validity of arguments. This could explain why most of the U.S. students in this study agreed with the statements in the UFCTI inventory representing engagement construct, such as ‘I enjoy finding answers to challenging questions.’

In addition, this study found that Chinese students tended to be seekers while thinking critically. China is a collectivist society, which values group relationships and harmony. Individuals within a collectivist society would accept the coexistence of opposites and seek to remain moderate in disputes (Liu et al., 2015; Nisbett et al., 2001; Peng & Nisbett, 1999). This collectivist culture could explain why most of the Chinese students agreed with the statements representing information seeking construct, such as ‘I can get along with people who do not share my opinions’ or ‘I listen carefully to the opinions of others even when they disagree with me.’ Moreover, it has been known that the holistic cognition that China has been fostering focuses on integrating multiple sources of information to generate individuals’ own perceptions (Peng & Nisbett, 1999). Thus, a possible explanation for the characteristic of seekers (e.g., preferring generating arguments by combining multiple perspectives) might be the result of a holistic cognition culture.

Previous literature found that Chinese students showed lower level critical thinking skills compared to students from Western countries. This study argues that the observed lower level of engagement behaviors in critical thinking, such as keeping silent during classroom discussion or rarely asking questions, may not simply explain Chinese students’ lower level of critical thinking performance. The ‘quiet’ or ‘passive’ critical thinking behaviors may be attributed to the Chinese students’ critical thinking style influenced by their culture. As noted by Cheng et al (2011), the relatively ‘quiet’ classroom behaviors observed from Chinese students might be due to their
holistic thinking style, which focuses on constructing connections with information. The holistic cognitive thinking style may lead them to wait for instructors to present knowledge as a big picture.

This comparison of critical thinking styles between U.S. and Chinese students provided further insight into how to incorporate useful pedagogical approaches into international or multicultural agricultural educational programs. By understanding students’ critical thinking styles from different cultural backgrounds, educators will be able to effectively support students’ learning based on their critical thinking style preferences. In other words, educators might create better practical opportunities to develop curriculum and teaching strategies for the purpose of fostering students’ critical thinking. Specifically, a better understanding of Chinese students’ critical thinking style may help educators diminish intercultural educational challenges faced when cultivating critical thinking.

Since engagers and seekers have different ways of processing or gaining information, a match between teaching strategies and learners’ critical thinking styles can encourage classroom engagement and improve learners’ performance. For instance, the U.S. students who identified as engagers prefer to acquire information by communicating or interacting with others. Educators should develop an array of activities to conduct active learning, such as incorporating group discussions or class debate. Chinese students who are identified seekers have a different way of processing information. Therefore, different teaching strategies should be utilized with those who prefer to acquire information by themselves from reading materials. Educators could provide information from different perspectives that can appeal to seekers’ motivation to investigate new information from different points of view to generate arguments. For example, in an agricultural context, educators should provide seekers information about differing viewpoints as they related to controversial agricultural issues (e.g., biotechnology concepts, the role of genetically modified organisms) to improve seekers’ critical thinking.

The internationalization in higher education nurtures cultural diversity, which requires students to have broader cultural knowledge (Pandit, 2007). Lamm and Irani (2001) stated that both critical thinking styles are important in order to enhance critical thinking skills. Each student, to some degree, should possess multiple cognitive thinking styles to adapt to increasing globalization. For this reason, developing different programs and activities to cultivate both types of critical thinking styles should be encouraged in the context of agricultural education. For instance, to help engagers seek broader information and integrate multiple perspectives, educators should demonstrate the process of seeking comprehensive information from different perspectives. It is important to encourage engagers to be attuned to their biases and to explore all angles of a subject. On the other hand, if students are seekers, educators should help them develop their engagement style. For instance, creating opportunities for seekers to interact with others, such as opening group discussion or class debate, would be effective teaching strategies to encourage seekers’ classroom engagement.

As teaching critical thinking is a long-term educational goal for educators around the world, educators should continue to apply different teaching strategies to cultivate students’ critical thinking skills. This is especially important for international students who are educated in a culture where critical thinking is barely encouraged or even discouraged. In order to gain in-depth information about critical thinking from international Chinese students’ perspectives, qualitative research should be conducted to explore how to help them think critically. For example, researchers could interview Chinese international students about how they view critical
thinking in different cultures as well as their educational experiences with critical thinking development during studying abroad.

