The *Journal of International Agricultural and Extension Education (JIAEE)* is the official refereed publication of the Association for International Agricultural and Extension Education (AIAEE). The purpose of the *JIAEE* is to enhance the research and knowledge base of agricultural and extension education from an international perspective. Acceptance rates for the past five volumes are: Volume 20 = 21%. Volume 21 = 13%. Volume 22 = 18%. Volume 23 = 12%. Volume 24 = 18%. Volume 25 = 9%. Volume 26 = 26%.

Articles intended for publication should focus on international agricultural education and/or international extension education. Articles should relate to current or emerging issues, cite appropriate literature, and develop implications for international agricultural and extension education. **Manuscripts, or portions of manuscripts, must not have been published or be under consideration for publication by another journal.**

For publication in the *JIAEE*, manuscripts must pass the *JIAEE*’s double blind, referee process, where peer reviewers evaluate manuscript content and ensure readability. Reviewers are selected from the AIAEE membership. In the double blind, referee process, all references to authors are removed before the manuscript is sent to reviewers. Articles may be submitted for peer review a total of **three times** before they are no longer acceptable for publication in the *JIAEE*. Failure to meet the submission formatting guidelines will result in an automatic first rejection.

Two different types of articles are solicited for the *JIAEE*: Feature Articles and Research Notes.

**Feature Article**
A Feature Article should focus on philosophy, current or emerging issues, and the methodology and practical application of specific research and appropriate technologies, which have implications for developed and developing countries. Conceptual/Theoretical and Methodological manuscripts are also encouraged as submission for feature articles. If applicable, a feature article should report the findings from a fully investigated study. Feature articles are **no longer than 20 double-spaced pages, excluding references.**

**Research Note**
A Research Note is a concise but complete description of a limited investigation that will not be included in a later manuscript. It serves one of the following purposes: (1) presents initial proof-of-concept results on new ideas or program evaluations, timely issues, or innovative approaches; (2) reports replications or extensions of previously published research that does not merit another full-length manuscript yet provides results that contribute to a greater understanding of the phenomena under study. Research Notes are **no longer than 10 double-spaced pages, excluding references.**
Editorial Board and Leadership Team .............................................................................. 4

From the Executive Editor .................................................................................................. 6

Feature Articles
Identifying Factors to Increase the Adoption of Integrated Pest Management Practices: An Audience Segmentation Study ................................................................. 7
  John M. Diaz, University of Florida
  Laura A. Warner, University of Florida
  Faith M. Oi, University of Florida

Scale Development and Validation: Methodology and Recommendations ............... 24
  Kevan W. Lamm, University of Georgia
  Alexa J. Lamm, University of Georgia
  Don Edgar, University of Georgia

Understanding the Context for Agricultural Technical, Vocational, Education and Training in Haiti ......................................................................................................................... 36
  M. Christelle Calixte, University of Florida
  T. Grady Roberts, University of Florida
  J. C. Bunch, University of Florida

Communication of Genetic Modification Science: Consumer’s Critical Thinking Style, Perceived Transparency of Information and Attitude ................................................. 49
  Yu-Lun Wu, The Ohio State University
  Joy N. Rumble, The Ohio State University
  Alexa J. Lamm, University of Georgia
  Jason D. Ellis, Kansas State University

Improving Livelihoods through Youth-Adult Partnerships Involving School-Based Agripreneurship Projects: The Experiences of Adult Partners in Uganda ......................... 62
  Stephen C. Mukembo, University of Missouri Extension
  M. Craig Edwards, Oklahoma State University

The Relationship of Global Exposure and Intercultural Effectiveness among Secondary Youth ................................................................................................................................. 77
  Stacy Vincent, University of Kentucky
  Courtney Turley, University of Kentucky
  Ashley L. Austin, Canton-Galva High School

Identifying Capacities an Extension Network May Need to Effectively Support the Professionalization of Extension Providers ................................................................. 91
  Kevan W. Lamm, University of Georgia
  Alexa J. Lamm, University of Georgia
  Kristin Davis, International Food Policy Research Institute
  B. Jyothi Swaroop, University of Florida
  Leslie D. Edgar, University of Georgia
Intention Level of Farmers to Use Information Communication Technologies for Agricultural Risk Management in Malaysia ................................................................. 108

Muhammad Ali, PMAS-Arid Agriculture University Rawalpindi
Norsida Man, Universiti Putra Malaysia
Farrah Melissa Muharam, Universiti Putra Malaysia

Manuscript Submission Guidelines........................................................................................................ 118
Editorial Board

The editorial board consists of the editors, the past editor and other members representing regions of the world.

Editors

Dr. Alexa Lamm, Executive Editor
University of Georgia
132 Four Towers
Athens, GA 30602
United States of America

Dr. Todd Brashears, Managing Editor
Texas Tech University
Box 42131
Lubbock, TX 79409
United States of America

Dr. Kristina Hains, Past Editor
University of Kentucky
314 Garrigus Building
Lexington, KY 40546-0215
United States of America

Dr. Fallys Masambuka-Kenchewa,
Assistant Editor
University of Georgia
209 Four Towers
Athens, GA 30602
United States of America

Global Editorial Board Members

Dr. Kristin Davis
International Food Policy Research Institute
Editor, JAEE
South Africa

Dr. Bryan Hains
University of Kentucky
United States of America

Dr. Kim Dooley
Texas A&M University
United States of America

Dr. Assoumane Maiga
International Livestock Research Institute
Mali

Dr. Leslie Edgar
University of Georgia
United States of America

Dr. Sarahi Morales
Zamorano Pan-American Agricultural School
Honduras

Dr. Jason Ellis
Kansas State University
United States of America

Dr. Adam Rosenberg
Foreign Agricultural Service
United States of America

Dr. Anthisasios Gertsis
Perrotis College
Greece

Dr. Lisa Taylor
University of Nevada
United States of America
Association for International Agricultural and Extension Education Officers

Dr. Kristina Hains, President
University of Kentucky
U.S.A.

Dr. Ataharul Chowdhury, Secretary
University of Guelph
Ontario, Canada

Dr. Wayne Ganpat, Past President
Dean, Faculty of Food and Agriculture UWI
Trinidad, W.I.

Dr. Roger Hanagriff, Treasurer
Texas A&M University - Kingsville
Kingsville, TX, U.S.A.

Dr. M. Craig Edwards, President-Elect
Oklahoma State University
U.S.A.

Dr. Kristin Davis, Member-At-Large
International Food Policy Research Institute
Pretoria, South Africa

Danette Philpot
Graduate Student Representative
Texas A&M University
U.S.A.
From the Executive Editor

It is next to impossible to maintain a sense of calm in times of great uncertainty. The COVID-19 pandemic has no doubt led to one of the most uncertain times the world has faced. One of the ways I find solace within myself in this time of uncertainty is a knowledge of the deep connections extensionists across the world have within their local communities. Their ability to keep people informed and making good decisions based on sound science gives me hope. Stories of extensionists working diligently alongside those keeping food chains open, ensuring the physical and mental well-being of every global citizen, and advocating for continued research and outreach while caring for and protecting their own families are awe inspiring. I want to thank each of you, on behalf of the editorial team of the JIAEE, for your contributions at the local, regional, national and international level within which you work as you strive to share research-based information and help our communities stay informed amid this chaos.

Browse through the April 2020 issue of the JIAEE and you will notice a wide variety of research projects that encompass the totality of agricultural and extension education offering recommendations for how we improve and support educational practice in the field. Within this issue you will find an in-depth discussion of the need for collective professionalization across global and regional Extension networks. You will then find a complimentary study examining the role Technical, Vocational, Education and Training schools play in professionalizing agricultural and extension educators in Haiti. Another study highlights the importance of global exposure and its impact on the intercultural effectiveness of secondary youth, emphasizing the importance of intentionally exposing students to global perspectives when educating about agriculture. Finally, a study conducted in Uganda revealed how youth-adult partnerships utilized during an educational experience impacted not only youth, but their adult partners.

You will also find ways to best educate and communicate about critical agricultural issues with specific audiences within this issue. Contexts covered include the adoption of integrated pest management practices, communicating about genetic modification science as a possible solution to citrus greening, and agricultural risk management. For example, one study found Information Communication Technologies (ICTs) could be an effective way for extension officers to engage with farmers in Malaysia, further building on research conducted in the Caribbean shared in the previous issue of the JIAEE. Finally, you will find a methodological piece highlighting the importance of scale development and validation. The article offers researchers a way to effectively create and test scales to ensure the reliability and validity of international agricultural and extension education research.

The articles in this edition of the JIAEE remind me of our solidarity as a community of researchers striving to better agricultural and extension education practices, so we are prepared as extensionists when faced with times of crisis. I encourage you to read the articles cover-to-cover in this April 2020 edition of JIAEE and be at peace knowing we are all together in spirit despite our physical distance.

Sincerely,

Alexa J. Lamm, PhD
Executive Editor, Journal of International Agricultural and Extension Education

Identifying Factors to Increase the Adoption of Integrated Pest Management Practices: An Audience Segmentation Study

John M. Diaz  
Laura A. Warner  
Faith M. Oi  
University of Florida

Abstract
Tailoring programs based on audience needs and priorities is a critical component of effective programs. Audience segmentation research provides an opportunity to identify subgroups based on characteristics that affect their willingness to adopt a certain behavior and allows extension programs to fulfill a variety of needs and target the most important groups within a population. Currently there is minimal research exploring the factors that influence the sustained adoption of environmentally responsible pest management practices. As a result, the purpose of this study was to explore potential extension audience segmentation strategies by evaluating factors related to differences in residents’ intentions to use integrated pest management (IPM) practices. We used online surveys to collect data from a sample of 3,588 residents. We found relatively high intentions to adopt IPM practices but there remains room to increase adoption levels. Responses of undecided ranged from 14.7% to 23.1% across all pest management practices, which demonstrates the potential for an audience to be influenced to adopt an IPM approach. We also found that demographics, complementary conservation behaviors and engagement with the natural environment characterize meaningful subgroups to guide extension program design. Interestingly, we found an interrelationship between the intention and actual adoption of other environmentally responsible practices and the intention to adopt IPM practices. Respondents with greater intent to engage in IPM were also more engaged in general conservation, water conservation and fertilizer best practices. This demonstrates that previous engagement with other environmentally responsible practices may influence the adoption of IPM. Respondents with greater intent to engage in IPM also had less negative experiences with water quality and availability, implying the possible role negative consequences can play as teaching tools in extension programs.

Keywords: audience segmentation, pest management, practice adoption, integrated pest management, water quality, water quantity
Introduction

The complexity of today’s issues and their solutions challenge extension professionals on a global scale to develop the expertise and attitudes among various audiences to drive change. The intricacies of behavior change need to be incorporated into the educational strategies developed during program planning to produce greater outcomes with available resources (Taylor-Powell & Boyd, 2008), which starts with understanding the program’s audiences (Harder et al., 2009). Extension professionals who focus on environmental issues in any location need to understand the personal and social factors that influence an audience’s intention to adopt relevant behaviors and technologies (Gregory & Di Leo, 2003; Huang, Lamm, & Dukes, 2016).

The World Health Organization cites changes in ecology, climate and human behavior as factors that have increased the development of urban pests (Bonnefoy, Kampen, & Sweeney, 2008). The nexus of environment and human populations that has created this global issue requires careful examination to ensure communities are not superfluously exacerbating environmental issues, such as water quality, through pest management behaviors. Unfortunately, the common reaction to pests of public health, invasive species, and pests that can devastate landscaping is to do a broadcast application of a pesticide. The use of insecticides as the primary control method to manage insect populations has increased twenty fold since the 1960s (Atwood & Paisley-Jones, 2017). Residential consumers (i.e., home and garden) still account for more user expenditures of insecticides than agricultural, commercial, governmental and industrial users combined (Atwood & Paisley-Jones, 2017).

Landscape management, which includes pest management, is dominated by United States interests, with consumers annually spending approximately $52.3 billion USD for products and services (National Gardening Association, 2019). While pest management in other countries is largely focused on food safety and public health, the global landscaping and gardening services market projects an annual growth rate of 7.1% for the period of 2017-2026 (Business Wire, 2018). The extent of insecticide use coupled with improper use by untrained individuals draws concerns towards the degradation of water bodies. Extension is well positioned to educate homeowners on best practices and address limitations such as availability of water.

Integrated Pest Management (IPM) represents a decision-making process that offers a more effective, sustainable, and environmentally-conscious approach to controlling pest populations across the globe (Calibeo, Oi, & Oi, 2017; Cooper, Wang, & Singh, 2015; Kass et al., 2009; Wang & Bennett, 2009; Williams et al., 2005). IPM is a strategy that includes pest identification, surveillance, execution of chemical and non-chemical (i.e., communication, education, plant and turf health, excluding pests from building, and sanitation) tactics, and evaluation. While IPM has a long history of scientific success, there are consistent issues of increasing adoption by end-users in both agricultural and non-agricultural settings worldwide. One of the reasons for poor adoption may be that it is a process versus a single action such as applying a pesticide to manage pests.

The complexity of IPM coupled with the diversity of extension audiences represents a significant challenge to delivering an effective program (McDowell, 2004). According to Andreasen (2006) and Newton et al. (2013), programs that ignore the inherent variability of a potential audience and use a standard, singular approach are generally ineffective. Tailoring programs based on audience needs, priorities and lifestyles is a critical component of effective programs (McDowell, 2004; McKenzie-Mohr, 2011; Raison, 2010). Extension professionals are encouraged to conduct extensive formative audience research to identify an audience’s values and perceived barriers to change (Lee & Kotler, 2011).
While there are extension professionals working in the area of landscape conservation, there is not literature that identifies prevailing psychosocial elements that guide adoption of effective pest management practices. It is critical to understand how education may be used to influence adoption because the emergence and re-emergence of public pests is predicted to only increase. This study represents the first attempt to investigate the relationship between the intent to adopt landscape integrated pest management (IPM) practices with and individual’s previous experience with water bodies. We also draw conclusions on the likelihood of IPM adoption based on analyses of demographic data and a homeowner’s experience with other conservation behaviors.

Theoretical Framework

A behavior change approach known as social marketing could play a role in helping clientele adopt IPM. Social marketing has demonstrated longstanding success in promoting public health behaviors (Andreasen, 2006; McKenzie-Mohr et al., 2012; Rogers, 2003), resulting in recent adoption among extension professionals to encourage environmentally responsible behaviors (Shaw, 2010). Its success is underpinned by the framework’s foundational recognition of audience diversity and utilizes a process known as audience segmentation that allows its users to strategically target audiences based on similar characteristics (Andreasen, 2006; Kotler & Roberto, 1989; McKenzie-Mohr et al., 2012). The audience segmentation process helps the researcher identify the most important subgroups within the larger, relevant population and results in audiences segmented by factors or characteristics that relate to likelihood of adopting a behavior (Lee & Kotler, 2011; McKenzie-Mohr et al., 2012).

Segmenting a target audience has proven to be effective in delivering prominent programs that address the segment’s unique needs (Andreasen, 2006; Lai et al., 2009; Lee & Kotler, 2011) which leads to higher participant satisfaction and levels of behavior change (Andreasen, 2006; Kotler & Roberto, 1989). The key is to select a small number of subgroups as target audiences and develop a comprehensive summary of their distinctive characteristics to inform strategies that appeal to their needs (Lee & Kotler, 2011).

While countless audience segmentation strategies may be used (Andreasen, 2006), a cross-sectional approach is common. This type of audience segmentation creates subgroups based on fixed characteristics of audience members (Kim, Njite, & Hancer, 2013; Kotler & Roberto, 1989) such as behavioral characteristics (i.e., likelihood of adoption or decision-making preference), where they live, psychological traits (i.e., attitudes and values), and sociodemographic attributes (i.e. age, education, income, and social class). More recently, researchers have expanded these characteristics to include environmental factors as core variables that influence behavioral change (Clark & Finley, 2007; Lam, 2006; Trumbo & O’Keefe, 2001).

Cross-sectional audience segmentation represents a meaningful framework to identify subgroups based on audience characteristics and factors to promote IPM adoption at the household level (see figure 1). Unfortunately, audience segmentation among extension audiences, and specifically surrounding IPM practices, represents an under-researched context, so here we must review the factors that influence the adoption of pest management practices using primarily agricultural producers as a model. According to Palis, Morin, and Hossain (2005), the location of the farm in relationship to others influences the adoption of IPM, with areas with higher farm densities experiencing higher adoption rates. In the context of landscape management, Blain et al. (2012) found that whether the next door neighbor applies yard
chemicals influences the application of chemicals to the surrounding yards. Closely related, the researchers found that the type of residential environment (i.e. rural, suburban, or urban) significantly influence the homeowner’s practices and may be related to the population density paradigm outlined among the agricultural producers (Blain et al., 2012).

Figure 1. Potential cross-sectional approaches for audience segmentation

Several studies identified the influence of demographic factors including age (McNamara, Wetzstein, & Douce, 1991), education level (Chaves & Riley, 2001; Ridgley & Brush, 1992), farm income or wealth of farmer (Alston & Redding, 1998; Chaves & Riley, 2001), length of land ownership (Grieshop, Zalom, & Miyao, 1988), the type of enterprise (Alston & Redding, 1998); Hammond, Luschei, Boerboom, & Nowak, 2006), farm size and yield (Alston & Redding, 1998; Hammond et al., 2006). While these are all characteristics that were explored in the agricultural context, they may represent important considerations for the residential context. Even characteristics such as farm size and yield that seem very specific to agriculture could be translated to property size and landscape yield (based on the resident’s landscape management goals).

Past behaviors also demonstrated significant influence on behavioral intention and actual adoption of pest management practices. According to Grieshop, Zalom, and Miyao (1988) previous experience with IPM programs outside of their current operations resulted in increased adoption on their own property. Those farmers that had previously implemented IPM practices on others’ farms were likely to incorporate IPM into the pest management plan on their own farm. Additionally, farmers that participated in training and technical assistance programs that incorporated IPM practices were more likely to demonstrate an intention to adopt the same or similar approaches on their farm (McNamara, Wetzstein, & Douce, 1991; Parsa et al., 2014). The effect of past behaviors is a significant among the variables used to increase the predictive power of attitude on behavior across various contexts (Fielding, Russell, Spinnks, & Mankad, 2012; Gregory & Di Leo, 2003; Oullettee & Wood, 1998).
Evidence shows that past behaviors influence the development of an individual’s attitude toward a specific behavior (Aarts, Verplanken, & Van Knippenberg, 1998). Extension has recently applied this concept to water conservation strategies. For example, Monaghan et al. (2013) found that high water users had specific demographic characteristics, which impact their engagement, attitudes, and interests in water conservation behaviors. When understood by extension professionals, there is the potential to inform strategies to successfully convince high water users to engage in water conservation behaviors. Similarly, Huang, Lamm, and Dukes (2016) identified high water users as being older, with higher incomes and education levels, and living in communities where landscaping practices were regulated by homeowner associations, and recommended for Extension to focus on this subgroup as an important target audience.

Additionally, the literature on agricultural pest management practices outlines several factors that center on perception of self-efficacy that informs the potential psychological profile of IPM users. Knowledge of IPM (Alston & Redding, 1998; Parsa et al., 2014) and perceived control or risk (Chaves & Riley, 2001; Parsa et al., 2014) both demonstrated significant influence on IPM adoption. Farmers that reported higher knowledge levels of IPM also reported more influence on managing pest populations as well as lower perceived risk associated with IPM-related practices. This is an interesting consideration as research shows that individuals perceive having more control over water conservation than water quality behaviors (Leal et al., 2015; Warner et al., 2018) or even do not believe their landscape affects water quality. Similarly, many people may not understand or believe that landscape pest management practices can impact water quality (Blaine, Clayton, Robbins, & Grewal, 2012).