The Chinese students in this study were recruited from China instead of the U.S. There are a few implications for this. First, it is important to investigate Chinese students’ critical thinking style before they are exposed to other cultures. Research indicates that insufficient awareness of the U.S. culture and a lack of knowledge regarding the U.S. educational system result in academic difficulties for Chinese international students studying in U.S. (Wu, et al. 2015). This study suggests that the educational institutions in China should be aware of improving cultural knowledge and perspectives to better prepare their students for adapting to the U.S. academic environment. Secondly, international student recruitment has been a high priority for many educational institutions because of the financial benefits (Chue & Nie, 2016). According to Association of International Educator (NAFSA) (2019), international students contributed $39 billion to the U.S. economy during the 2017-2018 academic year. However, some international students reported that they do not experience the same benefits as their domestic peers, which raises questions for attracting more international students studying in U.S. (Kim et al., 2017). Because the largest group of international students studying in the U.S. are Chinese, this study encourages future research be conducted to investigate the influences of culture on Chinese students’ cognitive style. The goal should be to develop a cultural bridge to connect educational programs with diverse thinking or learning styles to improve Chinese international students’ educational experiences (Moon et al., 2020).

This study has several limitations. First, this study used a convenience sample to explore the differences between U.S. and Chinese agricultural students, and they were recruited from only one university in each country. Thus, these findings cannot be generalized to the population. Future studies should use a larger sample from multiple universities to generalize the results. Second, this study only investigated two constructs associated with critical thinking—engaging and seeking information. Critical thinking is a complex and multi-dimensional concept involving a set of cognitive skills (Ennis, 1991; Facione, 1990). Future studies should include other thinking styles to provide a comprehensive understanding of cultural differences. Third, the cultural differences in this study were measured by the country of origin. It would be ideal to include other cultural dimension values to further analyze the relationship between culture and critical thinking styles.

Despite the limitations of this study, the results indicate that the critical thinking styles between U.S. and Chinese agricultural students are different, and those differences may be explained by cultural backgrounds. This study suggests that future international educational interventions aiming to improve critical thinking should be developed based on that population of international students’ critical thinking style. Specifically, discovering the critical thinking style within the context of Chinese culture could facilitate Chinese international students’ cross-cultural acculturation process. Providing educational programs by including Chinese international students could be a critical source of synergy beneficial for international agricultural development.

**References**


Transformative Learning in Nicaragua: A Retrospective Analysis of University Agriculture Students’ Long-Term Changes in Perspective After a Study Abroad Course

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Richie Roberts
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Abstract
Study abroad courses have become a priority for institutions of higher education because of a need to broaden students’ perspectives of the world. However, a dearth of knowledge existed regarding whether the reported outcomes of study abroad courses, such changes to students’ perspectives, endure over time. In response, this retrospective study explored how university agriculture students’ (n = 5) shared experiences during a one-week study abroad course to Nicaragua influenced their long-term changes in perspective after returning to the U.S. in 2018. Through our phenomenological analysis, three themes emerged: (1) dichotomous learning outcomes, (2) recognition of power and privilege, and (3) advocacy for global experiences. In the first theme, dichotomous learning outcomes, participants’ long-term changes in perspective appeared to vary based on their level of academic maturity. Meanwhile, in the second theme, as university agriculture students compared their lived experiences in Nicaragua to their existing assumptions of the U.S., it appeared to elicit powerful shifts concerning how they viewed the world. And, as a result, they reported their experiences prompted them to consider the implications of social inequities more deeply. In the final theme, participants reported that after returning home, they began to advocate for global experiences among their peers, family, and friends. Consequently, our findings supported the use of short-term study abroad courses to foster a positive transformation in students’ global perspectives and behaviors after returning to the U.S.

Keywords: agricultural education, study abroad, phenomenology, retrospective long-term change
Introduction

A shift has occurred in recent decades by which the world has become more globally interconnected. Institutions of higher education have responded by championing study abroad courses as a way to help graduates become more culturally, professionally, and socially prepared to navigate this new reality that is fraught with increasingly complex problems (Blake-Campbell, 2014; Boli & Petrova, 2008; McCabe, 2001; Ogden, 2007; Reilly & Senders, 2009). The Forum of Education Abroad (2011) defined study abroad as “…an education abroad enrollment option designed to result in academic credit” (para. 1). When designing study abroad courses, a number of approaches must be evaluated to determine their relative strengths and weaknesses before making critical decisions on the curriculum, duration, and format type (McCabe, 2001). Examples of study abroad approaches include (a) faculty-led courses, (b) international service-learning, (c) language-focused programs, (d) student exchange programs, and (e) others. However, faculty-led study abroad courses remain the most popular option. Schlarb (2019) defined these experiences as:

…faculty-designed and delivered study abroad courses for which students earn credit. In the context studied, they are typically of shorter duration than traditional, semester-long study abroad programs, taking place over the course of one to six weeks. In these courses, faculty guide students as they study specific course content, undertake field research, or participate in applied learning practicums or internships. (p. 8)

In 2020, the COVID-19 pandemic created a massive shift in the global landscape. However, in the three years leading up to the pandemic, study abroad course offerings had increased by more than 2.3% (Institute of International Education (IIE), 2020). A number of researchers credit the rise in international experiences to students’ interest and willingness to participate in short-term study abroad experiences (Donnelly-Smith, 2009; Mapp, 2012; Tarrant & Lyons, 2012; Wang et al., 2011). It should also be noted, however, that institutions of higher education have used short-term study abroad courses to respond to employers who report they value employees who have previously participated in an international experience (Stroud, 2010). Such trends have given rise to international experiences that last two weeks or less, which are more cost effective for students and, therefore, more assessable (Donnelly-Smith, 2009).

Because of the lower cost and convenience of short-term study abroad courses, students from more diverse socioeconomic backgrounds and other demographic minorities have a greater opportunity to participate (Tucker et al., 2011). Consequently, more university graduates are now entering the workforce with a deeper understanding of empathy, geopolitics, food insecurity, sustainability, and water scarcity (Hartman & Kiely, 2014). The broader literature on study abroad has also identified several additional benefits for students such as improved: (a) capacity for global citizenship, (b) intercultural tolerance and competence, (c) career exploration and professional advancement, (d) personal and emotional growth, and (e) self-identity (Reilly & Senders, 2009; Schlarb, 2019; Taylor & Rivera, 2011). As a result, short-term study abroad courses have emerged as a critical approach to fostering university students’ personal and professional development and have become central to the university experience (Blake-Campbell, 2014; Seifen et al., 2019), especially for colleges of agriculture.

As an illustration, colleges of agriculture have been tasked with producing graduates prepared to navigate complexities involving food, fiber, and natural resources than span borders across the globe (Alston et al., 2019, 2020). Therefore, graduates should be culturally competent and equipped with the ability to address complex problems (Lewis & Gibson, 2008; National Association of State and Land-Grant Colleges [NASULGC], 2004). So far, evidence on study
abroad courses in agriculture has documented the motivations and barriers of university agriculture students’ participation (Raczkoski et al., 2018; Roberts et al., 2020b, 2020c). On this point, Raczkoski et al. (2018) reported that university agriculture students were largely intrinsically motivated to participate in study abroad courses; however, the perceived cost of the experience and its relative value also influenced their decisions. In response, Roberts et al. (2020a) created a profile of agriculture majors’ motivations to participate in a study abroad course that included students that were: (1) goal-oriented, (2) social-oriented, and (3) learning-oriented. As a result, faculty and other decision-makers now have a better understanding of how to design and deliver study abroad courses to support university agriculture students underlying motivations (Roberts et al., 2020a).

The literature in agriculture has also explored the short-term impacts and best practices of study abroad courses (Bunch et al., 2018; Conner et al., 2019; Conner & Roberts, 2015; Dobbins et al., 2019, 2020; Lamm et al., 2011; O’Malley et al., 2019; Roberts & Edwards, 2016, Roberts et al., 2020a, 2020b; Rodriguez & Roberts, 2011). During short-term study abroad courses, existing evidence has demonstrated that students can began to reexamine their lifestyle, beliefs, attitudes, and behaviors (Dobbins et al., 2019, 2020; O’Malley et al., 2019; Roberts & Edwards, 2016, Roberts et al., 2020a). Despite this progress, the value and validity of short-term study abroad courses have consistently been called into question (Tarrant & Lyons, 2012). Common critiques of short-term experiences include: (a) a lack of immersion into the local culture, (b) little exposure to customs and traditions of the host country, and (c) only marginal understandings of complex issues and problems such as gendered norms, racial bias, and other dynamics of power (Vanden Berg & Schwander, 2019). As a consequence, a need emerged to better understand whether the reported outcomes, such as changes to students’ perspectives, of study abroad courses endure over time.

**Theoretical Framework**

Mezirow’s (1991, 2000) transformational learning theory (TLT) served as the theoretical lens used to interpret this study’s findings. TLT describes how individuals ascribe meaning to their lived experiences, which has been theorized to influence important changes in perspective on issues and topics (Clark, 1993; Kiely, 2004, 2005). Or, as Perry et al. (2012) explained: “fundamentally, TLT is concerned with not only the experience a learner has, but how they interpret and explain what happens” (p. 691). Mezirow (1991) advocated for the use of TLT to interpret how individuals construct meaning after exposure to a disorienting experience that provokes them to call into question their underlying beliefs and values – a notion called dissonance. Mezirow (2000) conjectured that exposure to and the meaning derived from dissonance could lead to an individual’s perspective being altered. As such, Mezirow (1991, 2000) called for individuals to reflect on their lived experiences critically; a practice that has been shown to initiate a powerful process by which transformational learning occurs (Mezirow, 1991). Because of the learner-centered nature of Mezirow’s (1991, 2000) theory, transformational learning has become central to interpreting the experiences of students abroad.