What has yet to be explored within this context is the influence of environmental factors on behavior change, which may be a result of its recent addition to the segmentation framework (Clark & Finley, 2007; Lamm, 2006; Trumbo & O’Keefe, 2001). Significant work has demonstrated an important relationship between an individual’s feeling of connection to the natural environment and their willingness to take action to protect it (Brügger et al., 2011; Dutcher et al., 2007; Franz & Mayer, 2013; Leopold, 1949; Mayer & Frantz, 2004). According to Schultz (2001) when an individual believes they are a part of the natural world, they are likely to have stronger concerns over the environment and engage in more pro-environmental behaviors (Schultz, 2001). A precursor to the connection to nature is engagement, which represents a salient factor to explore its influence towards the actions that protect the environment.

Feeling connected to nature may be an important factor to consider when segmenting audiences and tailoring education programs focused on promoting behaviors to protect water (Church, 2015). White, Pahl, Wheeler, Fleming, and Depledge (2016) found that people that engage more frequently with water are healthier and also more likely to adopt behaviors that protect water. Similarly, Warner, Diaz, and Gusto (2019) found more exposure to water related to more positive attitudes, greater perceived behavioral control, stronger social norms, and greater intent to engage in good residential fertilizer practices in home landscapes.

In addition to an individual’s frequency of exposure to water bodies, the quality of engagement with water bodies also influences behaviors. Kelly et al. (2012) found that positive experiences with nature effectively promoted responsible behaviors for water quality in watershed education programs. Inversely, North and van Beynen (2016) found that negatives experiences may drive appropriate practice adoption and suggested using what they called “show caves” to create a cognitive dissonance where people might become unhappy with their previous ideas about their environments and consequently adopt new thoughts.
An interesting commonality among the agricultural producer IPM adoption studies was the influence of extension pest management information and programs (Alston & Redding, 1998; Parsa et al., 2014; Ridgley & Brush, 1992) on increased IPM adoption. This provides rationale for extension professionals to provide education and training on IPM to address the pest issues of residential audiences (i.e., urban communities). While the studies discussed here provide interesting considerations for exploration, there remains a dearth of inquiry regarding the implementation of IPM especially among residential audiences and reinforces the need for Extension to better understand how to influence its increased adoption.

**Purpose and Objectives**

The purpose of this study was to explore potential extension audience segmentation strategies by evaluating factors that related to differences in residents’ intentions to use IPM practices. The specific objectives were to:

1. Describe residents’ behavioral intentions to adopt IPM practices,
2. Describe residents’ engagement and experiences with water bodies, and
3. Describe differences in the intention to adopt IPM practices based on audience characteristics.

**Methods**

**Approach**

To achieve study objectives, we collected quantitative data from a non-probability sample of 3,588 Floridians in November and December of 2018 using a researcher-developed instrument. Potential respondents were recruited using a professional survey sampling company and given an opportunity to opt-in to the study. The use of a non-random sample creates the potential for non response and under coverage biases (Lamm & Lamm, 2019). To increase the reliability of our results, we used a combination of quota sampling to match the existing gender demographics followed by post-stratification weighting to match the age category, race, ethnicity, and county population density to that of the actual statewide population (Baker et al., 2013; Lamm & Lamm, 2019). Our protocol was reviewed and approved by the University of Florida Institutional Review Board.

**Study Context**

The state of Florida in the United States represents an intriguing case to explore where urban sprawl has created increases in residential pests. The U.S. Census reports that from April 1, 2010 to July 1, 2018, the population in Florida increased by 13.3%, placing it at an estimated 21.3 million, behind only California and Texas (U.S. Census Bureau, 2018). A common reason for moving to Florida is that the weather is moderate, which is related to people being able to enjoy outdoor activities virtually all year long. The presence of pests creates a significant incentive for people to purchase landscape pest control services or attempt pest control on their own. Florida was the first state to report locally-acquired Zika (Likos et al., 2016), a devastating disease to some newborns that can result in microcephaly and a shortened lifespan (Mlakar et al., 2016; Petersen et al., 2016). *Aedes albopictus* and *Ae. aegypti* are established invasive species and competent vectors of not only Zika, but Dengue (Richards et al., 2012) and Chikungunya viruses (Vega-Rúa et al., 2014) as well. In response to vector-borne threats, 70% of the pest control companies surveyed now offer mosquito control services, double that of five years ago (PCT, 2019).
Measures

The survey that was used for this study was part of a larger statewide assessment of residential landscape practices. Four sections of the survey pertained to the study objectives. The first section followed Warner et al. (2019) and used a Likert-type scale to measure exposure to water bodies by asking respondents to indicate the frequency with which they came into contact with seven types of water bodies. We also adapted this scale to measure active exposure to water bodies by asking respondents to indicate how often they visit and spend time around each of the same seven water bodies. Response choices for both questions included never, less than once a month, 1-3 times a month, once a week, 2-3 times a week, and more than 3 times a week. The responses were coded with values from 1 to 6, and the two sets of seven responses were each averaged to create exposure to water bodies and active exposure to water bodies indexes. Post-hoc reliability, as measured by Cronbach’s alpha, was .752 and .828, respectively.

In the second section of the survey, we collected information about respondents’ positive and negative experiences with water availability and quality. Four new variables were designed for the purposes of this study. Positive experiences with water availability was measured using four statements such as there is enough water in the water bodies around me. Negative experiences with water availability was measured using four statements such as The water levels around me are too low. Positive experiences with water quality was measured using four statements such as the water around me is clean. Negative experiences with water quality was measured using four statements such as there is poor quality water around me. Respondents could indicate their level of agreement with each of these statements across five points ranging from strongly disagree (1) to strongly agree (5). We averaged each set of four items to create the four indexes: positive experiences with water availability, negative experiences with water availability, positive experiences with water quality, and negative experiences with water quality. Post-hoc reliability, as measured by Cronbach’s alpha, was .818, .876, .848, and .893, respectively.

The third section of the survey was researcher-developed for the purpose of this study and used to measure intent to engage in seven pest management practices. There were six desirable behaviors: a) manage yard pests with as few chemicals as possible, (b) walk around their yard frequently to detect any pest problems early, (c) spot treat only the portions of the yard where there are significant pest problems, (d) obtain a positive identification before treating any possible pest problems in their yard, (e) ensure their yard is a healthy environment for beneficial insects, (f) use integrated pest management, which includes non-chemical options and treatments that pose the least risk, and one undesirable behavior: (g) treat their entire yard with pesticides without identifying pests. Five response choices ranged from very unlikely (1) to very likely (5). Respondents could also indicate a practice was not applicable. We added the responses of the seven items to create an intent to engage in IPM score. We used respondents’ intent to engage in IPM score to split the sample into low-IPM-intent (n = 1,663) and high-IPM-intent (n = 1,690) groups for data analysis purposes.

The final section of the survey pertaining to the study collected demographics. In this section, we collected gender, homeownership, age, education, membership in a homeowners association, family income from the previous year, and postal code. Postal code was later used to assign respondents to a category defined by the density of their county’s population. Prior to using the instrument we asked an expert panel to review the instrument for face and content validity. The expert panel included seven individuals beyond our research team who each
had some combination of extension education, technical science knowledge (i.e., landscape management, horticulture, integrated pest management), familiarity with the target audience (residents across Florida), and survey research expertise. We made minor adjustments to a few items to increase clarity following the panel’s recommendations, and then conducted a pilot test ($n = 50$) to check reliability of the instrument prior to the full study (data not reported).

**Data Analysis**

After weighting the data we used descriptive statistics to evaluate the current state of pest management practices being used as well as quantify exposure to water bodies, and experiences with water (Objectives one and two). We used the high- and low-IPM-intent variables to conduct chi-square analysis to determine if any differences in demographic characteristics of the study respondents existed based on IPM intent (Objective three). We ran independent $t$-tests for equality of means to identify any further relationships between active and total water body exposures, experiences with positive and negative water quality and quantity, general conservation intent, intention and actual adoption fertilizer and water conservation best practices, and pest best management practice intentions.

**Respondent Demographics**

Of the 3,588 respondents, just over half ($f = 1,855; 51.7\%$) were female and about one in five ($f = 757; 21.1\%$) were Hispanic or Latino(a). The average age of respondents was 48 years old. Most respondents indicated they identified as white ($f = 3,259; 90.6\%$) with a small proportion identifying as black ($f = 200; 5.6\%$). Respondents most commonly owned their home ($f = 2,409; 67.1\%$), had earned a 4-year college degree as their highest level of education ($f = 991; 27.6\%$), and reported $25,000 to $49,000 USD as their total family income in the previous year ($f = 914; 25.5\%$).

**Results**

**Objective 1: Describe residents’ behavioral intentions to adopt IPM practices**

To simplify data presentation and aid interpretation of IPM behavioral intent, we collapsed *very unlikely* and *unlikely* into one category (indicating general unlikelihood) and *very likely* and *likely* into one category (indicating general likelihood). Table 1 outlines the respondents’ likelihood of engagement across seven pest management practices. The practice with the highest likelihood of engagement (76.8\%) is managing yard pests with as few chemicals as possible. Interestingly, the item with the least frequency of engagement is the undesirable behavior, treating the entire yard with pesticides without identifying pests (27.6\%). While the aforementioned practice represents that with the least frequency, it accounts for about a quarter of the respondents, or approximately 855 households. Of the desirable practices, respondents were most likely to intend to use as few chemicals as possible to manage yard pests.
Table 1

**Frequency of likelihood of engagement in pest management practices**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very unlikely or unlikely</th>
<th>Undecided</th>
<th>Likely or very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage yard pests with as few chemicals as possible</td>
<td>8.0 (250)</td>
<td>15.3 (481)</td>
<td>76.8 (2414)</td>
</tr>
<tr>
<td>Spot treat only the portions of the yard where there are significant pest problems</td>
<td>10.6 (332)</td>
<td>15.7 (492)</td>
<td>73.7 (2304)</td>
</tr>
<tr>
<td>Walk around yard frequently to detect any pest problems early</td>
<td>13.3 (427)</td>
<td>14.7 (470)</td>
<td>72.0 (2305)</td>
</tr>
<tr>
<td>Obtain a positive identification before treating any possible pest problems in their yard</td>
<td>11.5 (357)</td>
<td>19.2 (598)</td>
<td>69.3 (2152)</td>
</tr>
<tr>
<td>Ensure yard is a healthy environment for beneficial insects</td>
<td>12.2 (382)</td>
<td>21.8 (686)</td>
<td>66.0 (2074)</td>
</tr>
<tr>
<td>Use integrated pest management, which includes non-chemical options and treatments that pose the least risk</td>
<td>11.1 (343)</td>
<td>23.1 (713)</td>
<td>65.8 (2035)</td>
</tr>
<tr>
<td>Treat their entire yard with pesticides without identifying pests^a\</td>
<td>52.9 (1642)</td>
<td>19.5 (606)</td>
<td>27.6 (855)</td>
</tr>
</tbody>
</table>

*Note. Very likely and likely combined into one category and unlikely and very unlikely combined into one category to aid data presentation. Rows may not total 3596 because not applicable responses were excluded from this analysis. \^a\ indicates reverse-coded item (non-desirable behavior).*

Objective 2: Describe residents’ engagement and experiences with water bodies

The respondents’ average exposure to water bodies was nearly three on a six point scale while active exposure to water bodies was about two on the same scale (see Table 2). Respondents reported moderately positive experiences with having enough water and moderately negative experiences with poor water quality, as indicated by these variables falling above the mean. Respondents generally had more positive experiences with water availability and more negative experiences with water quality.

Table 2

**Mean values for frequency and quality of exposure to blue space**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M (SD)$</td>
</tr>
<tr>
<td>Exposure to water bodies^a</td>
<td>2.93 (1.08)</td>
</tr>
<tr>
<td>Active exposure to water bodies^a</td>
<td>2.05 (.98)</td>
</tr>
<tr>
<td>Experiences with water^b</td>
<td></td>
</tr>
<tr>
<td>Positive exp. avail</td>
<td>3.51 (.92)</td>
</tr>
<tr>
<td>Negative exp. avail</td>
<td>2.68 (1.03)</td>
</tr>
<tr>
<td>Positive exp. qual</td>
<td>2.90 (1.00)</td>
</tr>
<tr>
<td>Negative exp. qual</td>
<td>3.21 (1.03)</td>
</tr>
</tbody>
</table>

*Note. \^a\ real limits 1 and 6. \^b\ real limits 1 and 5.
Objective 3: Describe differences in intentions to adopt IPM practices based on audience characteristics

The results of the chi-square analyses (see Table 3) shows that there were statistically significant differences based on gender, homeownership, education level, and county population. Females, homeowners, and those individuals with some college were more engaged in pest best management practices. The low-IPM-intent group was more likely to hold a Master’s degree. The high-IPM-intent group was more likely to live in a metro area with 250,000 to 1 million residents. The rest of the demographic characteristics did not demonstrate any statistically significant difference in the adoption of pest best management practices.

Table 3
A comparison of demographic characteristics among Floridians with low-intent and high-intent to engage in IPM practices

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Low-IPM intent (n = 1663)</th>
<th>High-IPM intent (n = 1690)</th>
<th>p</th>
<th>χ²</th>
<th>Cramer’s V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>48.6 (809)a</td>
<td>54.5 (920)b</td>
<td>.001</td>
<td>11.38</td>
<td>.06</td>
</tr>
<tr>
<td>Male</td>
<td>51.4 (854)a</td>
<td>45.5 (769)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOA membership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>65.5 (1089)a</td>
<td>70.2 (1186)b</td>
<td>.01</td>
<td>9.51</td>
<td>.05</td>
</tr>
<tr>
<td>Rent</td>
<td>30.9 (514)a</td>
<td>27.2 (459)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3.6 (60)</td>
<td>2.6 (44)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education*</td>
<td></td>
<td></td>
<td>&lt;.001</td>
<td>32.37</td>
<td>.10</td>
</tr>
<tr>
<td>Less than high school</td>
<td>2.9 (48)a</td>
<td>1.1 (18)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school/GED</td>
<td>19.0 (316)a</td>
<td>16.4 (277)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>22.1 (367)a</td>
<td>25.1 (424)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-year college degree</td>
<td>10.8 (180)a</td>
<td>12.5 (211)a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year college degree</td>
<td>26.3 (438)a</td>
<td>28.7 (485)a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s degree</td>
<td>14.2 (237)a</td>
<td>11.2 (187)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>1.7 (28)a</td>
<td>2.2 (38)a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional degree (JD, MD)</td>
<td>3.0 (50)a</td>
<td>3.0 (50)a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income (2017)</td>
<td></td>
<td></td>
<td>.42</td>
<td>10.28</td>
<td>.06</td>
</tr>
<tr>
<td>Less than $24,999</td>
<td>15.9 (265)</td>
<td>15.3 (259)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25,000 to $49,999</td>
<td>24.3 (405)</td>
<td>25.9 (437)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50,000 to $74,999</td>
<td>23.0 (383)</td>
<td>21.4 (362)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$75,000 to $99,999</td>
<td>14.2 (236)</td>
<td>17.0 (287)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100,000 to $124,999</td>
<td>7.9 (131)</td>
<td>7.6 (129)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$125,000 to $149,999</td>
<td>5.6 (94)</td>
<td>5.3 (90)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$150,000 to $174,999</td>
<td>2.8 (46)</td>
<td>2.7 (45)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$175,000 to $199,999</td>
<td>2.3 (39)</td>
<td>1.6 (27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$200,000 to $224,999</td>
<td>1.1 (18)</td>
<td>.9 (16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural-urban area*</td>
<td>$225,000 to $249,999</td>
<td>$250,000 or more</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Metro area (population of 1 million or more) | 63.9 (1063)^a | 61.1 (1031)^a | .01 15.75 .07  
| Metro area (population of 250,000 to 1 million) | 24.4 (405)^a | 27.7 (468)^b |  
| Metro area (population of less than 250,000) | 4.9 (81)^a | 4.8 (81)^a |  
| Nonmetro - urban population of 20,000 or more | 3.2 (54)^a | 4.0 (68)^a |  
| Nonmetro - urban population of 2,500 to 19,999 or more | 3.4 (57)^a | 1.9 (32)^b |  
| Nonmetro - rural area with population less than 2,500 | .2 (3)^a | .5 (8)^a |  

* indicates significant. For reference, Cramer’s $V$ values were interpreted as 0.10 to 0.19 = weak effect (Rea & Parker, 1992). Different superscript letters indicates significant differences across row as identified by post-hoc z-tests using Bonferroni method.

Based on the results of the $t$-tests, we found that the high-IPM-intent group had greater intent to engage in fertilizer best practices and landscape water conservation (see Table 4). The high-IPM-intent group was also currently more engaged in the use of landscape and general water conservation and fertilizer best practices. The high-IPM-intent group spends more active and total time around various water bodies. The low-IPM-intent group is less likely to have had negative experiences with water availability and quality, meaning a relationship exists between exposure to inadequate or unclean water and engaging in IPM. The low-IPM-intent group is slightly more likely to have had positive experiences with water quality, highlighting a relationship that indicates people that see clean water are less likely to use environmentally responsible pest management practices.
## Table 4

*A comparison of water conservation and relationships with water among Floridians with low-engagement and high-engagement in pest BMPs*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Low IPM intent ( (n = 1663) )</th>
<th>High IPM intent ( (n = 1690) )</th>
<th>( t )</th>
<th>( p )</th>
<th>( d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer BMP intent index*</td>
<td>3.06 (1.07)</td>
<td>4.03 (0.80)</td>
<td>-13.77</td>
<td>&lt;.001</td>
<td>1.02</td>
</tr>
<tr>
<td>Water conservation intent index*</td>
<td>2.81 (.96)</td>
<td>3.49 (.87)</td>
<td>-12.54</td>
<td>&lt;.001</td>
<td>.74</td>
</tr>
<tr>
<td>Water conservation score*</td>
<td>5.06 (3.83)</td>
<td>7.66 (4.40)</td>
<td>-10.66</td>
<td>&lt;.001</td>
<td>.63</td>
</tr>
<tr>
<td>General water conservation index*</td>
<td>3.47 (.74)</td>
<td>3.83 (.74)</td>
<td>-13.98</td>
<td>&lt;.001</td>
<td>.49</td>
</tr>
<tr>
<td>Fertilizer BMP index*</td>
<td>3.15 (.74)</td>
<td>3.34 (.68)</td>
<td>-7.93</td>
<td>&lt;.001</td>
<td>.27</td>
</tr>
<tr>
<td>Water body frequency index*</td>
<td>2.82 (1.05)</td>
<td>3.07 (1.10)</td>
<td>-6.88</td>
<td>&lt;.001</td>
<td>.23</td>
</tr>
<tr>
<td>Water body active frequency index*</td>
<td>1.97 (.92)</td>
<td>2.17 (1.02)</td>
<td>-5.99</td>
<td>&lt;.001</td>
<td>.21</td>
</tr>
<tr>
<td>Negative experiences with water quality*</td>
<td>2.62 (.98)</td>
<td>2.75 (1.09)</td>
<td>-3.84</td>
<td>&lt;.001</td>
<td>.13</td>
</tr>
<tr>
<td>Negative experiences with water availability*</td>
<td>2.95 (.91)</td>
<td>2.85 (1.09)</td>
<td>2.68</td>
<td>.007</td>
<td>.10</td>
</tr>
<tr>
<td>Positive experiences with water quality*</td>
<td>3.52 (.86)</td>
<td>3.49 (.98)</td>
<td>.80</td>
<td>.426</td>
<td></td>
</tr>
<tr>
<td>Positive experiences with water availability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* * indicates significant. Cohen’s \( d \) values were interpreted as 0.2 = small, 0.5 = medium, 0.8 = large (Cohen, 1988). The real limits of the three index variables was 1 and 5 and the real limits of water conservation score was 5 and 50.

### Conclusion, Recommendations, and Implications

Understanding how to tailor extension programs for the unique needs of diverse target audiences will continue to be a paradigm that researchers need to explore as issues and solutions evolve. Our study represents an initial inquiry to better understand residential pest management audiences and identify meaningful subgroups to target with extension programming to drive behavior change and practice adoption. Additional inquiries are needed to develop comprehensive audience profiles, especially pertaining to IPM, and this study represents an important step in that process.

We found that the respondents demonstrate relatively high intentions to adopt pest management best practices but there remains room to increase adoption levels. Responses of undecided ranged from 14.7% to 23.1% across all practices, which demonstrates the potential for an audience to be swayed to adopt an IPM approach. Additionally, almost half (47.1%) of respondents that selected either *highly likely*, *likely* or *undecided* in regards to treating their entire yard with pesticides without identifying the pest or pests that are the issue. This represents a group where further inquiry should be explored to understand this choice of practice that can help to inform their audience profile for program design.

We also found that multiple audience characteristics including some demographics, complementary conservation behaviors and engagement with the natural environment that characterize meaningful subgroups to guide extension program design. Our findings align with those of Chaves and Riley (2001) and Ridgley and Bush (1992) that demonstrated how
educational level influences the adoption of pest management practices. We did not identify a gradient of adoption based on increases to education levels but noticed significant differences among those who had completed high school, had less than a high school level of education, or Master’s degrees (more likely to have low-IPM-intent) and some college (more likely to have high-IPM-intent). A new demographic characteristic that our study found that did not exist in the inquiry of agricultural producer adoption of IPM was the significant difference in adoption based on gender. Females were more likely to be in the high-IPM-intent group than their male counterparts. Interestingly, there was no significant difference in IPM intent based on family income contrary to the findings of Alston and Redding (1998) and Chaves and Riley (2001). The high-IPM-intent group was more likely to live in a metro area with 250,000 to 1 million residents, revealing a possible relationship between more urban areas and more engagement in IPM, although this finding did not appear in the most urban designation.

An interesting finding was the interrelationship between the intention and actual adoption of other environmentally-protective behaviors and the intention to adopt IPM practices. The practical differences of these relationships were much greater than those of the demographic characteristics, signaling the need to understand how extension clientele intend to engage in related landscape maintenance tasks and generally interact with the natural world. Respondents with greater intent to engage in IPM were also more engaged in general conservation, landscape water conservation and fertilizer best practices. These differences provide a new lens to the influence of complementary behaviors, demonstrating that previous engagement with other environmentally-responsible practices may influence the adoption of IPM. This new view of complementary behaviors expands the work Grieshop, Zalom and Miyao (1988) and makes connections to a larger body of research (Fielding, Russell, Spinnett, & Mankad, 2012; Gregory & Di Leo, 2003; Oullettee & Wood, 1998) that shows how past environmentally responsible behaviors may transcend contexts and may be a predictive tool for the adoption of IPM practices.

Our study also demonstrated the relationship between water body exposure and the adoption of IPM practices. High-IPM-intent respondents spent more total time as well as active time around various water bodies. This connection with engagement with water bodies aligns with the work of Warner, Diaz and Kumar Chaudhary (2019) whose findings show that exposure to water bodies relates to increased likelihood of individuals to engage in good fertilizer practices. The relationship between total exposure to water bodies and IPM hints at the value of indirect connections to water quality as intentional exposure to water bodies may occur in areas that do not suffer from extensive water quality issues (i.e., public beaches). Further, active exposure may provide a similar experience to that of passive exposure respondents that may be exposed to more impaired water bodies. Interestingly, low-IPM-intent individuals had more positive experiences with water quality (i.e., they were exposed to clean water). This contradicts the work of Kelly et al. (2012) and suggests that fewer experiences with good water quality relates to high IPM engagement. The high-IPM-intent group reported more negative experiences with both water quality and availability (i.e., they were more exposed to unclean and inadequate water), suggesting experiencing the negative consequences of failing to protect water might be influential upon behaviors.

Returning to audience segmentation, this work demonstrated a modest audience segmentation analysis, yet the distinct differences between the high- and low-IPM-intent groups revealed opportunities to tailor extension programming to the two groups but also guide extension IPM programming in general. Based on our findings, we recommend that globally, extension IPM education efforts target females to influence the household and potentially change
pest management approaches. This supports the National Pest Management Association (Hampshire, 2017) findings that show that women make about 80% of purchasing decisions, which includes pest control. We also believe there is an opportunity to couple IPM education with education on fertilizer use and other conservation practices to enhance the adoption of the practices with those groups that are more likely to adopt based on the past experiences with environmentally responsible behaviors. Further, there may be an opportunity for extension professionals to target individuals and groups they know are using other best practices as they may be more likely to adopt IPM. Finally, we believe that those incorporating exposure to water bodies within the confines of the program should consider the influence that increased frequency with water bodies in general as well as poor water quality and availability may have on potential, residential IPM users and make decisions on the exposure experience accordingly.

We also recommend continued inquiry and analyses into the characteristics and factors that influence IPM adoption. While our data were drawn from a large sample in a location especially prone to pest concerns, extension professionals working elsewhere globally should consider our findings and also conduct audience research to guide local programs. We believe our study provides rationale for more rigorous, regression analysis to understand the most salient characteristics and factors that increase the likelihood to influence pest management practice adoption. Additional factors that should be explored include (1) past IPM practices, (2) knowledge and perceptions of self-efficacy of IPM, (3) public’s attitudes towards IPM (4), the connection between other environmentally responsible behaviors and the adoption of an IPM approach, and (5) differences in audience intentions based on complementary conservation behaviors. As these factors are better understood, we suggest our profession will discover more complex audience segmentation strategies driven by a number of audience characteristics in addition to IPM engagement.

We also believe continued inquiry is needed within the paradigm of exposure to water bodies to provide additional clarity on the influence that active and passive engagement with water bodies has on IPM adoption as well as the influence of water quality experiences. There is an opportunity to evaluate these factors and others that may hold promise in changing residential users’ intentions to adopt an IPM approach. This study took an essential first step at understanding potential audience segments to guide future adoption of IPM practices in the residential context, there is more research needed to develop comprehensive audience profiles to promote the extent of change needed.

References


Scale Development and Validation: Methodology and Recommendations

Kevan W. Lamm
Alexa J. Lamm
Don Edgar
University of Georgia

Abstract
The importance of valid and reliable data and its collection is fundamental to empirical research; however, there remain inconsistent approaches to creating robust scales capable of capturing both valid and reliable data, particularly within international agricultural and extension education contexts. Robust scale development consists of five areas for validation: content, response process, internal structure, external structure, and consequential. The purpose of this guide was to provide methodological recommendations to improve scale development rigor and adoption and to provide a set of functional principles to aid researchers and practitioners interested in capturing data through developed, or adapted, scales. Additionally, the information summarized provide a benchmark upon which to evaluate the rigor and validity of reported scale results. A consistent framework should provide a common lexicon upon which to examine scales and associated results. Proper scale development and validation will help ensure research findings accurately describe intended underlying concepts, particularly within an international agricultural and extension education context.

Keywords: scale development, validity, quantitative analysis
Introduction

Data, its collection, its analysis, and the meaning that is drawn from it is ubiquitous within research and evaluation across disciplines and is fundamental activity of science (DeVellis, 2017). However, despite the consistent agreement on the importance of valid and reliable data, there have been challenges associated with data collection instruments, particularly scales (Emmerson & Neely, 1988). Frequently, data are collected in a manner that jeopardizes both validity and interpretability (McKnight, McKnight, Sidani, & Figueredo, 2007). These potential issues are noteworthy as they represent the fundamental building blocks of analysis, borrowing a classic warning from computer programming, “garbage in, garbage out” (Lordo, 2001).

There has been a notable gap in the international agricultural and extension education literature providing a set of scale development guidelines and methodologies. In social science, research measurements are most often derived from theory which leads to conceptualization of problems toward measurement (DeVellis, 2017). Without a common understanding of these principles, a potential for misinterpretation and missed opportunities are inherent towards accurate measurement of what is to be measured. Historically, one of the main limitations with scale development is the perception of opaqueness, that is clarity between measures (Nunnally & Bernstein, 1967). Therefore, scales that are developed in complementary disciplines are frequently employed (DeVellis, 2017); however, the nuance and uniqueness of efforts within a particular context are frequently omitted. Within the international agricultural and extension education literature, the need for contextually relevant scales has been identified: “A standardized scale should help to provide a common measure of capacity among RAS [rural advisory service] networks and to facilitate knowledge sharing using a standard set of capacity items” (Lamm, Lamm, Davis, & Swaroop, 2018, p. 52).

In an age when there is increasing emphasis on data collection and analysis, the utility and appropriateness of scales used to collect data are vital. These trends are reinforced by factors such as a culture towards increased scrutiny and accountability in international settings (Taras, Rowney, & Steel 2009). Additionally, the fidelity of scales to appropriately measure that for which they are intended and in the context in which they are intended, is a persistent trend (DeVellis, 2017). These trends are amplified within international agricultural and extension contexts where evaluation, capacity assessments, capacity building, and other activities require high levels of collaboration among many local and international actors (Davis & Sulaiman, 2014).

Literature Review and Methodological Recommendations

This work is based on the scale development recommendations of Crocker and Algina (1986) as well as Messick (1995). Overall, there are five main areas for validation: content, response process, internal structure, external structure, and consequential. Adhering to an established set of methodological process steps helps to ensure consistency and predictability across scale development endeavors (Crocker & Algina, 1986).

Content Validity

Content validity refers to the ability of the scale to appropriately measure what it has been intended to measure. Initially, the researcher or team should consult the literature through an exhaustive search to determine aspects that will construct the scale. Once the review of literature has been completed, experts should review the proposed scale to confirm that the intent
and purpose of the scale is valid. Any revisions, edits, or changes should be made to align further with respects to the expert’s opinion. DeVellis (2017) refers to this as sampling adequacy in which the content domain is revealed through a specific set of items. This is critical to further steps in scale development as it sets the parameters of what is to be measured. Consequently, reliable data is consistent – it reports what is being measured with dependable accuracy towards the intended response. Furthermore, it should be noted that data deemed reliable could be invalid. The scale could produce data deemed consistent but not valid relative to the underlying phenomena of interest. Data to be gathered must be valid in relation to the scope of the study, constructs, participants, and setting (McMillan & Schumaker, 2010).

Content validity in social sciences can be established in several ways. Examples include a panel of experts, literature review, or a Delphi method approach (Crocker & Algina, 1986; DeVellis, 2017; Messick, 1995; Williamson, 2007). However, the most robust approaches are those that use multiple sources to establish content validity. For example, literature review, while critical, may be insufficient to adequately define the content domain the scale is intended to cover. Therefore, the use of an expert panel may provide additional insights and triangulation of the concept that may otherwise be unconsidered. Given the context of international agricultural and extension education programs, the ability to convene an expert panel in person may be somewhat limited. Therefore, a Delphi method may provide a methodological approach to gather comprehensive viewpoints in an efficient manner, particularly when the process is facilitated online (Lamm, Lamm, Davis, & Swaroop, 2017). The focus on the Delphi method is also consistent with the international agricultural and extension education literature where previous research has recommended “to use the Delphi process to gather insights from RAS [rural advisory service] experts for future research” (Lamm et al., 2017, p. 103). The use of the Delphi method allows specifically identified experts to provide, review, consolidate, and work towards consensus on provided insights. Decidedly, the Delphi method has been used to gain experts’ opinions regarding “content validation of constructs to be used in quantitative research” (Garson, 2014, Chapter 8, para. 1). A more comprehensive description of the Delphi method is provided as a set of operational guidelines; however, the underlying considerations are also applicable to establishing a more traditional expert panel.

To arrive at a consensus amongst experts, the Delphi method uses an iterative approach (Garson, 2014). Generally, the Delphi process includes a set of predictable steps. First, a questionnaire is created and sent to a panel of experts. Second, a panel of experts will complete the questionnaire and return it to the researcher. Third, the researcher analyzes data gathered from the expert panel. Finally, the researcher will modify the questionnaire based on their analysis and a second iteration of processing will be initiated (Stines, 2003). Based on a review of the literature, Gliddon (2006) found that the number of iterations included in a typical Delphi research study ranged from two to eight rounds. However, three rounds were identified as an optimal number of iterations for the majority of applications (e.g. Delbacq, Van de Ven, & Gustafson, 1975; Gliddon, 2006).

According to Czinkota and Ronkainen (1997), “the selection of the experts is critical to the success of a Delphic study” (p. 152). The Delphi method harnesses the expertise of individuals familiar with the issue of interest (Garson, 2014); however, one of the primary criticisms of the Delphi method has been, “if panelists are misinformed about a topic, the use of Delphi may only add confidence to their ignorance” (Roy & Garai, 2012, p. 39). Consequently, “the individuals comprising the expert panel should represent the research purpose in a way that legitimates the outcome of the Delphi process” (Garson, 2014, Chapter 6, para. 2).
In addition to selecting the correct experts to constitute the panel, identifying the correct number of panelists has also been explored within the literature. For example, Boulkedid Abdoul, Loustau, Sibony, and Alberti (2011) found that of 80 Delphi studies conducted between 1978 and 2009, the median size of the expert panel was 17. However, Skulmoski, Hartman, and Krahn (2007) found that across 41 doctoral dissertations that employed the Delphi method, the median was 28 within a range of 8 to 345. Overall, researchers have found that panels with larger numbers of experts tend to have lower agreement indexes (Meijering, Kampen, & Tobi, 2013); however, studies that desire a higher degree of precision in outcomes should have sufficiently large panels to address potential issues associated with unintended panel homogeneity (Garson, 2014).

Next, relevant organizations and individual experts are identified (Okoli & Pawlowski, 2004). A diversity of expertise within a common domain should provide sufficient coverage of the topic. Heterogeneity within the panel helps to ensure a variety of perspectives, while the Delphi method ensures all panelists have equal opportunity to contribute, mitigating the tendency to defer to the opinions of the most experienced experts or conformity to groupthink (Garson, 2014). The outcome of a robust and properly administered Delphi process may provide a foundation for establishing content validity. However, the Delphi outcomes should be employed as one source of content validity where further triangulation of content concepts through a literature review and other actions are utilized.

Based on the results of the content gathering process, scale development can then proceed into the item generation stages. It is the responsibility of the individual, or team, working on the scale to identify and decide on the best item type and format to ensure the underlying phenomenon is appropriately captured. Context and intended audience types should be considered during the item type selection process. Furthermore, careful consideration of context variables such as connectivity, reading level, available time, among other factors are considerations throughout this process (DeVellis, 2017). These items are particularly relevant when considering international contexts where infrastructure and other criteria may vary (Ganpat, Ramdwar, Stripling, & Roberts, 2013).

An additional consideration related to item type selection is the utility of item types to capture the underlying phenomena of interest. For example, phenomena that have binary outcomes (e.g., yes or no) may be effectively captured with binary item types. However, phenomena that have gradations of existence responses may be better captured through Likert-type items (Rossi, Lipsey, & Freeman, 2004). Regardless of item types, it is critical that the underlying content is appropriately captured through the scale development process; doing so will be necessary to establishing content validity. Based on the ubiquity of Likert-type scale items present within the existing international agricultural and extension education literature, the following areas for establishing validity are based on scales composed of Likert-type items; however, the specific guidelines, standards, and approaches should be amended to suit different item types as appropriate. Although beyond the scope of the present work, additional resources are available and should be employed specifically related to item development; for example, DeVellis (2017), among others.

**Response Process Validity**

Following the establishment of a scale, response process validity should be examined. The literature recommends a small sample of respondents or experts adequately suited to
knowledgeably evaluate the face validity and interpretability of a scale. Any items or directions that are unclear should be revised and retested as appropriate (Crocker & Algina, 1986).

Establishing response process validity has both functional and strategic benefits. From a functional perspective, it is important to establish whether the individuals that the scale is intended for are able to complete it as expected. From an international perspective, considerations such as translation and localization are also important considerations (Radhakrishna, 2006). Many of the considerations associated with establishing content validity and developing the proposed scale are examined during the response process validity process. In addition to the functional importance of the step, establishing response process validity also has strategic value in the scale development process. Specifically, the time taken to intentionally examine the scale characteristics at the preliminary stages has the potential to mitigate time and expenses required to revise the instrument and recollect data during primary data collection. Additionally, scale items or directions that are unclear, or worse, incorrect, may bias all subsequent analyses. Therefore, it is important to establish response process validity prior to additional data collection or analysis (Crocker & Algina, 1986).

During an initial data collection associated with establishing response process validity, specific recommendations have been established in the literature (DeVellis, 2017). For example, if utilizing an online data collection instrument, periodic prompts are recommended for respondents to indicate whether they understood the requested response or if there is any confusion with the response process associated with the instrument. Responses to instrument items should be analyzed and any confusion over directions or response expectations should be examined. Expected outcomes from this process are to identify and/or modify items requiring updating or adjustment. If utilizing paper-based instruments, include a section at the end for respondents to identify items that were unclear or confusing. Alternatively, a facilitated administration of the instrument would provide the researcher real-time input and/or feedback from representative respondents.

Any modifications made to the scale based on establishing response process validity should be documented and considered relative to the previously established content validity. It is important to ensure any modifications don’t have unintended consequences in the scale’s ability to serve its intended purpose. An iterative process may be required to test, revise, and retest scale items, as well as the overall scale (DeVellis, 2017).

**Internal Structure Validity**

Establishing internal structure validity has been suggested within four primary domains (Clark & Watson, 1995; Crocker & Algina, 1986; Messick, 1989). First, individual item response distributions should be analyzed using descriptive statistics to ensure acceptable characteristics. Second, internal consistency amongst items should calculated using Cronbach’s alpha. Third, validation of the hypothesized latent variables should be examined using exploratory factor analysis. Finally, latent variable structure should be further analyzed using confirmatory factor analysis (Crocker & Algina, 1986).

Initially, descriptive statistics should be calculated to determine response distributions for each individual item to examine acceptability prior to conducting subsequent analyses (Clark & Watson, 1995). Result distributions should be further analyzed for skewness and kurtosis (Ferguson & Cox, 1993). Skewness values less than two and kurtosis values less than seven should be considered acceptable given established thresholds for factor analysis within psychological research (Fabrigar, Wegener, MacCallum, & Strahan, 1999; West, Finch, &
Curran, 1995). Following individual item analysis, an overall index score, generally the mean score, should be calculated in order to determine values of individual items. The resulting index score is then analyzed using descriptive statistics. Mean and standard deviation scale scores should be analyzed relative to individual item analysis and expectations.