Previous evidence has demonstrated the transformative potential of study abroad courses in agriculture (Dobbins et al., 2019; Hainline et al., 2018; O’Malley et al., 2019; Roberts & Edwards, 2016; Roberts et al., 2020a). However, the outcomes of such transformations appear to have ranged considerably in the literature. In response, O’Malley et al. (2019) reported that to foster transformative learning, experiences abroad should be designed to introduce university agriculture students to dissonance that allows them to critically reflect and derive meaning. For
instance, during a study abroad course to Nicaragua, students encountered four forms of dissonance – environmental, sociocultural, intellectual, and personal – that influenced the transformation in perspectives that students endured (O’Malley et al., 2019). However, in a comparison of the dissonance experienced by agriculture majors during international experiences to Costa Rica and Thailand, Pigg et al. (2020) argued the dissonance students encountered appeared to be influenced by the context and duration of their study abroad course, which provided deeper insight into why students may experience variant shifts in perspectives in literature. Although some previous work (Roberts & Edwards, 2015, 2016) has explored whether these transformations are integrated into students’ lives after returning home, more knowledge is needed to distill the long-term outcomes of study abroad courses. As such, data from this study served as a follow-up to an investigation on students’ experiences during a study abroad course to Nicaragua to document how such resulted in long-term shifts in how they approached their daily lives (O’Malley et al., 2019).

**Purpose, Research Question, and Significance of the Study**

The purpose of this retrospective study was to explore how university agriculture students’ shared experiences during a one-week study abroad course to Nicaragua influenced their long-term changes in perspective after returning to the U.S. in 2018. Because of this investigation’s emphasis on students’ long-term outcomes, findings could be used to inform study abroad programming and better prepare agriculture majors to thrive in the global workforce (Harder et al., 2015). One research question guided the investigation: What was the essence of university agriculture students’ lived experiences regarding their long-term perspective changes after a study abroad course to Nicaragua in 2018?

**Background and Setting**

In spring 2018, nine agriculture majors from Louisiana State University participated in a one-week study abroad course to Nicaragua. The participants had the unique opportunity to visit and experience various agricultural industry sites including a national coffee producer and Starbuck’s Coffee exporter, cattle ranch, rice farm, and tobacco producer. Students also participated in many different recreational and cultural excursions during the course to develop a more holistic perspective of Nicaragua and its culture. Until civil unrest in 2018, Nicaragua had experienced rapid growth of its tourism sector, as alternative forms of tourism, like eco-tourism, emerged (Aldrich, 2016). Unfortunately, the country has still not completely recovered from these events (The Economic Times, 2018; Martin, 2018). As a result, all study abroad programming was stopped at Louisiana State University to Nicaragua.

It is also important to note that the culture and economy of Nicaragua relies heavily on the agricultural industry. For example, agriculture plays such a vital role in Nicaragua that 31% of the country’s population is employed by the agricultural industry and up to 90% of the country’s rural population relies on agriculture as its primary means of securing a livelihood (U.N. Development Programme, 2020; U.N. World Food Programme, 2020). Further, more than 70% of its population is actively engaged in subsistence agriculture, reflecting the importance of agricultural knowledge among even the most impoverished citizens. As a result, this context provided an optimal setting for university agriculture students to experience dissonance and ultimately, transformational learning (O’Malley et al., 2019). Therefore, the unique context and design of the study abroad experience greatly influenced the design of this investigation.
Methodology

We grounded this study, methodologically, in Moustakas’ (1994) phenomenological approach. Phenomenological research focuses on understanding the lived experiences of individuals and meaning regarding “…a phenomenon (or topic or concept) for several individuals” (Creswell & Poth, 2018, p. 314). Fundamental to phenomenological research is the distillation of the essence, or the central meaning of individuals’ experience (Moustakas, 1994). As such, phenomenological research is fitting to explore “affective, emotional, and often intense human experiences” (Merriam, 2009, p. 26). To achieve this, Moustakas (1994) advocated for four distinct phases to facilitate phenomenological research: (a) epoché, (b) phenomenological reduction, (c) imaginative variation, and (d) a synthesis of composite textural and composite structural descriptions. Before offering our description of how we upheld each phase, it is critical to address the biases and experiences that influenced this investigation.