To establish internal consistency, Cronbach’s alpha should be calculated for each latent variable. Based on established social science standards, an observed value of 0.70 or above should be considered acceptable (Cortina, 1993; Schmitt, 1996; Streiner, 2003). If value(s) are observed below the acceptable range, additional individual item analysis may be required (DeVellis, 2017).

Although internal consistency has been identified as a necessary condition to establish internal structure validity, it has not been shown to be sufficient to analyze dimensionality of proposed constructs (Clark & Watson, 1995). Furthermore, internal consistency has no ability to investigate factor structure stability (Ferguson & Cox, 1993). Consequently, structural analysis of proposed scales conducted through exploratory factor analysis (EFA) are recommended as an appropriate next step to establish internal structure validity (Crocker & Algina, 1986). One of the necessary conditions to effectively analyze the factor structure of a proposed scale has been to ensure a sufficiently large number of responses. Specifically, a ratio of five respondents per item has been proposed (Ferguson & Cox, 1993).

After establishing the sufficiency of the respondent to item ratio, the Kaiser-Meyer-Olkin test of sampling adequacy and Bartlett’s test of sphericity should be employed to ensure that observed factor structures are not found by chance. The Kaiser-Meyer-Olkin test observations should be evaluated according to established criteria; a minimum value of 0.5 might be considered acceptable with values above 0.8 considered very good (Dziuban & Shirkey, 1974). Additionally, results of the Bartlett’s test of sphericity ($p < .05$) should be analyzed for significance as an indication of psychometric adequacy of the samples (Dziuban & Shirkey, 1974).

To investigate factor structure within the data, Kaiser’s (1960) eigenvalue greater than 1 ($K_1$) and Cattell’s (1966) scree test are recommended (Hayton, Allen, & Scarpello, 2004). Based on the $K_1$ analysis, the nature and dimensionality of the latent variable and associated factors should be analyzed. Confirmation of $K_1$ analysis is done through an examination of a plot of eigenvalues known as a scree test (Cattell, 1966). Specifically, breaks or discontinuities within the eigenvalue plot will be used to identify stable factors followed by numerous smaller minor factors, “a few major factors account for the most variance, resulting in a steep ‘cliff” as these factors are identified first, followed by a shallow ‘scree’ describing the small and relatively consistent variance accounted for by the numerous minor factors” (Hayton et al., 2004, p. 193). Additionally, a Promax rotation of the data is recommended to provide a validation of the dimensionality of the latent variable. Overall, the EFA analysis should identify the dimensions associated with a stable factor or factors associated with the latent variable. Based on the results of the EFA, the observed and hypothesized factor structure will be further analyzed through confirmatory factor analysis (CFA).

Confirmatory factor analysis has been established as an appropriate technique to validate observations against theoretical expectations (Henson & Roberts, 2006). From a CFA perspective, the hypothesized model should be analyzed using a statistically appropriate tool or software package capable of performing the necessary analysis. Model fit statistics should be calculated with recommended tests including: Chi-square test of model fit, root mean square
error of approximation (RMSEA), comparative fit index (CFI), Tucker Lewis Index (TLI), and standardized root mean square residual (SRMR).

As an initial starting point for CFA analysis the chi-square test of model fit has been proposed with non-significant observations indicating strong model fit (Bollen, 1989). However, more recently scholars have questioned the appropriateness of this measure, “it is well documented that the chi-square test is very sensitive to sample size, and thus, very small differences between the observed and reproduced covariance matrices will result in a statistically significant chi-square value” (Vanderberg, 2006, p. 197). Therefore, alternative measures of model hit have been proposed to account for the practical considerations associated with theory based model development and testing. According to Hu and Bentler (1998) several benchmarks have been established to analyze model fit statistics and thus identify model misspecification. Specifically, the following thresholds have been proposed: RMSEA values less than 0.08 represent acceptable model fit with values less than 0.06 representing good fit; CFI and TLI values of 0.90 represent marginal fit, with values below 0.90 indicating poor fit and values 0.95 representing good fit; SRMR values less than 0.08 represent acceptable model fit with values less than 0.05 representing good fit.

A criticism of CFA has been that, due to the specified nature of the model, researchers have the ability to manipulate variable relationships to fit observed data, thus improving model fit without an *a priori* grounding for such manipulations (MacCallum, Roznowski, & Necowitz, 1992). However, specifying relationships that are expected due to theoretical rationale has been deemed as appropriate (McDonald & Ho, 2002). A recommendation is for CFA observations and model fit to be treated and analyzed from a theoretical perspective.

**External Structure Validity**

An examination of the hypothesized relationships between the construct of interest and previously established constructs has been proposed to establish external structure validity (Schwab, 1980). Theoretically implied relationships between the construct and other measures within a similar domain context should be related, but not redundant. Typically, the use of established measures within a nomological network of similar concepts is used to validate external structure validity (Messick, 1989).

During initial content validity and scale development stages it is recommended to complete an exhaustive literature review where identification of similar scales should be noted. To establish external structure validity of an instrument it is recommendation to administer previously established instruments during the data collection process. Once collected, data analysis should include correlations between the proposed scale latent variables and existing scale latent variables. Magnitude of correlations (Davis, 1971) between the proposed scale and previously established scales should inform and establish external structure validity if resulting values meet the desired threshold.

**Consequential Validity**

According to Messick (1995), consequential validity “appraises the value implications of score interpretation as a basis for action as well as the actual and potential consequences of test use, especially in regard to sources of invalidity related to issues of bias, fairness, and distributive justice” (p. 745). This source of validity has been shown to be paramount when there is the potential for score inferences to be associated with scale scores (Blanton & Jaccard, 2006). Specifically, scale scores should be meaningful and, thus, not arbitrary (Greenwald, Nosek, &
Sriram, 2006). This type of validity is particularly relevant in international agricultural and extension education contexts where scale results may be related to numerous needs such as evaluations or capacity assessments (Davis, 2016).

To establish consequential validity, the recommendations of Blanton and Jaccard (2006) and Messick (1995) are presented. First, a recommendation has been to employ a progressive approach whereby a proposed scale validity evolves from evidence for the construct interpretation, to evidence of the basis for score use, to evaluating value consequences of scores, to evaluating functional worth of scores (Messick, 1995). Therefore, one of the primary methods for collecting consequential validity evidence has been to coordinate with those that are responsible for implementing the proposed instrument, collecting, and interpreting results and building consensus amongst this audience accordingly (Blanton & Jaccard, 2006). Additionally, contextual relevance has been noted as an important condition for score meaningfulness and evidentiary support (Blanton & Jaccard, 2006; Messick, 1995).

Conclusions, Recommendations and Implications

Instrument development and validation is critical to data gathering and the subsequent analysis. Although there is agreement that reliable and valid data is the foundation for social science research, challenges associated with scale development should be acknowledged (Emmerson & Neely, 1988; McKnight et al., 2007). Validation of scales, either researcher developed or those adapted from previous utilization in other settings, is paramount to sound research practices and reliable data. Within international agricultural and extension education contexts, these needs are amplified when additional considerations such as audience, culture, and intended use must also be considered (Davis & Sulaiman, 2014).

Initially, researchers should focus on the ability of the scale to appropriately measure the underlying phenomena of interest, thus establishing content validity. Researchers should conduct an exhaustive literature review towards the construct of the scale. Experts should then review the scale to confirm the validity of its purpose and intent. This step can be accomplished in several ways such as a panel of experts, literature review, or a Delphi process (Crocker & Algina, 1986; DeVellis, 2017; Messick, 1995; Williamson, 2007). Both content and face validity should be evaluated (Crocker & Algina, 1986). If a Delphi process is employed (Lamm et al., 2017; Lamm et al., 2018), an iterative approach (Garson, 2014) should be utilized. Response process validity should also be ensured by prompting respondents to indicate whether they understand requested response(s), or if any confusion is associated with the instrument. Within international contexts, translation (Radhakrishna, 2006) and audience characteristics (Davis & Sulaiman, 2014) are important considerations.

Next, internal structure of the scale should be validated with descriptive analysis. Distributions from analysis should be analyzed for skewness and kurtosis to provide normalcy of the data. Following descriptive analysis, internal consistency analysis should calculate a Cronbach’s alpha. Cronbach’s alpha values greater than .70 are generally deemed acceptable. Subsequent analysis will examine the hypothesized variable structure through exploratory factor analysis followed by latent variable structure examination through confirmatory factor analysis (Clark & Watson, 1995). A minimum of five responses per item is advised (Ferguson & Cox, 1993). Establishing external structure validity is facilitated by collecting data from within the nomological network of conceptually related scale. Similarities without redundancy are an indication of external structure validity. Lastly, consequential validity ensures the usefulness of the latent variable information as represented by the scale result. From an international
perspective, consequential validity is very important as scale results can have implications beyond research, such as evaluations or capacity assessments (Davis, 2016).

Scale development and validation are foundational to appropriate data gathering procedures and validity of results based on research questions and/or objectives of study in social sciences. Proper implementation of scale measures will allow researchers to gather pertinent and reliable data to draw conclusions and recommendations. Researchers should ensure that scales to be developed follow proper guidelines and procedures. A robust framework and set of actionable methodological recommendations should provide international agricultural and extension education researchers and practitioners a robust foundation upon which to construct valid and reliable scales and directly addresses identified needs within the literature (Lamm et al., 2018).

References


analyses. Psychological Methods, 7(1), 64-82. https://doi.org/10.1037/1082-989X.7.1.64


Understanding the Context for Agricultural Technical, Vocational, Education and Training in Haiti

M. Christelle Calixte
T. Grady Roberts
J. C. Bunch
University of Florida

Abstract
Agricultural activities in developing countries are critical for the future of the world’s food security. These countries have the lowest agricultural productivity and dissemination of agricultural technologies are often insufficient. Extension has a vital role in improving agricultural productivity. The Caribbean country of Haiti is one such case. In Haiti, agricultural technicians perform much of the extension field work. Agricultural technicians often have a diploma earned at a Technical, Vocational, Education and Training (TVET) school. However, not much is known about Haitian TVET schools, as little research has been conducted. This study explored the context for Haitian agricultural TVET. Individual interviews with four school directors and three teachers per school (12 total), as well as a student focus group in each school allowed to identify the ambiguous cultural value of agricultural TVET in Haiti. Results identified the cultural disregard for TVET through its stakeholders’ contempt for this sector as well as the government’s failure to support it appropriately. However, it was also found that TVET added value to the agricultural system both for its inherent qualities, and because of the reputation, competitiveness it creates for the graduates through the schools’ curricula, INFP recognition, and the networking experiences it facilitates notably with internships.

Keywords: TVET, Haitian, agriculture
Introduction

Developing countries view agricultural activities as routine (Wilkin, 1997), but agricultural production is often inferior in these countries (Fuglie & Wang, 2012). This situation likely contributes to the critical food insecurity status in some of these nations (FAO, 2006). This, coupled with the fact that 70 to 75% of the poverty worldwide is found in the rural communities (FAO, 2002) suggests that developing countries are key to reducing the food insecurity crisis in the world (Fuglie & Wang, 2012).

Many developing countries (30 out of 68) have experienced agricultural productivity increase which has allowed more than 30% GDP growth per year as a consequence (Atchoarena & Sedel, 2003). However, Haiti is one of those countries whose GDP has been fluctuating but mostly trending down since the beginning of the new millennium (FAOSTAT, 2018). Haiti also registers an alarming hunger index severity, the worst of the Latin American and Caribbean (LAC) region (von Grebmer et al., 2016). Haiti was also the main reason for LAC’s failure to attain the First Millennium Development Goal (MDG1) against hunger (FAO, IFAD, & WFP, 2015). This situation suggests a critical need for addressing agricultural issues in Haiti in order to tackle the food insecurity status of its population.

Improving agricultural productivity requires new technologies and new practices (Fuglie & Wang, 2012). Extension can play a key role in working with farmers to make changes. Previous research in the Centre department of Haiti has revealed that extension activities have doubled farmers’ income and improved their food security status (Maxime & Paul, 2017). In Haiti, agricultural technicians perform much of the extension field work (GFRAS, 2017). Agricultural technicians often have a diploma earned at a Technical, Vocational, Education and Training (TVET) school (GFRAS, 2017). Therefore, making improvements in TVET has the potential for improving the larger agricultural situation (Basu & Majumdar, 2009). However, not much is empirically known about Haitian TVET schools. Anecdotal and indigenous knowledge most certainly exists. This study will fill a need by moving some of this knowledge into the literature so it can be discoverable by others.

Theoretical Framework

We approached this research using social constructivism as a lens (Doolittle & Camp, 1999). This allowed us to examine the larger phenomena from the individual perspectives of people who are most familiar with TVET in Haiti. It also allowed us to recognize that learning occurs within a culture and is socially constructed by people who work together (Lave, 1991). Operationally, this allowed us to answer the question of how do directors, teachers, and students believe TVET fits within the larger socio-cultural context of Haiti.

Literature Review

According to UNESCO (2017b, p. 1) TVET can be defined as “those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupation in various sectors of economic life.” UNESCO also documented TVET’s role in tackling various social inequalities, such as unemployment, and also in contributing to sustainable development (UNESCO, 2017a). Therefore, market demands determine the skills that must be part of the curricula, particularly those pertaining to specific technical expertise, scientific and information technology, as well as the ability to transfer those skills from the school to home and to the workplace (King, 1993; Mouzakitis, 2010). Many TVETs only
provide terminal degrees focused on technical skills. However, in LAC many TVETs are non-terminal and they may allow for higher degrees as much as they provide a technical diploma (King, 1993). TVET has been found to contribute to sustainability, growth, equity, employability, decent work, and lifelong learning (UNESCO, 2015). However, in developing countries TVET is often regarded as having low prestige because it is reserved for people from a certain social class and those who cannot get into universities (King, 1993). In Ghana for example, TVET is believed to be for people with poor academic performance, and results in less vertical mobility, growth, and salary (Darvas & Palmer, 2014).

TVET schools vary greatly due to a variety of historical and cultural influences. They offer an array of curricula and focus on diverse employment opportunities (King, 1993). In Europe, three models have been identified: the market model, the state-controlled model, and the cooperative or dual model (Koudahl, 2010). The dual model is an integration of both the market and the state-controlled model and it provides the combined benefits of easy and fast employment of market model, as well as the excellent and broad training found in the state-controlled model (Koudahl, 2010). The cooperative model is operationalized through the formal training in school settings followed by placement in the workplace to learn the intricacies of the trade (Koudahl, 2010). This diversity is also found in the various locations where TVET is conducted, specifically school-based or post-school programs (King, 1993). Post-school programs mean post-primary education in developing countries (King, 1993). Apprenticeships have been prevalent in the past, and work-based trainings are increasing in more recent years (King, 1993). National public agencies usually finance these programs in LAC (King, 1993). Whereas in Africa, enrollment in private TVET remains two-times more than the public TVET (Darvas & Palmer, 2014).

Post-secondary TVET must focus on six critical areas: institutional linkages, government support, physical infrastructure, human capacity building, and curriculum development (Rivera, 2006). Various types of TVET institutions, curricula, and outcomes mean that there is not a single best approach to TVET. Rather, TVET must build upon the cultural context already prevalent in the society (King, 1993).

In Haiti, not much is empirically known about agricultural TVET schools. Related work by the same research team has recently begun describing agricultural TVET in Haiti. Calixte et al. (2019a) found that agricultural TVET schools improved the social mobility of students, improved local communities, and enhanced extension activities. We also studied the curricular balance of theory and practical skills and found that the schools desired a balance of theory and practice, but many barriers prevented this from happening (Calixte et al., 2019b). In a third article (Calixte et al., 2019c), we examined employment opportunities for graduates from the TVET schools. Most graduates were either (a) working as extension technicians in the public sector or for NGOs; or (b) entrepreneurs. The existing research has not examined how agricultural TVET schools fit within the socio-cultural context of Haiti. The current study will examine this phenomenon.

**Purpose**

This study’s purpose was to gain a better understanding of the context for agricultural TVET schools in Haiti. A single research question guided our inquiry. How do directors, teachers, and students believe TVET fits within the larger socio-cultural context of Haiti?
Methodology

The study used a phenomenological qualitative design (Ary, Cheser Jacobs, Sorensen, & Walker, 2012; Creswell & Roth, 2018). Based on our theoretical lens, we began the study seeking to understand the phenomena based on the lived experiences of the people most familiar with agricultural TVET in Haiti. This study was conducted in conjunction with additional research on TVET in Haiti (see Calixte et al., 2019a; 2019b; and 2019c).

The target population was agricultural TVET schools in the Ouest (West) Department of Haiti. This resulted in four schools, three schools in Petit-Goave (schools 01, 02, and 03) and one in Montrouis (school 04). These were all of the TVET schools identified in the department. These schools were considered typical cases (Miles, Huberman, & Saldaña, 2014), with the exception of the school in Montrouis, which was affiliated with a university and operated differently than the others. Within each school, stratified sampling (Ary et al., 2012) was used to provide a diversity of perspectives. This resulted in interviews with the director (noted as D-01, D-02, D-03, and D-04, so D-01 was the director at school 1), interviews with three teachers (noted by the school and teacher number, so 01-T1 was the first teacher interviewed at school 1), and a focus group of nine students to occur (noted by FG, so FG-01 was the focus group conducted at school 01). Accessibility to students in the school in Montrouis was limited, so only one student was interviewed.

The interview and focus group guides were written in English then translated in French and Haitian creole. Interview and focus group questions were developed based on a review of the literature and reviewed by experts in the field, including Haitian researchers. The interview guides were semi-structured and the researcher who conducted the interviews and focused groups expanded and asked probing questions based on participant responses.

The interviews occurred in creole at the respondents’ office, campus, or home. The focus groups occurred on each campus. Interviews and focus groups were conducted by the lead researcher, who is Haitian. The interviews and focus groups were audio recorded and the researcher kept a journal (Yin, 2016). The researcher also made general observations of the facilities on each campus in her journal.

Data analysis was conducted using the constant comparative method to identify emergent codes. Codes were grouped into themes and sub-themes using open and axial coding (Saldaña, 2016). The initial codes were in English, emerging directly from the audio recordings (Ary et al., 2012; Miles et al., 2014) rather than a transcription (Green, Franquiz, & Dixon, 1997). This was deemed appropriate since part of the research team could read and write French and Haitian Creole and part of the team could not. The same process was used in the related research (Calixte et al., 2019a; 2019b; and 2019c).

Peer-reviewing was also used to ensure trustworthiness by two peers fluent in English and Creole who reviewed a randomly selected report of a teacher interview (Creswell & Miller, 2000). Representative quotes were pulled directly from audio recordings. Trustworthiness was further established by using member-checking with the directors by sending them synthesized versions of their interviews (Cho & Trent, 2006; Hoffart, 1991). Three of the four directors responded. For further rigor, data were triangulated occurred by using multiple sources (directors, teachers, and students), as well as data collection methods (interviews, field notes, and observations) (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014).
Demographics

The directors and teachers were all male and most were agronomists. Three of them had earned graduate degrees. The same three worked fulltime at their schools. The others worked part time at the schools and either taught in other schools or had other businesses. A few also worked as agriculture technicians. The students were mostly from rural communities, with personal of family activities in agriculture and commerce. There were nine women among 28 students in total, and the age range seemed wide, not just students who had recently finished secondary school. Many of the students also had worked or studied elsewhere before beginning the TVET school.