Researcher Reflexivity

To accurately represent the study’s findings, it is important to acknowledge how our previous experiences and worldviews may have influenced our interpretation of the data. First, we perceive it is important to disclose that each researcher in this study has advocated for study abroad courses as a valuable complement to students’ higher educational experience. Each author has also previously conducted research on the impact of study aboard courses. Two of the researchers were also in attendance during the study abroad course to Nicaragua in 2018. Further, the first two authors are graduate students, and the other two researchers are faculty members at Louisiana State University. Therefore, some members of the research team have had relationships with the participants in this study for several years. We also perceive it is important to reveal that we approached this investigation using a constructionism epistemological lens and interpretivist theoretical perspective (Crotty, 1998). We believe that such factors may have influenced our interpretation of data. To reduce the influence of our preconceptions, we bracketed our experiences during analysis (Moustakas, 1994).

Participant Selection

Polkinghorne (1989) argued phenomenological research should have a minimum of five participants. Therefore, we purposefully (Creswell & Poth, 2018) selected five (n = 5) university agriculture students who participated in a study abroad course to Nicaragua in 2018. Previous data was collected and published from this cohort (see O’Malley et al., 2019). As such, the collection of additional data provided a more granular depiction of participants’ outcomes. Of the five participants, four were female and one male. At the time of data collection, which was two years after the study abroad course, four of the participants were still enrolled at Louisiana State University and pursuing a bachelor’s degree in agriculture, and the other participant had graduated. To maintain confidentiality, we assigned each participant a pseudonym.

Data Collection

Because of the COVID-19 global pandemic, face-to-face interviews were not possible. Therefore, after IRB approval, we used an online video conferencing software, Zoom, to facilitate interviews. Two different researchers conducted interviews using the same semi-structured interview protocol. Example questions from the interview protocol included: How has the experience in Nicaragua shaped your life since you have returned? and Because of your experience in Nicaragua, what have you told (or would you tell) others who are considering traveling to Nicaragua, Latin America, or another developing country? During the collection of the data, we captured detailed fieldnotes regarding the setting, atmosphere, and overall emotions the participants expressed. These fieldnotes were mobilized as an additional source of data.
also used data from the previous investigation that included student video reflections as well as observational analysis to triangulate findings (Creswell & Poth, 2018). All data sources were transcribed verbatim for analysis.

Data Analysis

To analyze each source of data, we employed Moustakas’ (1994) phenomenological approach. In the first phase, epoché, we employed bracketing to set aside any preconceived notions, assumptions, and experiences that may influence our interpretation (Moustakas, 1994). However, we recognize that to be bias-free was not possible. Next, we identified significant statements through the use of an open-coding approach (Moustakas, 1994). The identification of significant statements allowed us to create categories of the open codes, a concept known as horizontalization in phenomenological research (Moustakas, 1994). During this phase, the researchers met as a team to negotiate horizons and reduce the data through the phenomenological reduction phase (Moustakas, 1994). After data was reduced, we entered the imaginative variation phase by which we viewed the data from the different lenses, which helped emerge Mezirow’s (1991, 2000) TLT as the most appropriate lens to ground our findings. As a result, we were able to explain what and how university agriculture students experienced regarding long-term changes to their perspective after a study abroad course to Nicaragua through a synthesis of textural and structural descriptions. The product of this process was described through three themes (Moustakas, 1994).

Qualitative Quality

To uphold qualitative quality, we employed Tracy’s (2010) criteria for excellent qualitative research. According to Tracy (2010), rigorous qualitative research should uphold eight criteria: (1) worthy topic, (2) rich rigor, (3) sincerity, (4) credibility, (5) resonance, (6) significant contribution, (7) ethics, and (8) meaningful coherence. For example, because of the large number of study abroad courses at institutions of higher education in the U.S., distilling the long-term outcomes of students could provide value to administrators, designers, and facilitators moving forward. Additionally, providing a deeper look into the long-term impacts of study abroad courses could allow researchers to better understand how to market such experiences to university agriculture students in the future. To uphold Tracy’s (2010) standards, we chose a topic that was interesting, relevant, significant, sincere, and, timely. Then, to ensure a rigorous and credible investigation, we implemented procedures uniformly as we conceptualized, collected, and analyzed data. We also used multiple sources of data to establish Tracy’s (2010) notion of “rich complexity of abundance” (p. 841). In particular, we upheld credibility by analyzing the phenomenon from diverse perspective and lenses using Moustakas’ (1994) imaginative variation approach. Regarding resonance, Tracy described such as a “researchers’ ability to meaningfully reverberate and affect an audience” (p. 844). To accomplish this, we provided a poignant interpretation of this phenomenon. We should also note that this investigation was conducted with an emphasis on procedural, situational, and relational ethical considerations for each participant. Case in point, all the data collected, including interview audio files, interview transcripts, and fieldnotes, were kept confidential from any individuals outside the research team. Finally, to ensure coherence, we meaningfully interconnected the literature with the findings of this investigation, which are presented next.