Schools 01 and 02 only offered the agriculture technical option. School 03 also offered other technical options. School 04 was a university delivering both a technical diploma and a bachelor’s degree. Directors reported that their program of study lasted between 2 and 3 years. School 04 used a credit system, which allowed matriculation to the university. The minimum entry level requirements varied across schools. School 04 required philo, school 03 required 2e, and schools 01 and 02 required 3e. In terms of accreditation, only school 02 reported having INFP (government) recognition and school 04 was an accredited university.

Findings

Overall, two major themes emerged, each with several sub-themes. First, there was cultural regard for agriculture and TVET. Second, the value of TVET in the Haitian agricultural system. Each theme and sub-them is expanded below.

Cultural Disregard for Agriculture and TVET

Overall, participants revealed that the agricultural community did not believe in a future in agriculture or the value of TVET. They preferred other modes of development for the next generation, partly due to the lack of investment in the agriculture sector. The government was also sending mixed signals when it did not address the challenges faced in the sector, despite the importance of the agriculture sector for development of the country.

Stakeholders’ contempt for agriculture and TVET. This contempt for agriculture, which was reported in FG-01, sometimes came from the farmers themselves “some people say they would rather beg than do agriculture.” Farmers were giving up on agriculture as 01-T2 explained, “the way Haitian think, they send kids to school, so they may not have to farm like them.” Since the technician is involved closely in agriculture, this may be a reason why the population does not consider a technical diploma as a desirable product. D-02 claimed that “in Haiti, all the kids only focus on university studies but disregard professional studies which are the most important” for the rural communities.

Students were also aware of this situation. According to some of them in FG-01, “in our country, an agricultural technician does not have much importance […] an agricultural technician should be important but from now on in our country they are the people who struggle the most.” The struggling comes from the fact that “the state does not give importance to agriculture” (FG-01). The same frustration was expressed about the private sector, “ […] even if you go to the bank for a loan if it is an agricultural project it’s very difficult, because the sector is looked down upon” (FG-01).

State’s failure. Many participants highlighted the government’s failure to support TVET, even though it is an important link in the human capacity development chain. As this teacher explained “the Haitian state [government] does not accentuate on agriculture” (03-T1) when
referring to training. 01-T3 hoped that "the state will take its responsibility one day and give the country’s education the value it deserves." Teacher 01-T2 felt like “our state doesn’t support our trained people,” they could “come to the schools and give the best students support,” referring to the potential for providing scholarships. D-01 had a dream that “if the state gave the possibility I would do an agricultural institution.” He believed this was a prime example of how the government is failing agricultural TVET. Even students were aware of the fact that one of the “issue[s] is that there may be technicians, but the state doesn’t take charge of them.” The biggest failure reported may be from 04-T3 when he reflected on how agricultural TVET "used to happen before, which is important but is neglected now;” “in the past, the state had many EMAs, technical schools in many cities in the country.”

**Value of TVET in the Haitian Agricultural System**

In contrast, despite the disregard for TVET, it was reported that agriculture and TVET schools help those vulnerable communities and their youth by making graduates competitive on the job market, providing networking opportunities, giving a solid reputation, and providing the diploma which can allow the student to continue towards higher education.

**Inherent value.** The duality of roles between agronomists and technicians within the agricultural system was brought up many times but may be summed up by teacher 01-T3, “to solve Haiti’s many issues we need agronomists for some determined parameters, and we need technicians for other parameters.” The “parameters” which seem to fall under technicians’ responsibility are to “just accompany them [the farmers] in that sense and bring technical knowledge to them” as a student during FG-03 commented. Director D-01 agreed that “technician is science and knowledge; whenever science is applied in any field you will get results.” Therefore, according to 03-T2, “no country can pretend to create emergence in the agricultural sector without emphasizing on technicians.” He went further to say that “the technician goes onsite to execute the study conducted by the agronomist.” According to 01-T2, this situation is due to the fact that the technician’s relationship with agriculture is "in terms of hands-on.” This explains their importance, because agriculture is a practice. D-02 proposed, “technicians are masters in the subject” of agriculture, “technicians are the main authors of the work,” which is why they are important, as compared to agronomists who have other roles within the system. 01-T1 sustained that the practical “things must be done by technicians, and agronomists are there to supervise.” Therefore, D-03 concluded, “if we do not have them [the technicians], we will not be able to do agriculture in the country and there will be no one to help do agriculture in the country.” This idea was supported by teacher 01-T3 “even if s/he [the agronomist] has a personal project or one for the state or NGOs particularly […] they recruit technicians as well.” As 04-T1 put it the “technician is the base; a motor of society.” Students went as far as to suggest that the intergenerational return to agriculture from people who want to abandon it was incumbent to them. “People say this [they would rather beg than do agriculture] because they lack knowledge about what agriculture is; so, they really do not have enough training on the subject and it should be a technician’s role” (FG-01).

**School curriculum and network/internship.** 04-T2 thought that “the academic aspect counts but also you enter the market in competition” with others “so then you have to be looking for new elements to add [to the curriculum] to make students competitive.” Someone in FG-02 was “just waiting for my diploma and I fly away.” According to D-02, “an advantage that a school has, which makes students like and attend it is to know that the school is of quality and when they come, they’ll find what they were looking for. And when they finish with their
Studies, they won’t have a hard time finding their legal paper [diploma with INFP recognition], and wherever they go they’ll be able to work with it.”

There are [soft] skills which also complement graduates from technical schools. For instance, communication skills. Many of these schools offered language courses or communication-related courses. 04-T1 was one of them and said, “I’m preparing a group of students not to be afraid to speak.” This is particularly important during interviews for jobs. Written communication is also crucial. 03-T2 described it well, “NGOs working in soil and water conservation require a daily report; some technicians who go work in these types of organizations but simply because they don’t have the ability to write these reports, they let go of them in the jobs.” Teacher 02-T3 targeted their computer competencies as well; “then they have an obligation; whatever institution they’re in, they’ll function [like that]. They will not hand over handwritten papers anymore,” speaking about typed assignments he forced his students to submit.

School’s curriculum also intentionally integrates a networking experience. The schools can and did try to find internship opportunities to students in places that may become employers of graduates. 01-T3 clarified, after “we sent some graduates to do internships in the BAC,” the director of the BAC got promoted and took some of the best in the group with him to Leogane; then from there the best amongst that group followed some of officials from the ministry to Damien to work. Obviously, the students have to perform in these organizations but the school’s effort to place some of them, are the networking nudge they may need. D-02 explained “while the person is there on an internship, the NGO sees that the person is capable, and recruit him.” Students desired even more formal internships during their studies. Like FG/E-04, “if while I’m taking courses, I could have internships as practices, this would have allowed me to have more experience but also have more assets to compete or as a candidate for a job.” Apart from the internships, some teachers intentionally take students to the field in areas where the probability of encountering organizations is high. 03-T2 teacher took his students where “there are always interventions in the area like surveys” or “on soil and water conservation,” because according to him, “this can allow the students to participate in this kind of programs (...) when there are calls for recruitment” from these NGOs working in the area. This other teacher 02-T1 said his practicums are conducted on land owned by farmers or other organizations. It is surely beneficial to create a relationship between the school and these organizations, so that when graduates apply, it is easier because there is familiarity with the school. D-03 admitted, “relative to technic or practices in the field, there are places we especially go to with the students where we estimate that, after their training they could go work to these places.” 03-T2 also took students to businesses, and “work[s] in agreement with” important people in the sector they need to know, such as “a coordinator of a peasants’ association.” He also brought them to people in the community whose knowledge and connections will be useful to someone wanting to start a business in the community. All of these efforts ultimately pointed at increasing the school’s reputation and subsequently its graduates’ competitiveness in the job market.

**Reputation.** A TVET schools’ reputation is critical for it to be able to create networks, it has to be esteemed in the community. 02-T2 admitted, “my pride is when the student goes to work in an organization and they see he has qualities and knows what he’s doing; so, then the school is renowned, and the teacher is also renowned for the course he teaches.” A good reputation opens doors for other graduates from the school and to other organizations in the community. D-02 explained that there are many other schools in the city, many of which had opened at the same time as theirs and they are now closed. Former teachers had decided to open
their own school and failed. “It’s a lot of steps towards INFP recognition,” which is a competitive factor for a school to have, and it contributes to their reputation amongst students. The reputation of the school also opens doors to continuing education for those students who desire it. Some students enter TVET as a step towards the bachelor’s degree. “We can get a paper [diploma] for us to function either on the job market or other, if we wanted to continue” our studies (FG-03). They added, “the diploma will help us work and add more superior studies” (FG-03). With the technical diploma, they hoped to find a job or create their own job in order to finance their bachelor’s degree. Some teachers and directors even approved of this situation. 04-T1 thought “it is interesting [a diploma in agronomy] because first the kids have a basic training that will allow them to enter the job market all the while pursuing more studies towards a license.” D-04 managed an institution which also offers higher studies degrees. He confirmed, “we receive students from these schools who want to pursue a license [bachelor] with us.” However, very few schools allow students to get credits for courses they have already completed. It is closely related to the school’s reputation according to D-04, whether or not students will be given credit for courses.

**INFP recognition.** INFP recognition from the government was a recurring theme. “We’re the only agricultural technical school in Petit-Goâve with a paper [INFP permit]” coined D-02. INFP recognition and reputation of the school are somewhat related. D-02 recognized this situation “it is a technical school that many give credit to because of cohorts’ results and INFP calendar.” This idea was supported by his students during FG-02, many of whom were studying at another technical school and decided all together to come to this one, because it would allow them to have a diploma with INFP recognition. Another student from FG-03 also previously attended another school and said he “didn’t like the way it was functioning,” he realized that he “will have difficulty finding a paper [diploma].” He actually knew about “students before me who finished and couldn’t get a paper [diploma].” So, he switched to the school (school 03) where he is currently enrolled. According to D-01, school 01 did not have INFP certification because there was not enough money and the requirements are very tedious. Nonetheless, they still used the INFP curriculum for their courses because they were in the process of being certified. D-02 confirmed that the steps to certification are tedious and that there is small success rate for obtaining INFP recognition. Therefore, it is a competitive factor. D-02 explained that students come from afar to be able to attend this school because they know they will be able to get a diploma and work as soon as they graduate. Since D-04’s school was different, it was important to understand the process his graduates need to go through to get their certified diploma. He explained that “they need to legalize their papers in the ministry of education” then “the ministry sends a form and a letter to us for us to fill about what was the condition for awarding the degree, whether the engineering or technical, to the student.” This reaffirms that state recognition is essential to these students. INFP recognition means the graduates from the school, on average, are qualified to do the job they have been trained to do. INFP publishes a list of required courses, but directors acknowledge that it is a minimum, and they all add many more courses to it. Therefore, INFP recognition is important, but so is a solid curriculum.

**Competitiveness.** In the curriculum, the competitive advantage is in the details. For example, D-04 argued that their technicians are different from the others in that they may “have the same title but they are not the same” because “they have the same basic courses” with agronomists. Also, the teachers at school 04 made no difference between students pursuing a diploma and a technical degree. However, this idea was contradicted by the student interviewed who claimed that his teachers gave him more practices than his peers. 04-T1 acknowledged that
it is difficult to stand out, “especially the technician in 2 years will have to face a market; it is a very competitive market. I need to prepare mine to be better, so my students make the difference.” Many teachers and directors have spoken about strategies they used to make their graduates more competitive on the job market. Practical experience is one competitive factor that works in favor of technicians. A perfect example of this situation is a student’s statement during FG-03, “the agronomist who is an engineer doesn’t practice as much according to information I have. An agronomist told me that sometimes in exams, a technician goes competing against agronomists and the technician wins because of practice.” An idea that was backed up by 01-T2, who knew of a former student who got a job alongside three agronomists He is employed with them doing the same job and having the “same respect.” There is even a perceptible competitive nature in a few of them, like D-02 who recounted when ODVA came to the city, did an exam back when he was a student, their school scored highest. He continued to say that “we’re credible and we’re the only ones giving [releasing] good products on the market.” As a result, “our graduates, when we send them to a project, sometimes they’re not tested because they know they’re qualified, and they can do what they’re doing.” This is an incredible advantage to skip entrance exams, which the school’s positioning may obtain for their graduates.

**Conclusions, Recommendations, and Implications**

Overall, this group of participants had mixed feelings about how agricultural TVET schools fit in the larger socio-cultural context in Haiti. Respondents believed agricultural TVET in Haiti was not always as valued as it should be, even by people who are active members of the agricultural community. Participants specifically noted that parents, students, and the government did not realize the value of attending a TVET school. In contrast, participants recognized the important roles that agricultural TVET schools are playing in Haiti.

The TVET schools had the ability to influence employment opportunities for their graduates by positioning themselves in the system as institutions delivering quality training. As also suggested by UNESCO (2016), TVET can only achieve these ambitious goals through the relevance of its curriculum to the labor market and the proper management of TVET institutions.

One of the ways to achieve that position in Haiti was to get INFP certification, which ensured the authentication of the diploma and became a decisive factor for students when choosing amongst competing schools. Although INFP certification was reported to be extremely difficult to get from the ministry of education.

At the course level, many teachers helped students with employment, through the networking they facilitated during practicums. Teachers often set up the practicums in areas where organizations were present and introduced to people whom are important stakeholders in the communities. This often led to internships, which are valuable in agricultural-related studies (Roberts, 2006). These internships were ultimately the most efficacious at connecting employers with graduates, as many of the interns ended up being employed by the organizations where they interned. In general, UNESCO (2017a) reported that TVET is thought to help tackle various social inequalities, provide employment and contribute to sustainable development.

Despite this situation, many parents and students seemed to avoid agriculture and TVET. They were not highly regarded. Rather, people would prefer to enroll in science or avoid agricultural activities altogether. This was consistent with previous research which showed people in developing countries were reluctant to enroll in TVET because there is a perception that it is reserved for youth from a certain economic status and were not expected to continue to higher education (King, 1993). Moreover, students and educators agreed that the government had
a role to fulfill to help TVET and ensure success of young people, especially when it comes to
agrarian policy decisions and even the training itself. Students in the current study were having
difficulty paying the tuition and often did not pay it. Therefore, some participants suggested
government scholarships for the most capable students. This is complicated because the interplay
between two government ministries. The Ministry of Agriculture which sets regulates agriculture
and the Ministry of Education which regulates schools. King (1993) recommended that
government intervention in TVET should be individualized based on the context of each
individual country, particularly when taking into account the government’s concern for equity
among the population, the capacity of the private sector to deliver quality training and the market
demands. Government interventions were also mentioned because of lack of infrastructure,
agrarian policy, and credit, which made it difficult to start or maintain a business. There have been
discussions about “the extent to which the character and provision of TVET are actually
affected by the broad economic policy of the state” (King, 1993, p. 213). “The more appropriate
course may be to build upon the culture of TVET that has already been long established in a
particular country” (King, 1993, p. 214). In this case, it may be that the Haitian government was
expected to intervene in the realities of agricultural TVET.

Recommendations for research would be to investigate other cultural implications for
agricultural TVET such as the position of the ministry of agriculture on private TVETs, the
farmers, and rural communities’ perception of technicians. It would also be important to compare
the findings in other geographic departments of the country so as to determine the regional
subcultures around agricultural TVET. This study also suggested that there were other cultural
elements that play a role in TVET in Haiti such as trainings as currency and students not paying
tuition.

Recommendations for practice would be to consider including elements of the
importance and purpose of technical studies in trainings targeted to technicians, agronomists,
farmers, extensions agents going in the communities, and ministry staff. Agricultural TVET
schools can develop practicums in the rural communities through which students and farmers get
acquainted in order to change the perception of these communities on the sector. TVET also
needs more exposure in the media, particularly on the radio, most used in the rural communities,
but also more mainstream media which can change their image with economic forces. Changing
the image of TVET has the potential to attract even more students to these schools.

References
D. Atchoarena & L. Gasperini (Eds.), Education for rural development: Towards new
policy responses. A joint study conducted by FAO and UNESCO (pp. 35-68). Paris,
Basu, C. K., & Majumdar, S. (2009). The role of ICTs and TVET in rural development and
poverty alleviation. In R. Maclean, D. N. Wilson (Eds.), International handbook of
education for the changing world of work (pp. 1923-1933). Dordrecht, The Netherlands:


Communication of Genetic Modification Science: Consumers’ Critical Thinking Style, Perceived Transparency of Information, and Attitude

Yu-Lun Wu
Joy N. Rumble
The Ohio State University

Alexa J. Lamm
University of Georgia

Jason D. Ellis
Kansas State University

Abstract
Consumers’ attitude toward GM science is not only an important factor to determine the industry’s development, it is also a crucial topic across various countries. How people express their judgment of GM science, involves a highly complicated process. Because of this complexity, influence on attitude toward GM science has become a popular research topic and has been examined through various variables. This study sought to examine the effects of critical thinking styles and perceived transparency of GM science on attitude toward GM science. To fulfill the purpose of the research, an online survey was conducted. A total of 1,047 adults across the United States were recruited using non-probability sampling techniques. The results of the study found critical thinking style had a significant impact on the perceived transparency of GM science information and attitude toward GM science. However, consumers with higher perceived transparency of GM science information reported lower attitudes toward GM science than those who had lower perceived transparency. An interaction effect of critical thinking styles and perceived transparency of GM science on attitude toward GM science was found. Further research examining perceived transparency was recommended. In addition, it was recommended that extension agents or agricultural communicators could develop various communication strategies based on various attribution of consumers.

Keywords: genetic modification science, critical thinking styles, perceived transparency, attitude

Acknowledgements: This study was funded by the USDA’s National Institute of Food and Agriculture through the Specialty Crops Research Initiative/Citrus Disease Research & Extension. USDA NIFA Award No. 2015-70016-23028.
Introduction

GM (genetically modified) science, or GMOs (genetically modified organisms), which can modify plants or animals more quickly than traditional breeding, has brought a rapid revolution in the contemporary biotechnology industry (Grun, 2004; Lang & Hallman, 2005). These technologies can develop herbicide, disease, and pesticide-resistant crop varieties, increase shelf-life, improve the nutritional value of foods, and increase production yields, all of which can lead to greater global food security (Mahgoub, 2016, p. 6; Wunderlich & Gatto, 2015). Although the literature shows that the advantages of GM science outweigh the risks, consumers’ attitude toward GM science remains polarized (Mahgoub, 2016; Wunderlich & Gatto, 2015) due to food safety, human health, and environmental concerns.

To understand public support and opposition toward GM science development, attitude toward GM science communication has become an important research topic that has been examined worldwide (Aerni, 2005; Friedel, Meyers, Mamontova, & Irani, 2007; Gaskell et al., 2000; Gaskell, Bauer, Durant, & Allum, 1999; Li, Curtis, McCluskey, & Wahl, 2003; Macer & Ng, 2000; Ruth & Rumble, 2016). Human perception involves a complicated cognitive process, which may vary by individual differences. Therefore, it is necessary to explore and continuously examine the relationship of various variables related to attitude. This study aimed to explore if two variables related to information seeking, critical thinking style and perceived transparency of information, impact attitude toward GM science. Additionally, this exploratory study sought to examine if there was an interaction between these variables.

Literature Review

Public’s attitude toward GM science

Attitudes are critical to emerging research or technology, such as biotechnology, energy, or other topics because they are the main factor driving the adoption of new technologies and the growth of industries (National Science Board, 2018). Marques, Critchley, and Walshe (2015) stated that public attitudes could have an impact on the consumption of GM products, and frame government policy and regulation which are related to the industry’s development, production, and distribution.

Practically, attitude is recognized as individual psychological judgments of the worthiness and favorableness toward a specific issue (Roberts, Reid, Schroeder, & Norris, 2011), which involves a process of evaluation. Evaluative attitudes could be expressed as liking or disliking, approval or disapproval, approach or avoidance, and attraction or aversion (Frewer, 2003). Attitudes have been used to explain why some people support specific ideologies, policies, products, while others do not. In other words, a person who favors a particular issue is said to have a positive attitude. However, attitudes are not able to directly observed but can be deduced from observable responses, for instance, responses to interviewers or self-reporting questionnaires (Frewer, 2003).

Attitude has long been a focus in theories and research about consumer behavior (Ajzen, 2008). Ruth (2018) stated that most research has shown attitude could be a main and reliable factor of trust toward specific issues or organizations (Muñoz, 2012; National Science Board, 2018; Roberts et al., 2011). Roberts et al. (2011) found public attitude may differ by demographic variables such as gender, age, educational background, and social status.
Perceived Transparency of Information

Rumble and Irani (2016) examined the effects of transparent communication and personal relevance on participants’ attitudes and found transparency had a significant effect on attitude. Researchers have tried to improve communication between consumers and scientists by releasing information and publications about the benefits of GM food, but many consumers remain skeptical due to perceptions of researcher bias and subjective interpretation of results (Funk & Kennedy, 2016; Mahgoub, 2016). Transparency has been recognized by the scientific community as one of the vital features of science, but research suggests transparency of science is not well supported or commonly examined (Nosek et al., 2015). We can define transparency from various perspectives, but visibility is recognized as a fundamental meaning of transparency. According to Grimmelikhuijsen and Welch (2012), transparency can be explained as a composite construct which involves multiple components, such as external accessibility and active disclosure. It is also applicable to include inferability of information (Michener & Bersch, 2013), or completeness and understandability (Grimmelikhuijsen, Porumbescu, Hong, & Im, 2013). Meijer (2013) defined transparency as “the availability of information about an actor that allows the other actors to monitor the workings or performance of the first actor” (p. 430).

Previous studies have focused on how to promote governmental or organizational transparency as a communication strategy. Song and Lee (2016) stated that organizations are able to promote transparency by actively revealing news about their activities and decisions, and then making citizens able to access, monitor, and evaluate their updates. People assume that they will perceive government transparency when government information is publicly available. But even though the information is available, if people are not effectively informed of government activities and decisions, they will not perceive transparency from the government (Song & Lee, 2016). Even in cases where science is transparent, the skepticism of consumers can only be overcome if they perceive the information as transparent (Goodwin, 2013). In other words, if the public does not know or cannot see the information, they will not trust the information (Grimmelikhuijsen, 2009). Therefore, the examination of consumers’ perceived transparency toward science information may be critical in practical science communication throughout the world. Scholars have gradually realized trust associated with transparency has just as much to do with consumer access and perception as it does the organizations’ efforts to be transparent (Goodwin, 2013; Song & Lee, 2016).

There are few studies focused on “perceived transparency.” van der Cruijsen and Eijffinger (2010) found insufficient transparency perceptions influence people’s actions which were reflected in their perceptions and expectations, also in their trust of the organization. The study also indicated higher transparency perceptions are aligned with higher levels of trust. To study the company-consumer relationship, Kang and Hustvedt (2014) used perceived transparency in predicting consumers’ trust-building with a company. The results indicated consumers’ perceived transparency of a company’s production, labor conditions, and community responsibility influences their trust and attitude, and further affected their intentions to purchase from the company and spread positive news about the company and its products. Zhou, Wang, Xu, Liu, and Gu (2018) focused on how perceived transparency influenced online purchasing behaviors. Perceived transparency was examined under the consumer service life cycle framework. One of the results revealed perceived transparency of information significantly increased consumers’ online purchasing intentions (Zhou et al., 2018). Based on the available literature, perceived transparency may have a positive impact on consumers’ attitude toward GM science.
Consumers’ Critical Thinking Style

Consumers’ attitude involves a series of cognitive processes that may be influenced by demographic variables. Understanding consumers’ information seeking behaviors could be helpful in determining their perception of transparency when they encounter GM science information as well as their resulting attitude. People rely on media, primarily that available on the Internet, to obtain science information; including listening to the radio, reading print media, watching television, and surfing online (Schäfer, 2016). The Internet is commonly accessed first and provides a rich source of product and service information that can influence consumers’ information seeking behaviors (Peterson & Merino, 2003; Ratchford, Talukdar, & Lee, 2001).

However, consumers’ information seeking behavior is inherently complicated (Peterson & Merino, 2003). Lamm (2015a) has proposed that individuals obtain information through either seeking or engaging. Seekers prefer to pursue information actively and take an elaborate research approach to decision making. They are willing to adjust their own biases and investigate topics from all aspects. Seekers are eager to know the truth, even if the truth does not correspond with their own beliefs. Conversely, engagers participate in information gathering through interactive communication. Engagers gain more benefit from open group discussions because they prefer to collect information from their surroundings and via word of mouth. They have faith in their beliefs and are confident to share their opinions with others (Gay, Terry, & Lamm, 2015; Lamm & Irani, 2011).

Understanding information seeking behaviors can help educators and communicators understand how individuals learn and gather information. Additionally, gaining this understanding can allow for information to be customized to appeal to those with different critical thinking styles to seek or engage with information (Leal, Rumble, & Lamm, 2017). For instance, Lamm and Irani (2011) found consumers with different critical thinking styles prefer different media sources: A seeker will prefer one-way communication, like print media; while an engager will prefer collecting information through conversations, such as blogs, social media, consumer email, forums, and email (Lamm, 2015b). Gorham, Lamm, and Rumble (2014) applied critical thinking style to examine the feasibility of developing communication strategies to promote water conservation behaviors. The results showed a relationship between critical thinking style and engagement in water conservation behaviors. Seekers were more likely to participate in more conservative water behaviors, while engagers were less likely to participate in water conservation behaviors. Leal et al. (2017) conducted an online survey to examine consumers’ preference for food safety information and their critical thinking style. The results indicated seekers preferred printed fact sheets, bulletins or brochures, and demonstration or displays, while engagers preferred websites, which were consistent with previous studies.

Purpose and Objectives

The purpose of this study was to determine how individuals’ critical thinking style and perceived transparency of GM science information influenced their attitude toward GM science. The study was driven by the following research objectives:

1. Examine if consumers’ critical thinking style influences their perceived transparency of GM science information.
2. Examine if consumers’ critical thinking style influences their attitude toward GM science.
3. Examine if consumers’ perceived transparency of GM science information influences their attitude toward GM science.
4. Examine if consumers’ perceived transparency of GM science information and critical thinking style interact to influence their attitude toward GM science.

The conceptual model guiding this study is shown in Figure 1. To illustrate the interaction effect of consumers’ perceived transparency of GM science information and critical thinking style on attitude toward GM science, the relationship of the variables is shown as H4. We predict that the pre-existing critical thinking style of individuals will interact with their perceived transparency of information to influence attitude.

![Conceptual model](image)

**Figure 1.** Conceptual model of consumers’ critical thinking style, perceived transparency of GM science information, and attitude toward GM science

**Methods**

The study applied non-probability sampling techniques to collect data from 1,047 adults, 18 years of age and older, across the United States (US) using an online survey. To compensate for selection, exclusion, and non-participation bias, weighting was utilized to lessen the limitations associated with non-probability sampling (Lamm & Lamm, 2019). The research was part of a larger study (Rumble, Lamm, Beattie, & Ruth, 2018) that examined US citrus consumers’ perceptions toward and acceptance of combating citrus greening technologies. However, only three sections were used to meet this study’s objectives: perceived transparency of GM science information, attitude toward GM science, and critical thinking style.

Perceived transparency of GM science information was measured using 12 opposing word pairs on a five-point semantic differential scale with 1 indicating negative attitude, and 5 indicating positive attitude. Item responses were averaged to create a perceived transparency index, which was found reliable (α = .93). The attitude was measured using eight opposing adjectives on a five-point semantic differential scale ranging from 1 = Negative to 5 = Positive. Item responses were averaged to create an attitude index, which was found reliable (α = .97). Respondents’ critical thinking style was measured using the University of Florida Critical Thinking Inventory (UFCTI; Lamm & Irani, 2011). The UFCTI is a tool to measure how an individual adopts critical thinking skills to learn and think about an issue (Gay et al., 2015). The instrument is composed of 20 items on a five-point Likert-type scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, and 5 = Strongly Agree. The UFCTI was used to identify respondents as either an information engager or seeker. Item responses were averaged to create a UFCTI index (α = .93). Critical thinking style scores could range from 26-130. Respondents with a score of 78 or below were categorized as information
engagers. Respondents scoring a 79 or above were categorized as information seekers (Lamm & Irani, 2011). The survey was reviewed by a panel of experts and pilot tested before distribution.

SPSS® 25.0 was used to analyze the data from this study. Objectives 1 to 3 were analyzed using simple linear regression to examine the relationship between consumers’ perceived transparency of GM science information, critical thinking style, and attitude. Moderation was applied in objective 4 to see if there was an interaction between perceived transparency of GM science information and critical thinking style on attitude toward GM science. Initially, an examination of a boxplot was applied to detect outliers. For the standard errors and t-values to be valid in linear regression analysis, the variables needed to meet specific assumptions: 1) normality of residuals, 2) linear relationship; 3) homoskedasticity, and 4) Leverage (Cohen, Cohen, West, & Aiken, 2003). The examination of normality of residuals showed residuals were normally distributed. A linear relationship was observed between prediction and actual scores. For homoskedasticity, constant error variance indicated residuals were equally distributed about zero across the breadth of the plot. As for testing leverage, there was one case diagnosed with both high leverage and residuals outside [-2, 2] range. But the case did not change the result after removing from the data, for substantive purposes, it was not opted out for regression analysis. Demographic analysis of the respondents can be found in Table 1.

Table 1  
**Demographics of respondents**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>511</td>
<td>48.8</td>
</tr>
<tr>
<td>Female</td>
<td>536</td>
<td>51.2</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 12th grade (did not graduate high school)</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>High school graduate (includes GED)</td>
<td>152</td>
<td>14.6</td>
</tr>
<tr>
<td>Some college, no degree</td>
<td>289</td>
<td>27.6</td>
</tr>
<tr>
<td>4-year college degree (Bachelor's, etc.)</td>
<td>305</td>
<td>29.1</td>
</tr>
<tr>
<td>Graduate or Professional degree (Master's, Ph.D., M.B.A., etc.)</td>
<td>168</td>
<td>16.0</td>
</tr>
<tr>
<td>2-year college degree (Associates, Technical, etc.)</td>
<td>126</td>
<td>12.0</td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>198</td>
<td>18.9</td>
</tr>
<tr>
<td>$25,000 to $49,999</td>
<td>268</td>
<td>25.6</td>
</tr>
<tr>
<td>$50,000 to $74,999</td>
<td>211</td>
<td>20.1</td>
</tr>
<tr>
<td>$75,000 to $149,999</td>
<td>296</td>
<td>28.2</td>
</tr>
<tr>
<td>$150,000 to $249,999</td>
<td>54</td>
<td>5.1</td>
</tr>
<tr>
<td>$250,000 or more</td>
<td>21</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Results**

Respondents’ perceived transparency of GM science information had a mean score of 3.16 ($SD = .02$). Their attitude toward GM science had a mean of 2.40 ($SD = .03$). As for respondents’ critical thinking style, 651 participants were denoted as engagers and 396 as seekers.
Objective 1. Examine if consumers’ critical thinking style influenced their perceived transparency of GM science information

A simple linear regression analysis was applied to model the relationship between critical thinking style and perceived transparency of GM science information (see Table 2). The regression model was statistically significant, $F_{1,1045} = 20.79, p < .001$. Hence, there was sufficient evidence to claim that the 1.9% of the variability in perceived transparency of GM science information accounted for by the model was statistically greater than would have been observed by random variation. Furthermore, consumers who were denoted as information seekers had a perceived transparency score .22 points lower ($t_{1045} = -4.56, p < .001$) on average than the consumers who were denoted as information engagers.

Table 2

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Unstandardized Coeff.</th>
<th>Stand. coeff</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking style</td>
<td>.020</td>
<td>.019</td>
<td>-.223</td>
<td>-.143</td>
<td>-4.560**</td>
</tr>
</tbody>
</table>

** $p < .01$.

Objective 2. Examine if consumers’ critical thinking style influenced their attitude toward GM science

Simple linear regression analysis was used to model the relationship between critical thinking style and attitude toward GM science (see Table 3). The regression model was statistically significant, $F_{1,1045} = 13.4, p < .001$. Hence, there was sufficient evidence to claim that the 1.2% of the variability in attitude toward GM science accounted for by the model was statistically greater than would have been observed by random variation. Respondents who were categorized as information seekers exhibited an attitude toward GM science score that was .25 points higher ($t_{1045} = 3.66, p < .001$) on average than the respondents who were categorized as information engagers.

Table 3

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Unstandardized Coeff.</th>
<th>Stand. coeff</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking style</td>
<td>.013</td>
<td>.012</td>
<td>.246</td>
<td>.113</td>
<td>3.661**</td>
</tr>
</tbody>
</table>

** $p < .01$.

Objective 3. Examine if consumers’ perceived transparency of GM science information influenced their attitude toward GM science

Simple linear regression was used to model the relationship between perceived transparency of GM science information and attitude toward GM science (see Table 4). The regression model was statistically significant ($F_{1,1045} = 542.11, p < .001$), hence there was sufficient evidence to claim that the 34.1% variability in attitude toward GM science accounted for by the model was statistically greater than what would have been observed by random variation. Furthermore, the results showed that when consumers perceived transparency of GM science information increased by 1 point, the expected difference in their attitude toward GM
science decreased by .79 ($t_{1045} = -23.28, p < .001$). On average, consumers with higher perceived transparency of GM science information had lower attitudes toward GM science.

Table 4

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Unstandardized Coeff.</th>
<th>Stand. coeff</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived transparency of GM  science information</td>
<td>.342</td>
<td>.341</td>
<td>-.786</td>
<td>-.584</td>
<td>-23.283**</td>
</tr>
</tbody>
</table>

** $p < .01$.

**Objective 4. Examine if consumers’ perceived transparency of GM science information and critical thinking style interact to influence their attitude toward GM science**

Regression was used to determine whether consumers’ perceived transparency of GM science information and critical thinking style were related to attitude toward GM science (see Table 5). The model was statistically significant ($F_{3,1043} = 185.204, p < .001$), hence there was sufficient evidence to claim that 34.6% of the variability in attitude toward GM science accounted for by the model was statistically greater than would have been observed by random variation. Furthermore, for two consumers with the same perceived transparency of GM science information, the consumer who was categorized as an information seeker was expected to have a lower (-.489) attitude toward GM science ($t_{1044} = -2.174, p = .03$) than information engager. Additionally, for two consumers who had the same critical thinking style, if one consumer had a higher level of perceived transparency of GM science information than the other consumer, he or she was expected to have a lower (-.845) attitude toward GM science ($t_{1044} = -20.105, p < .001$) than the consumer who scored lower on perceived transparency of GM science information.

This finding suggests that critical thinking style amplified the effect of perceived transparency of GM science information. The amplification was statistically significant, $b = .188$, $t = 2.647, p = .008$.

Table 5

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>403.499</td>
<td>2</td>
<td>201.750</td>
<td>272.735</td>
<td>.000**</td>
</tr>
<tr>
<td>Residual</td>
<td>772.276</td>
<td>1044</td>
<td>.740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1175.775</td>
<td>1046</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>408.652</td>
<td>3</td>
<td>136.217</td>
<td>185.204</td>
<td>.000**</td>
</tr>
<tr>
<td>Residual</td>
<td>767.124</td>
<td>1043</td>
<td>.735</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1175.775</td>
<td>1046</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** $p < .01$.

**Conclusions and Recommendations**

The results revealed that perceived transparency of GM science information and attitude toward GM science varied among seekers and engagers. Seekers reported lower perceived transparency of GM science information than engagers. This may be explained by the tendency
of seekers to deeply investigate topics and seek to know the truth (Gay et al., 2015; Lamm & Irani, 2011). If their investigations have not left them feeling effectively informed on the topic, then literature would suggest that their perceived transparency would be lower (Song & Lee, 2016). Engagers may have the opportunity to get all of their questions answered through conversations, while seekers are still looking for answers, thus resulting in differences in perceived transparency.

Despite having lower perceived transparency of GM science information, seekers’ attitude toward GM science was higher than information engagers. The attitude difference between seekers and engagers adds to the literature regarding attitude variations among different demographics of individuals (Roberts et al., 2011). In addition, literature has revealed that consumers are generally skeptical of GM science (Funk & Kennedy, 2016; Mahgoub, 2016). Through their investigations, a seeker may be able to overcome the popular opinion of skepticism by finding more balanced resources that discuss the pros and cons of GM science and thus hold a more positive attitude. On the other hand, engagers may never be exposed to a balanced conversation about GM science as the popular opinion of skepticism may dominate their word of mouth information gathering (Gay et al., 2015; Lamm & Irani, 2011). Further research is needed to confirm this explanation, but the differences in critical thinking styles between seekers and engagers provide a plausible explanation for the observed differences in perceived transparency and attitude.

Collectively, respondents in this study exhibited lower attitudes toward GM science overall; however, consumers who reported having higher perceived transparency were more likely to report lower attitudes toward GM science. The negative relationship between perceived transparency and attitude observed in this study differs from the positive relationship observed between the variables in previous research (Rumble & Irani, 2016). This finding may be explained by the information and sources accessed by respondents. It is possible that the respondents in this study perceived information that does not support GM science to be more transparent than information that does, thus resulting in the high perceived transparency and low attitude. Future studies should experimentally manipulate different information sources, or control for the information source, to further understand the nature of the relationship between perceived transparency and attitude in this context. The lack of data regarding information sources of the respondents is a limitation of this study.

When two consumers have the same perceived transparency of GM science information, the consumer categorized as an information seeker was expected to have a lower attitude toward GM science. This finding shows that the interaction of perceived transparency and critical thinking style is important, as seekers had higher attitudes than engagers when perceived transparency was not considered. The reversal of results provides evidence that caution should be taken when evaluating the results of the isolated critical thinking style variable on attitude. Additionally, for two consumers who had the same critical thinking style, the one with a higher level of perceived transparency of GM science information, was expected to have a lower attitude toward GM science. These results are consistent with the influence of perceived transparency on attitude observed in objective 3.

Based on the results of this study, practitioners are encouraged to customize information for different critical thinking styles (Leal et al., 2017). However, practitioners should consider other audience analysis characteristics, such as culture, demographics and psychographics, as well as perceived transparency when customizing information. Practitioners should also be
cognizant of the influences perceived transparency and critical thinking style can have on attitude as attitude can influence consumption, policy, and regulation (Marques et al., 2015).

As previously mentioned, further research should control or experimentally manipulate information sources to better understand the relationship between perceived transparency and attitude. Examination of additional background information about respondents’ experience and knowledge with GM science could also help to explain consumers’ attitudes toward GM science. Additionally, future research should examine the influence of the study variables on behaviors related to GM science, such as consumption of GM food. Gorham et al. (2014) found that behaviors, beyond information seeking, differed among seekers and engagers and further investigation of behaviors in the present context is warranted. This study should also be replicated in different countries. GM science is regulated differently among different nations and perceptions and opinions vary as well. Cultural differences among countries may also reveal alternative critical thinking styles or views on transparency. Caution should be taken when interpreting the results for populations and contexts beyond the sample and topic studied in this manuscript.