Results

Through our synthesis of the study’s textural-structural descriptions, three themes emerged: (1) dichotomous learning outcomes, (2) recognition of power and privilege, and (3)
advocacy for global experiences. When viewed through the lens of TLT, the themes highlight the long-term changes in perspective that university agriculture students at Louisiana State University experienced after a study abroad course to Nicaragua in Spring 2018 (Mezirow, 2000). Each theme forms the basis of the essence of the phenomenon, i.e., although the students’ experienced dichotomous learning outcomes, their recognition of power and privilege fomented a change in perspective by which they began to advocate for international experiences for others. Descriptions of the three emergent themes, with supporting evidence, are provided in Table 1. Then, a narrative of each theme follows.

Table 1
A Description of the Emerging Themes Identified in this Study

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichotomous Learning Outcomes</td>
<td>Participants’ outcomes varied based on their level of academic maturity.</td>
<td>Self-examination resulted in “regret” or “disinterest” because of a lack of prior cultural exposure.</td>
</tr>
<tr>
<td>Recognition of Power and Privilege</td>
<td>Comparisons between power and privilege in U.S. &amp; Nicaragua.</td>
<td>Participants felt both “guilty,” “grateful,” “frustrated,” and “upset” when comparing experiences in Nicaragua to their own lives.</td>
</tr>
<tr>
<td>Advocacy for Global Experiences</td>
<td>Championing for global experiences and study abroad course to others.</td>
<td>Students felt “inspired,” “invigorated,” and significant “wanderlust” following the program, resulting in many opportunities for advocacy.</td>
</tr>
</tbody>
</table>

Theme 1: Dichotomous Learning Outcomes

Through our analysis of data, it became apparent that participants’ learning outcomes seemed to vary based on their level of academic maturity. For instance, students who were underclassmen during the study abroad course often recounted events with less emotional impact than upper-level students. Further, students that had less global experience and little prior exposure to international agriculture often maintained that although the course was worthwhile and helped them build relationships with peers and faculty, the experiences were either outside of their academic scope or did not support their career interests. To demonstrate, Anna offered insight into the dichotomous nature of the outcomes she experienced in Nicaragua. She explained: “I think being a freshman, it kind of negatively impacted me during the trip because I didn’t know what I was even wanting to do at that point.” She continued: “So, I went in very open-minded not knowing what to expect, but also with Nicaragua, being a freshman, the positive thing is that you can adjust more quickly.” April echoed these sentiments when she revealed the course did “…not necessarily [make an impact]…as far as stuff that I want to do for a career.” Similarly, after reflecting upon her time in Nicaragua, Taylor stated:

It was kind of hard [to process] because it was my first time ever being somewhere internationally and getting all these experiences, it was kind of overwhelming at some points, but you learn to kind of just go with it and not to stress yourself out about it. But I
think at night when I finally laid down for the day is when I fully kind of just like started to process things that I didn't know had as big an impact as they did have on me... I wish I could have built more relationships. I think it was such a new concept to me… it was my first trip ever as an 18-year-old.

On the other hand, upperclassmen and students who had more international experience had a different perspective on their outcomes from the study abroad course. Take the case of Beth, who when probed about the long-term outcomes she had experienced in Nicaragua, responded:

Yes, they did, in a very broad sense too because they connected to my undergrad, because of the science [focus] ... but then they also connected to the education part of [my current major] to because… I think it’s good for everyone, especially educators, to be exposed to things that are different, to people that are different, and then just kind of forcing you to think outside of the box, if that makes sense. Even if it wasn't directly pertaining to what I was studying in the [United] States, I think all of it is very transferrable.

Morgan reinforced this idea, adding: “We learned stuff that was parallel to what I was learning, and even stuff that I'm still learning... it’s like, ‘Oh, I remember them talking about that there.’ I feel like it really helped me becom...e more well-rounded...” As a consequence, it appeared that university agriculture students’ academic maturity level appeared to influence the intensity at which they experienced transformative long-term outcomes. Despite the dichotomous learning outcomes experienced by students, all participants recalled that recognizing power and privilege on their trip led to important changes in their perspectives.