References


Improving Livelihoods through Youth-Adult Partnerships involving School-based, Agripreneurship Projects: The Experiences of Adult Partners in Uganda

Stephen C. Mukembo
University of Missouri Extension

M. Craig Edwards
Oklahoma State University

Abstract
The increasing number of unemployed and underemployed youth across the globe, especially in developing countries, has reached alarming levels. In Africa, for example, this phenomenon has led to some youth making treacherous journeys across the Mediterranean Sea to Europe and other parts of the world in search of better livelihoods. Such an influx of immigrants, primarily to Europe and North America, has caused resentment and outcries by many citizens of the affected nations. Some of these challenges, however, could be allayed by engaging youth in income-generating projects, including agricultural entrepreneurship, i.e., agripreneurship, to create jobs and improve livelihoods. This may be achieved through Youth-Adult Partnerships (Y-APs) by which youth and adults work together on agricultural projects of mutual interest. This study explored the experiences of adult partners in Uganda who collaborated with youth on their school-based, agripreneurial projects (SAPs) involving the raising of broiler chickens. Because of their partnership working on SAPs, both the youths’ and adults’ knowledge and understanding of concepts related to agripreneurship and raising of broilers chickens improved. The need exists to provide an enabling environment to promote an agripreneurial culture among youth through Y-APs if we seek to inspire them to pursue agripreneurship and related opportunities for job creation while also enabling the food security of communities and improved livelihoods for their citizens.

Keywords: agripreneurship; improving livelihoods; project-based learning; school-based agripreneurial projects; youth unemployment; youth-adult partnerships
Introduction/Review of Literature

Youth unemployment has reached alarming levels in many regions of the world. In Africa, for example, about “10 to 12 million youth enter the workforce each year, [and yet] only 3.1 million jobs are created, leaving vast numbers of youth unemployed” (Africa Development Bank, 2016, p. 1). Further, on a global scale, Sub-Saharan Africa (SSA) has the highest rate of youth classified as working poor (≥ 70%), i.e., individuals who are employed, but their incomes are below the poverty line (International Labor Organization [ILO], 2016). This phenomenon has led to some youth making treacherous journeys across the Mediterranean Sea to Europe and other parts of the world in search of better livelihoods (Lebada, 2019; World Vision, 2019). Such an influx of immigrants, primarily to Europe and North America, has caused resentment and outcries from many citizens of the affected nations (Herndon, 2019).

Youth migration is caused by a plethora of reasons, including poverty, unemployment, civil unrest, food insecurity, dictatorships, and displacements due to war (Semela & Cochrane, 2019). However, some of these challenges impacting youth could be allayed by engaging youth in income-generating activities, including agricultural entrepreneurship, i.e., agripreneurship. Agripreneurship could be vital to mitigating the challenges of unemployment and improving food security (ILO, 2014; Mukembo, 2017), including development in rural areas to enhance livelihoods and reduce emigration. Agripreneurship involves “the application of entrepreneurial principles to identify, develop, and manage viable agricultural enterprises/projects optimally and sustainably for profit and/or improved livelihoods” (Mukembo & Edwards, 2015, p. 5). The promotion of agripreneurship in communities may be achieved through Youth-Adult Partnerships (Y-APs) by which youth and adults work together on agricultural projects of mutual interest. Y-APs involve social interactions and collaborations between youth and adults to develop ideas, programs, and policies that advance the progress and enhancement of their communities while leading to improved livelihoods and positive youth development (Zeldin, Camino, & Mook, 2005; Zeldin, Christens, & Powers, 2013).

Y-APs arose out of the need to engage youth and adults in community-led development initiatives (Krauss et al., 2014; Libby, Rosen, & Sedanaen, 2005). Y-APs are distinguished from other partnerships or relationships such as apprenticeships in that the collaborations involve several youth working together with multiple adults while undertaking collective responsibility for their actions (Zeldin et al., 2013). In addition, most of these partnerships fall outside the regular school curriculum and are flexible, which allows for easier decision making and activities while not interfering with schools’ schedules and priorities (Akiva & Petrokubi, 2016). Examples of such include 4-H youth programs, boys and girls clubs, agricultural clubs, and other youth leadership development initiatives (Libby et al., 2005; Mukembo, 2017; Zeldin et al., 2005).

Y-APs can play an important role in the growth and development of community-based livelihood programs, including youth development to build their capacity to bring about desired changes in their local settings (Zeldin, Krauss, Kim, Collura, & Abdullah, 2015). The partnerships also provide platforms for young people to express themselves on issues that concern them, while adults with mutual interests provide support and guidance (Watson, Mazur, & Vincent, 2015; Zeldin et al., 2015). Through Y-APs, young people learn a variety of life skills from adults, such as conflict resolution, effective communication practices, and teamwork, among others (Weybright et al., 2016) while building their social capital. Such interactions involve the exchange of ideas, and fresh insights are developed on a variety of issues likely to lead to the development of new knowledge to solve challenges faced by communities (Mitra, 2008). For this reason, various organizations and agencies, public and private, have encouraged
Y-APs as a model to simultaneously promote youth and community development (Zeldin et al., 2005). Although the benefits of Y-APs to the youth partners have been well documented by various scholars (Libby et al., 2005; Watson et al., 2015; Zeldin et al., 2005; Zeldin et al., 2013), such has not been the case for the adult partners, especially in SSA. Therefore, this inquiry sought to describe the benefits acquired by the adult partners from their relationships with youth as a result of working together on agripreneurship projects.

**Purpose**

This study sought to describe the adult partners’ experiences regarding school-based, agripreneurial projects (SAPs), including the potential of such to improve agricultural practices and livelihoods. Ugandan high school students (the study’s youth) raised broilers as their SAPs and received training on entrepreneurship from agriculture teachers, extension educators, and poultry farmers, who were the youths’ adult partners. This portion of a larger investigation was guided by one overarching question: What were the adult partners’ experiences regarding their interactions with the students around a SAP featuring broiler production?

**Methodology, Collection, and Explication of the Data**

We used a phenomenological approach (Kafle, 2011; Moustakas, 1994) to explore and derive meaning from the adult partners’ lived experiences. This approach explores “the human world as we find it in all its variegated aspects” (van Manen, 2016, p. 18), and researchers provide an interpretation of the phenomenon experienced by the participants due to its essence (Guba, 1981; Husserl, 1989; Moustakas, 1994). This investigatory method helps researchers gain an understanding of participants’ shared experiences regarding a given phenomenon.

Creswell (2013) recommended interviewing three to 15 individuals who experienced a phenomenon to comprehend their shared experience. For this study, we purposely selected eight adult participants who partnered with students on their SAPs (Groenewald, 2004; Padilla-Díaz, 2015); these adults were interviewed about their experiences. These interactions involved the adults partnering with 140 youth, i.e., 70 girls and 70 boys, ages 12 to 20 years from two boarding schools in eastern Uganda, who had received instruction on poultry science integrated with entrepreneurship concepts for eight weeks. During this time, the youth had opportunities to apply the knowledge and skills acquired in their agriculture classrooms through the real-world context of SAPs. They kept broiler chickens and collaborated with adults, including extension educators, agriculture and entrepreneurship teachers, as well as local farmers who were poultry producers, to learn from one another and share experiences; this was the study’s partnership.

Interviews with the adult partners were conducted via Skype (Deakin & Wakefield, 2014) using a semi-structured interview protocol with one open-ended, overarching question (Patton, 2015). This approach allowed the researchers the flexibility to probe emerging themes to capture a rich and detailed description of the phenomenon until no new information emerged indicating that data saturation had been achieved (Groenewald, 2004; Padilla-Díaz, 2015; Patton, 2015). When employing a phenomenological approach, Kafle (2011) argued “for a dynamic interplay among six research activities: commitment to an abiding concern, oriented stance toward the question, investigating the experience as it is lived, describing the phenomenon through writing and rewriting, and consideration of parts and [the] whole” (p. 191).

Data collection and analysis were undergirded by Tracy’s (2010) eight guidelines for qualitative research to ensure a high-quality study. Through a review of literature on Y-APs and agripreneurship, we established a gap regarding such partnerships involving SAPs and their
contributes to improving livelihoods. Therefore, the findings and recommendations emanating from this study would be worthy or useful in filling a knowledge gap. The topic was also worthy as well as timely due to the growing concerns about food security and the number of unemployed youth, including that of policymakers. In qualitative research, the researcher is the instrument; therefore, trustworthiness and credibility in the research process are essential to ensure the validity of a study’s findings (Lincoln & Guba, 1985; Tracy, 2010).

Reflexivity statement: Sincerity, credibility, and being ethical are core to all qualitative inquiries (Tracy, 2010). We acknowledge that personal bias might be a factor in this study because the principal investigator was an agriculture teacher in Uganda, and he has a vested interest in youth and agripreneurship development in SSA. He has published and presented on related topics and studies. As such, to mitigate the potential for bias in this study, he had to bracket (epoche) or set aside his preconceived ideas to focus on the participants’ experiences about the phenomenon (Moustakas, 1994; Qutoshi, 2018). However, because this may not have been entirely possible (Kafle, 2011), he also collaborated with another scholar to conduct the study. This collaboration brought an outside lens or perspective and multivocality to the study and thereby helped mitigate the potential for bias. Moreover, we acknowledge that the interpretation of human experience can be equivocal depending on the researchers’ perspectives and experiences regarding the phenomenon they investigate (Kafle, 2011). The other researcher is an American with experience involving youth and agricultural development, including entrepreneurship, and he had traveled to Uganda with projects involving adult entrepreneurs.

The interviews were transcribed verbatim (Yin, 2010), and we used open coding (Corbin, & Strauss, 2014) to identify and organize the concepts into codes using NVivo 11 analysis software (QSR International, 2013, 2016). This involved analysis of both textual and structural data of what participants said they experienced and how such was experienced (Creswell, 2013; Padilla-Díaz, 2015). Based on the researchers’ judgements, the codes that they perceived to convey similar meaning were grouped together to develop themes, which yielded an overall meaning and essence of the phenomenon (Padilla-Díaz, 2015). In phenomenology, researchers reflect deeply on the meaning of the textual data (Kafle, 2011). Thus, we were “called to play with the texts – to get lost in deep conversation with them. The goal . . . [is] to invite the reader to enter the world that the texts would disclose and open up in front of themselves” (Kafle, 2011, p. 192). Moreover, “[t]he themes can be viewed as written interpretations of lived experience” (Sloan & Bowe, 2014, p. 3). Through this process, our analysis revealed seven themes and seven subthemes.

Description of the Study’s Participants

Eight adult partners shared their experiences regarding the students’ SAPs, including the potential of such to improve agricultural practices and livelihoods in their communities, and the youths’ acquisition of agripreneurship, leadership, communication, and teamwork skills. The adults included two agricultural teachers, two entrepreneurship teachers, two extension educators, and two poultry farmers in Uganda. They varied in age from 32 to 53 years and had a wide range of experience in their respective fields spanning 10 to 30 years. Their levels of formal education included associate’s degrees in agriculture to master’s degrees in several fields. The participants’ identities were replaced with pseudonyms to maintain confidentiality.

Participant #1 (Moses): Moses is an agriculture teacher and has associate’s and bachelor’s degrees in agricultural education. He was one of the project’s coordinators and oversaw the students’ training and SAPs implementation at one of the schools.
Participant #2 (Peter): Peter is an agricultural teacher and holds associate’s and bachelor’s degrees in agricultural education. He oversaw the implementation of the students’ SAPs at his school and participated in their training.

Participant #3 (Abu): Abu is an entrepreneurship teacher; he holds a bachelor’s degree in business education and a master’s degree in entrepreneurship. He provided agripreneurship training for the students.

Participant #4 (Julius): Julius is an entrepreneurship teacher with an associate’s degree in business education, a bachelor’s degree in business studies, and a master’s degree in commerce. He provided agripreneurship training for the students as they implemented their SAPs.

Participant #5 (Noah): Noah is an entrepreneurship/business extension educator. He holds a bachelor’s degree in entrepreneurship and small business management, a postgraduate diploma in project planning and management, and he was pursuing a master’s degree in project planning at the time of the study. As one of the project’s coordinators, Noah was involved in the students’ agripreneurship training and the facilitation of their related learning experiences.

Participant #6 (Daniel): Daniel is an agricultural extension educator who holds an associate’s degree in animal husbandry and several professional development certificates. He helped facilitate interaction between farmers and the youth and was involved with the training to ensure implementation of proper poultry management practices.

Participant #7 (Patience): Patience was one of the poultry farmers who partnered with the students; she operates a battery cage system for layers and a deep litter operation for broilers. She holds an associate’s degree in education, a bachelor’s degree in agriculture, and a master’s degree in gender and women’s studies. Patience taught agriculture for 15 years before venturing into poultry production.

Participant #8 (Shawn): Shawn holds a bachelor’s degree in social sciences and a master’s degree in human resource management. He was another poultry farmer who partnered with the students.

Findings

In reporting participants’ experiences about a phenomenon, Lester (1999) urged researchers, whenever possible, to provide direct quotes to substantiate their distillation of themes and subthemes. As such, we provided a number of direct quotes to describe and illuminate the participants’ lived experiences.

Theme #1. Improved understanding of and interest in agripreneurship and related opportunities for youth (students) and their adult partners.

The adult partners observed that the students’ understanding and knowledge of agripreneurship had improved by the end of the project. According to one partner, this observation was based on the kind of questions posed by students about agripreneurship, and the responses they gave when asked follow-up questions. Further, the actions of youth in developing business plans, planning and budgeting, marketing their products, successfully managing the broilers, and later reinvesting capital to continue with their SAPs showed they understood the value of agripreneurship projects, as well as interests to continue with such.

Julius, shared that, in the beginning, the students could not relate agriculture with entrepreneurship to infer agripreneurship. They even wondered what an entrepreneurship teacher was doing in an agricultural project, but Julius explained:
I brought it out that if you incorporate business ideas in agriculture, then you are likely to earn more profits which you can use to expand on your production. . . . I taught them the idea of marketing, marketing plan and strategies, which they used to market their broilers. Julius’ observation was supported by Noah, who said: “Most of the students knew about entrepreneurship but combining agriculture and entrepreneurship was a total surprise to them. Most had no idea what agripreneurship meant, but when we explained [it] to them, they were astonished.” Noah elaborated that the students could not initially connect entrepreneurship and agriculture, but during the training they were able to relate the two concepts and showed more interest. The youth wanted to learn more about how to identify opportunities, including business plan development and how they could get capital to start businesses. “The students were very interested and liked the idea of merging the two subjects [entrepreneurship and agriculture]. . . . Actually, most of them indicated they would like to start their agricultural businesses to help them pay their tuition at university,” said Noah. This experience was echoed by Abu:

The students were very excited to see that what had been taught in class can be applied outside practically in [the] form of agripreneurship. Meaning that the theory being taught in class was transferrable into practice; helping them transform [classroom] knowledge to the business environment, instead of them learning things in class and [later] forget. . . . In addition, some of the adults acknowledged that they also had gained more insight about agripreneurship and would use the knowledge acquired to start projects. Moses shared:

I would like to say . . . thank you because I also gained something dealing with students and attending the training by the entrepreneurship teachers. . . . The field visits to farmers gave me the motivation to go on with the projects I had already started. I invested in poultry and started a piggery unit because I got more business skills and ideas to write and develop my business projects. I am happy this experience changed my mindset, and I am sure it changed the mindset of the students and other teachers. . . .

Peter added: “Visiting farmers who were doing well and working with the students helped me get new ideas to revisit some of the projects I was working on. I plan to integrate more agripreneurship in my teaching.” Peter’s and Moses’ views were supported by Abu who indicated: “To me, this whole project experience helped me learn new ideas in agriculture that I could use in my business classes.”

**Theme #2: Students’ increased understanding of poultry science knowledge and its application outside the classroom.**

The agriculture teachers observed that students who participated in the SAPs were more active in class than other students. They would respond to questions during class discussions with practical examples from their SAPs and described what had been experienced. For example, they discussed the signs of coccidiosis in infected birds. Further, Patience was impressed by how the students were able to match their practice with relevant theory and apply concepts from classroom learning experience when they visited her farm. The teachers also noted students’ increased interests in their subjects, which made the learning easier, as Moses explained:

It was a good learning experience. Before that, we were approaching poultry in a theoretical way, and it was very hard for us to convince the girls that things can actually happen. But when it came to this training and the real practical sense with hands-on [experience], it simplified our work. . . . [The] girls loved the subject more because they saw agriculture as something they can benefit from and also help their community. Peter’s elaboration supported Moses’ position:
If we gave another test today, you will find that members who were still in the project would do better. . . . Those who were in the project had more contribution[s] in class than those who did not have hands-on [experience] with the project, especially when we were handling [teaching] the topic of poultry. The other ones [students] who were in the project had practical knowledge; they would tell you most of the things [answers] than those who did not have [the] hands-on [learning opportunities]. There is a very big change/difference between the two groups.

Theme #3: Students acquiring life skills.

Some adult partners observed that the students had acquired a variety of skills such as accounting, writing a business plan, budgeting, financial management, leadership, mobilization, and organizational planning. Noah and Julius explained that they taught students accounting skills, which were used to evaluate the viability of their SAPs. As such, Moses shared:

They know how to mobilize themselves, and they know how to budget. I have witnessed this with the new birds they bought. They budget for that little money they saved from the first project and account for whatever they are doing, which means they have learned to save. Now they work as a team, and you [the teacher] rarely get to solve any serious issues [or conflicts] because they handle it themselves.

Regarding this outcome, Julius added:

They [students] learned that they needed to be organized with their project. We developed an organizational plan and identified the people to work with the project, and we established a reporting matrix within the project in an orderly way to avoid conflicts and duplication of duties.

Theme #4: Improved interaction, networking, and support among teachers, extension educators, farmers, students, and students’ parents.

The teachers acknowledged that, as a result of the broiler raising project, they came to know the students better outside of the classroom, including some of their parents. According to Moses, one of the students convinced her parents to buy all the chickens from the project. Further, some parents who learned about the SAP from their child called the adult partners and inquired about the project and how they could support it. This experience was echoed by Abu, who shared:

[A] parent called and asked me about the project, that the daughter talked to him about. . . . The response from other parents who heard about the project was very exciting, and they thanked the school for starting the agro-entrepreneurship project with girls [and] that it would give them ideas to do rather than sitting at home. . . . They were [also] thankful that the project started with the young girls who were in lower classes [grades] because they would work on the project longer while still in school and get more skills.

Relationships were developed between the adult partners and some students, who they said had stayed in contact. For example, Patience indicated that students called her and inquired about starting individual poultry projects: “During the holiday, students called me and made an appointment to visit my farm with their parents.” Shawn reported a similar continuation of the relationship:

Those students from well-to-do families [financially stable] followed up with me and they wanted help to talk to their parents or visit their homes and advise them how they can also start the same kind of business I do. . . . I hope to get in touch with them soon.
Theme #5: Benefits of youth working with adults on projects in their communities.

As a result of the partnerships, mutual exchanges of ideas and better interaction occurred between the adult partners, students, and school administrators. The adults indicated that the students enjoyed interacting with and learning from the farmers visited. They were able to compare the performance of the farms and gave advice for improvement, if appropriate, as Moses described:

When we went to Iganga to visit one broiler farmer, the birds were really in a bad shape and looked emaciated. The students asked the farmer where he bought his chicks, and feed, and they realized the feed was the problem and the birds were not from a reputable source. They told the farmer where they bought their chicks. . . . They asked the farmer to change his source of feeds and ensure the birds were given enough water and that feeding was ad libitum because he was trying to ration the feeding to save money . . . .