**Theme 2: Recognition of Power and Privilege**

When students arrived in Nicaragua, they were confronted with gender inequality, political corruption, and disparities regarding power and privilege. Comparisons between their lived experiences in Nicaragua and their existing assumptions of the U.S. appeared to elicit powerful shifts concerning how they viewed the world. In particular, participants reported their experiences prompted them to consider more deeply the implications of social inequity. For example, participants had vivid memories of the dissonance they experienced in this regard. Beth explained: “…I didn't realize before just how far back they are as far as women’s rights and things. Sexism is rampant. I mean, I know that that stuff is everywhere, but I didn't realize how deeply ingrained it is.” She then added, “It's not like it was outwardly aggressive, but you felt it.” Meanwhile, Anna recalled how her experiences in Nicaragua opened her eyes to power imbalances, especially in regard to how power differentials were profoundly entrenched and upheld. She shared: “So I feel like to fight against those really traditional values is very difficult and very tough, especially when they don't... really have a government that does as much to try to listen to the people as we do.” The lived experiences of participants also appeared to reorient aspects of their lives. For instance, after witnessing the poor living conditions in Nicaragua, Taylor recounted how the experience ignited a passion to advocate for others:

Getting to see it firsthand, it was hard because here, I mean, we see of course homeless people on the street, but we don't see families really living like that. And it's not just in one central area, it's everywhere. It really changed how I view different countries… So, we were all in tears, just really sitting back and realizing what we have…these people are living on dirt floors in tin houses. And I still, to this day, think about that moment over and over again. Getting to see the differences between how good we have it here in America and, like, how they're sometimes forced to live [in Nicaragua]. I have a higher
respect for those people than I did before. And so that comes with, I'm more likely to help a lot more now.

The impact of the study abroad course was also evident as participants articulated how their perspectives had transformed because of the time in Nicaragua. Morgan explained that his interactions with locals stirred a reexamination of his privilege. He reflected: “…I felt like a rich, white boy…that's what I meant by a perspective change. I really have looked at life so differently after that trip. Just to be grateful for everything…there's so much that we take for granted…” Such realizations appeared to serve as a basis for important changes in perspectives for participants in this investigation. Or, as Morgan explained: “Really afterwards, I just took a major step back and start[ed] to look at my life a little bit differently… [I] realized how privileged we really are and just to not take what we have for granted. That was a really huge [aha] moment for me.”

Theme 3: Advocacy for Global Experiences

After having their eyes opened to the realities of power and privilege in Nicaragua, participants reported they began to advocate for global experiences among their peers, international students, family, and friends after returning to the U.S. This commitment to advocacy appeared to take on an array of forms. For example, some participants became heavily involved with campus organizations that formally advocated for study abroad courses and welcoming foreign exchange students. On this point, Morgan shared: “I actually worked with the Global [Agriculture] Ambassadors at Louisiana State University. [We] help a bunch of visiting scholars... and bring them to Walmart and helped them move in their apartment.” Similarly, Taylor reiterated this sentiment: “When we have visiting scholars on campus, I give up my time and go help them to make sure they feel welcomed… I want to make sure they have a good experience, just like I did.”

Meanwhile, other participants enrolled in additional study abroad courses after they returned from Nicaragua. Taylor explained: “So when I got back, I immediately realized I wanted to do a trip like that again. And so, my sophomore year I went to Cuba...” April also participated in additional international experiences, she recalled: “Since coming back from Nicaragua, I’ve gone on another study abroad to Mexico this past January, and I was supposed to be going to Africa this summer, but it’s obviously not happening [because of the COVID-19 global pandemic].” When asked if they had participated in other study abroad opportunities, Beth responded: “Yes. The year after I went to Nicaragua… I went [to] Costa Rica… I have a lot of wanderlust right now. But I also reflect on a lot of the emotional things that I [experienced] whenever I was there.” All participants in this investigation also reported they advocated for study abroad courses to promote enhanced global thinking and understanding among their family and friends. For example, when discussing if she promoted study abroad courses to others, April affirmed: “So, definitely, anybody who has the chance to go on a study abroad, I say 100% do it.” “Yes, absolutely,” agreed Beth. Morgan also added: “They need to go. Really… I think that the younger, the better. The sooner that you get your eyes opened to something like this, the better. It’s life changing. It really is.” As a result of the participants’ lived experiences in Nicaragua, they began to advocate for global experiences in diverse and meaningful ways.

Conclusions

This study explored how university agriculture students’ shared experiences during a study abroad course to Nicaragua influenced their long-term changes in perspective. As a result
of our phenomenological analysis, three themes emerged. We conclude that each theme helped describe the complexity of the phenomenon’s essence, which was that although the students experienced dichotomous learning outcomes, their recognition of power and privilege fomented a change in perspective that encouraged them to advocate for global experiences (see Figure 1).

**Figure 1**
The Essence of the Phenomenon

![Diagram of thematic relationships]

Although the participants described experiences as positive overall, in the first theme, we demonstrated that long-term outcomes achieved as a result of the study abroad course appeared to vary based on students’ level of academic maturity. For example, students who were underclassmen reported their outcomes with less emotional impact than upper-level students – a finding supported by Wielkiewicz and Turkoski (2010). We also concluded that students who were underclassmen during the course maintained their experience in Nicaragua did not necessarily align with their career aspirations or support their learning in regard to their academic major. However, upperclassmen and students with more global exposure indicated the study abroad course helped them prepare for advanced studies and their future careers. Harder et al. (2015) reported that study abroad course could help increase the employability of students from a job recruiters’ perspectives; however, our finding adds new dimensions to the knowledge base by demonstrating that students’ academic maturity may influence the intensity of outcomes they achieve concerning intellectual growth and career preparation.

Despite the dichotomous nature of students’ learning outcomes, all participants noted that when they reflected on issues of power and privilege in Nicaragua, a powerful shift in perspective occurred. We conclude that students’ lived experiences during the study abroad trip exposed them to forms of high-intensity dissonance that made them more deeply ponder the implications of social inequities in the world. Although previous literature (O’Malley et al., 2019, Pigg et al. 2020) has reported that university agriculture students experienced some short-term shifts in perspective in this regard, scant evidence exists in the literature on agriculture
concerning the long-term transformations that students endure after returning to their daily lives in the U.S. The final theme, advocacy for global experiences, addressed how participants began to incorporate new beliefs and worldviews in their daily lives because of their changes in perspective. In particular, students joined globally focused student organizations, engaged in additional study abroad courses, and encouraged family, friends, and peers to open their eyes to the realities of the lived experiences of individuals that live in different cultures. Such a notion does not appear to have been explicitly explored in the literature on agriculture.

**Discussion, Implications, and Recommendations**

Study abroad courses involve complex partnerships among faculty, students, and the host country. These educational experiences are often more complex, demanding, and time-consuming than other pedagogical approaches (Reilly & Senders, 2009; Schlarb, 2019; Taylor & Rivera, 2011). Nevertheless, mounting evidence has demonstrated the transformative potential of short-term study abroad courses for university agriculture students (Dobbins et al., 2019, 2020; O’Malley et al., 2019; Roberts & Edwards, 2016; Roberts et al., 2020a). The current investigation added to the knowledge base by examining the long-term outcomes that students experienced after returning to the U.S. As a result, this study held critical implications for research, theory, and practice.

First, because students in this investigation experienced dichotomous learning outcomes, future research should focus on how students’ academic maturity may influence their long-term impacts. We also recommend that faculty and other practitioners of study abroad address such differences prior to departure and plan how to navigate these complexities during the course. For the study abroad course under investigation, students were required to participate in pre-departure seminars by which they learned about programming details, cultural differences, and other relevant information. Moving forward, we recommend that greater effort should be made for students to consider individual academic and career connections before departure (O’Malley et al., 2019). We also recommend that faculty develop assignments that require students to purposefully create connections between their academic major and their experiences abroad. In this investigation, the recognition of power and privilege played a critical role in fostering transformative learning for university agriculture students. We recommend that faculty make existing cultural systems, ideologies, and structures of power visible for students during study abroad courses. Such phenomena appeared to help students make sense of the differences between Nicaragua and Louisiana in the current study (O’Malley et al., 2019; Pigg et al., 2020). Perhaps to make these power dynamics more accessible for students, faculty could embed approaches that seek to illuminate norms and traditions that are often less tangible and difficult for students to grasp (Hartman & Kiely, 2014). As such, we recommend that visual methodologies be incorporated into study abroad courses so that students can capture issues and problems they may struggle to assign meaning to during the experience (Dobbins et al., 2019, 2020; Roberts et al., 2020b). Then, through individual and social reflection of powerful images, the students can more deeply ponder the lived experiences of individuals who lack power in different social systems and begin to gain a greater sense of empathy (O’Malley et al., 2019). Through this shared vision and reflection, students could also serve as a conduit into marginalized spaces by uplifting the voices of the oppressed and advocating for transformative experiences for others (Kiely, 2004, 2005; Roberts & Edwards, 2015).

On this point, the current investigation reported that students’ changes in perspective led them to advocate for global experiences for others. Going forward, more research is needed to
examine whether these behaviors are upheld as the participants move in different life phases, such as when they begin a career and family. We also recommend that administrators, faculty, and other decision-makers consider how to support and leverage students’ shifts toward a greater orientation to advocate for the acquisition of global knowledge after returning to the U.S. (Roberts & Edwards, 2016). For example, perhaps panel discussions could be facilitated for students who participated in study abroad courses to provide discussion and ideas about ways they can continue to engage globally. Finally, to better capitalize on the transformative potential of study abroad courses, we recommend that faculty assess students’ cultural and educational biases before, during, and after students’ experience. If a greater understanding of these factors is achieved, perhaps faculty could address misconceptions and better support students’ transformative learning as they integrate such into their daily lives (Tarrant & Lyons, 2012).

References


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