Further, all adult partners acknowledged that the idea of students working with community members on mutual projects was excellent. It helped the communities’ adults to understand what the schools were teaching their children, and they learned new things by interacting with the students. Moreover, the adult partner teachers and extension educators indicated that it made their teaching easier because the students were able to understand better and implement what they were learning. According to Julius, “they [students] saw and experienced how they could apply the knowledge and content being covered in class to solve problems outside the class.” In support, Peter said: “Students realized that it was not [only] about getting good marks in class but how to apply the knowledge to earn a living and impact your community.” And, Abu added: “The skills development in agripreneurship is helpful for our learners and community to become self-reliant. That is if the students use the skills to create jobs and employ others.” Noah also shared: “When students engage with communities, they are able to see opportunities to apply their skills which are not available in a closed school environment.”

Further, Shawn explained that in the 1970s and 1980s, schools often had farms managed by students and the nearby residents would learn from these operations as well as buy their products. This helped promote better cooperation with the communities, and if farmers could not access immediate help from the extension educators they would visit and interact with people at these school farms, including the teachers. Shawn added:

School farms were a resource center for the communities, and at times they had better breeds of cattle that communities would access to improve their herds. . . . But now look at these schools . . . the practical aspect is not there, and they don’t have any single farm. How can you teach agriculture theoretically without practice?

Patience expanded on this point:

This initiative is long overdue. Schools should work with communities and not [stay] in isolation because, at the end of the day, there is a need for better cooperation and, as we all know, these students will return to their communities when they graduate and will be expected to solve emerging problems. But how can they do it if they are not given the opportunity to interact with us early on, so we all learn from each other?

Theme #6: Challenges experienced by adult partners during the project’s implementation.

Although the adult partners realized benefits partnering with the students, several outlined the challenges they experienced, which included seven subthemes. Limited time and schedule conflicts with established school programs: All participants indicated that the time periods allocated for the training of students and their interactions with them were limited. This
was because the projects were implemented during school time, and teachers had to balance their other duties with the project’s work. Moreover, most of the training and the students’ field trips had to be conducted on weekends, which was difficult to accommodate along with other school programs. To this point, Daniel stated: “The time was limited, and the school calendar was not favorable at times where the students were expected to attend classes or do weekly tests at the time when they are scheduled to visit farmers.” He added that “it was also difficult to align the school’s program with the farmers’ schedule[s] . . . and yet farmers want students to go to their farms when they are around.” This challenge was also supported by Abu who explained that when it came to training, it was difficult to find enough time to complete certain modules they intended to address because the students were required to attend to other school activities or assignments. And Moses shared:

It was hard for students and teachers to balance time between school activities and project work, especially when the chicks were still young. . . . Students were required to attend to the chicks when at the same time they were needed in class. Shawn expounded on this constraint: “Time was a challenge; I saw that students were willing to learn more, but their teachers were calling them to enter the bus that time is over.”

**Large number of students.** The adult farmer partners had the challenge of accommodating a large number of students who visited their farms, which limited their ability to provide enough time for one-on-one interactions. However, the more interested students took the farmers’ contact information and followed up with them during the schools’ holiday periods.

**Lack of cooperation from some farmers** was another challenge identified by the extension educators. For instance, some farmers contacted to work with the students were noncommittal and others would not allow their workers to meet students in their absence, as Daniel explained:

They [farmers] don’t always like students to visit their farms when they are not there, maybe they are insecure and not sure of what the farm attendants will tell or . . . [if] they will receive them well. [And], at times, the farm attendant may not know the history of the farm and there may be some information that they don’t know or understand unless that farm attendant has been there for some time.

**Fear of transmitting disease from one farm to another.** Some farmers worried that the visiting students could spread disease from one farm to another. This discouraged those farmers from hosting students on their farms. **Expensive cost of feeds.** Though the cost of production for the students’ initial broiler projects was provided, the adult partners indicated that when the students restocked their SAPs, the cost of feed was very high, and students, at times, would have to contribute additional funds to implement such follow-on projects.

**Lack of cooperation and time management by the students.** The adult partners indicated that some students were less interested in the project and this caused challenges with organizing them. Moses elaborated: “Some of the students were from posh [wealthy] families and they thought it was a dirty project. So, to bring them on board, I had to convince them about the importance of participating in the project.” This issue was also shared by Peter who said: “Though the majority of students loved working with the project, some wanted to give up because it required extra time to work on the project and yet they were required to prepare for tests.”

**Financial constraints.** The adult partners explained that the resources available to implement the project were limited compared to its magnitude. For example, Julius stated: “I observed that the resources available for the project were small and thus students had to operate on a small scale which made the unit cost of production per bird high, leading to less profits.”
Theme #7: Suggestions to overcome challenges experienced by the project’s adult partners.

The adult partners indicated that a need existed to harmonize school programs so that students have enough time to engage in extracurricular activities. They recommended that appropriate arrangements should be made in the future to involve farmers, schools, and other stakeholders so they understand their roles in and the importance of engaging students with adult members of their communities. This would lower the ratio of students to farmers during site visits and students would have more time to interact and share with a wider variety of farmers. In addition, Noah said: “Schools should connect their students with farmers close to their schools so they can work together as partners. Such programs should be sustained through communications and mutual understanding.” This point was also stressed by Peter who noted that having stable relationships with neighboring farmers ensures ongoing collaboration and reduces travel time for moving to places where farmers are willing to host students. And Moses expressed the need to have all school administrators onboard to support new initiatives such as SAPs in their schools.

Regarding limited resources, the adult partners urged that Uganda’s government should take a proactive role in funding schools to provide students with the necessary facilities to implement their SAPs. To this aim, Abu suggested that “there should be some small grants for students to compete for so that they can start income-generating projects that are sustainable.”

Theoretical Lenses

To ensure transparency and validity, researchers using naturalistic inquiries, such as the phenomenological approach employed in this study, ought to let theory evolve from their findings (Guba, 1981; Lester, 1999). Based on data analysis, experiential learning theory, as espoused by Kolb (1984), and social capital theory (Häuberer, 2011; Lin, 2004) evolved from the study’s themes and essence. Kolb (1984, 2014) contended that in the learning process ideas are organic and transformed as individuals encounter new experiences and reflect on such to make abstractions leading to the creation of new knowledge and meaning.

On the other hand, social capital theory is rooted in the positive attributes that individuals acquire as a result of being part of a social network (Lin, 2004; Seibert, Kraimer, & Liden, 2001). In this regard, Häuberer (2011) asserted: “Social capital, like other forms of capital, is productive and facilitates the achievement of certain ends that would be impossible in its absence” (p. 40). Social capital is dependent on social relationships and networks, including actions of the individuals within such structures to facilitate outcomes (Lin, 2004; Seibert et al., 2001). Such were developed by the partnerships between the youth and adults in this study. Evaluating the study’s findings through these two theoretical lenses helped us to gain an understanding of the phenomenon and to distill an essence of the adult partners’ experiences.

The Phenomenon’s Essence and Related Conclusions

The essence distilled from analyzing the findings about adult partners’ experiences working with students was the power of Youth-Adult Partnerships (Y-APs) to promote learning and skill acquisition while building social capital such that the adult partners were positively impacted as they served youth and lifted their communities. Y-APs are mutually beneficial, and both parties learn from one another (Camino, 2000). These partnerships have been instrumental in helping youth and adults engage in community initiatives, including bridging the gap between them and other stakeholders (Libby et al., 2005). The partnerships help in building social capital networks and improving relationships (Häuberer, 2011). This study’s adult partners leveraged
such to acquire new knowledge and skills while building relationships and networks for the betterment of their own livelihoods (Henness, Ball, & Moncheski, 2013).

Further, based on the emergent themes from the adult partners’ experiences, especially their direct observations from working with the students, we concluded that the students’ and adult partners’ knowledge and understanding of concepts related to agripreneurship improved as a result of the *hands-on, minds-on experiential learning* (Kolb, 1984) supported by the project. The students used abstract concepts learned in agriculture courses about agripreneurship and the raising of poultry to develop and implement their SAPs, and the adult partners not only helped guide the students in that process, but they also learned more about agripreneurship and the students’ SAPs due to the collaboration. In addition, the adult partners indicated acquiring new ideas by interacting with one another and with student partners that they intended to use to improve their own livelihoods in the future. Moreover, the teacher partners expressed that they would incorporate these ideas into their instructional practices.

**Implications and Recommendations**

Though the findings from this qualitative study should not be generalized beyond the participants who shared their experiences, such may be transferable to other individuals who undergo similar experiences. Based on the adult partners’ outcomes, engaging youth with adults in their communities provided positive outcomes whereby each group learned from the other (Camino, 2000; Zeldin & Petrokubi, 2008) during implementation of the SAPs. Better relations were built among the adult partners, the students, and the students’ parents as a result of collaborating through the SAPs and thereby contributed to building social capital in the participants’ communities. To achieve such aims, the need exists for schools and communities to build partnerships and work together to facilitate the teaching-learning process (Watson et al., 2015). This may involve Y-APs with SAPs as the *experiential context*, which was the case in this study, to increase the likelihood of establishing better community engagement that facilitates students’ applying knowledge and skills learned in school to real-world problems and opportunities under the mentorship of adult partners.

The adult teacher partners said that students expressed more interest in learning while working on SAPs involving the integration of agriculture and entrepreneurship. Therefore, teachers of these subjects should collaborate to promote students’ knowledge transfer across disciplines to increase their likelihood of contributing to improved food security, including agripreneurial and related livelihood opportunities, as facilitated by schools and their community partners. Integration of curriculum could be achieved by implementing experiential learning (Kolb, 1984) projects with community partners, which is likely to lead to better working relationships between the participating actors while building social capital together (Häuberer, 2011).

A need also exists to provide an enabling environment to promote an agripreneurial culture among youth (Chen, Greene, & Crick, 1998), and they should be exposed to prosperous livelihood opportunities in the agricultural sector. By recognizing and evaluating those opportunities as worthwhile, the youth are more likely to pursue such, which may have *spillover effects* in their communities leading to improved livelihoods and enhanced food security for themselves and others. This could be done by establishing *idea incubation sites* at schools, and connecting students with adults in their communities willing to provide mentoring through Y-APs (Zeldin et al., 2013; Zeldin & Petrokubi, 2008). As was the case with student and adult partners in this study, such collaborations have the potential to influence students’ career
aspirations and attitudes toward agripreneurship, while also providing personal growth and development for the adults.

Implementing partnerships involving SAPs requires a lot of time commitment from the partners and financial resources from the participating schools to implement the projects, which can be prohibitive, as expressed by this study’s adult partners. Therefore, schools, communities, as well as the Ministry of Education and Sports in Uganda should earmark special funds to be availed to schools and communities interested in pursuing such initiatives. Further, more adult partners should be recruited from local communities to reduce the youth-adult ratio and to likely increase the quality of interactions and related outcomes.

In this study, the Y-APs worked on SAPs for a relatively short period of time, i.e., eight weeks, which makes it difficult to evaluate the long-term impact of such partnerships. Therefore, follow up studies should assess the long-term impacts and sustainability of Y-APs in communities, including improvements to participants’ agricultural practices and livelihoods, and whether youth were able to establish successful agripreneurship projects. These investigations could involve cohort or panel studies (Creswell, 2012) with the youth who implemented SAPs, as examined by this inquiry.

References


The Relationship of Global Exposure and Intercultural Effectiveness among Secondary Youth

Stacy K. Vincent
Courtney Turley
University of Kentucky

Ashley L. Austin
Canton-Galva High School

Abstract
This study evaluated the impact of varying amounts of global exposure and previous travel experiences have on secondary agriculture students’ intercultural effectiveness (ICE) and global experiences through the lens of Mere Exposure Theory. Using a descriptive correlational approach, we surveyed 387 secondary agriculture seniors from 11 randomly selected schools in Kentucky to evaluate participant self-awareness, exploration, global mindset, relationship interest, positive regard, and emotional resilience. Findings revealed the majority of participants excelled in exploration but lacked in global mindsets. Benefits of successful ICE when applied are expected to increase communication and work effectiveness. Ignoring this approach would create poor abilities to connect with individuals of different cultural backgrounds.

Keywords: intercultural effectiveness, global exposure, youth, agricultural education, mere exposure
Introduction

Technology innovations have resulted in an increasing interconnected population, bridging distances by allowing people to instantaneously communicate over any distance. An enormous shift in the American population’s diversity is evidenced by each census. The United States (U.S.) Census Bureau (2012) projects the U.S. may become a majority-minority nation for the first time in 2043. As the population makeup steadily continues to reflect globally diverse ethnicities, so will the exposures to different global cultures. One of the most impactful places of cultural exposure is within classrooms across the U.S. and this exposure plays a key role in developing global mindsets and awareness of a diverse array of cultures (VanderStel, 2014). For the first time in history, most U.S. schools are on the verge of becoming majority-minority schools where the overall number of Latino, African American, and Asian students in public K-12 classrooms surpasses the number of non-Hispanic whites. The success of these students is inseparably linked to the well-being of any nation (Maxwell, 2014). In addition to enrollment changes, educators must be mindful of a multitude of other challenges to students’ education, including an increase in students living in poverty, an increase in English as a Second Language (ESL) learners (National Center for Educational Statistics, 2019), and an increase in students with vast differences in life experiences from those of their teachers, who remain overwhelmingly white. According to the National Center for Educational Statistics (2013), in the 2011-12 academic year, 82 percent of 3.4 million public school teachers were non-Hispanic White. Previously in the 2003-04 academic year reports, 83 percent of all public-school teachers were non-Hispanic white. This represents only a one percent change over eight years (National Center for Education Statistics, 2013). With the ethnic diversity in teacher and student backgrounds, a growing social disconnect is occurring.

The increasing disconnect between teacher and student cultures are extending into classroom instruction. Unfortunately, many of America’s teachers lack professional competence in the areas of diversity, experience in multicultural classrooms, and cross-cultural experiences. As a result, these teachers are not providing students with an education that expands their worldviews and allows them to become more informed of other cultures and nationalities (Milner, 2012; Cushner, McClelland, & Stafford, 2000). Furthermore, most teacher education programs do not provide pre-service teachers with significant intercultural experiences (Milner, 2012). Pre-service teachers are relatively inexperienced about global affairs, leaving a gap in the classroom curriculum (Goren & Yemini, 2017; Melnick & Zeichner, 1998). Regardless of their preparation, teachers will be called upon to teach individuals from very diverse backgrounds (Littleford & Nolan, 2013). In the world of agricultural education, experience and knowledge is especially important, as agriculture is not just a local phenomenon, rather spans across centuries and impacts every country in the world. Though the need for better cultural education of teachers and students applies to all areas of education, this work focuses specifically on the impact of global exposure and the experiences students have at the secondary level.

Need for the Study

A study by Lawrence, Rayfield, Moore, and Outley (2013) revealed that of the 7,487 FFA (formerly known as Future Farmers of America) chapters, during the time of their study, the collective racial composition of the chapters did not accurately reflect the racial composition of the U.S. population.

Of course, diversity is much broader than racial compositions, but the lack of racial exposure to the student organization reflects a deficiency for opportunities to engage discussions
that expands one’s cultural mindset. Thankfully, there are other approaches for youth engagement in these critical conversations that enhance cultural beliefs, knowledge, and skillsets. Teaching from global experiences has a positive influence on broadening student perspectives on diversity and diverse issues (Banks, 2014; Milem, Chang, & Antonio, 2005), including democratic citizenship (Gurin, Nagda, & Lopez, 2004) and social justice (Banks, 2004). Consequently, agricultural education at the secondary level is limited in their global understanding and content. In 2015, Hurst, Roberts, and Harder conducted a national study and discovered that teachers had positive attitudes towards teaching students about global education, but few had traveled beyond the borders of the United States.

Unfortunately, preservice agriculture teachers prefer a global experience in a country similarly developed to the United States and with a large group of their peers (Murphrey, Lane, Harlin, & Cherry, 2016) limiting the opportunity for exposure that assist in the expansion of, not only their cultural perspective, but also the global mindset and cultural understanding of their students (Banks, 2014). However, once enrolled in the courses of preference, students report to not be fully engaged (Bunch, Lamm, Israel, & Edwards, 2013).

Students engaged in a longer global experience have noticed a more positive and influential difference in their cultural mindset. After serving ten weeks in Australia teaching agriculture, U.S. students identified an increase in cultural awareness by simply being exposed to someone from a different country for multiple months (Bunch, Stephens, & Hart, 2011). A qualitative interview occurred among college of agriculture faculty engaged in a study abroad program. Following their engagement, the faculty revealed how the international immersion assisted their cognizance and they now consider the cultural contexts of their students (Roberts, Rodriguez, Gouldthorpe, Stedman, Harder, & Hartmann, 2016). Furthermore, a higher global perspective is correlated to a more positive attitude for cultural diversity (Zhai & Scheer, 2004).

The 2016-2020 national research agenda for agricultural education contains a scientific focus to examine meaningful, engaged learning in all environments (Roberts, Harder, and Brashears, 2016). To begin this process, it is vital to first gain an idea of the level of cultural proficiency, or effectiveness of both agricultural students and agricultural educators. Once the intercultural effectiveness of students is known, teachers can then work on ways to increase their global exposure both in and out of the classroom.

**Theoretical Framework**

The study was guided by the Mere Exposure Theory (Zajonc, 1968). According to Zajonc (1968), familiarity and exposure to other cultures impact the formation of one’s thoughts and ideas about individuals who are culturally different. The theory is shaped by two main concepts: 1) repeated exposure to a stimulus increases ones’ perceptual fluency (how easily one processes a stimulus) and 2) increased perceptual fluency increases positive affect, or the tendency for one to “like” something (Reber, Winkielman, & Schwarz, 1998).

Mere Exposure is based on the phenomenon by which people tend to develop a preference for things merely because they are familiar with them and have been repeatedly exposed to them. This theory is often called the familiarity principle. In early research, the effects have been demonstrated with paintings, faces, characters, and sounds (Zajonc, 1968). This principle was demonstrated by a study conducted by Carlson and Widaman (1988), in which students who were repeatedly exposed to another culture showed higher levels of concern and interest in the areas of international political concern, cross-cultural interest, and cultural cosmopolitanism.
When testing Mere Exposure, Zajonc found a strong connection between “familiarity” and “liking”. The connection would later be known as the affective primacy hypothesis, which posits affective reactions can be elicited with minimal stimulus input (Zajonc, 1980). In other words, the ability of someone to have an effective response to something (for example, liking something) requires very minimal stimuli. This was demonstrated in an experiment when subjects showed a positive bias or preference towards Chinese ideographs they had been previously exposed to during the experiment. Additionally, the time subjects spent making their decisions for liking an image, or not, decreased significantly on those images they had been exposed to previously (Kunst-Wilson & Zajonc, 1980).

When taking the idea of Mere Exposure into consideration, one can see the power the theory holds within the classroom context. The theory may be a valuable tool in expanding the worldviews of students by exposing them to individuals who are different from them. Mere Exposure theory is the underlying basis for the idea that cultural exposure can happen within the walls of a classroom and extend far beyond the lesson curriculum.

With the advancement over time, Mere Exposure has provided a lens in a variety of modern cultural concerns. Researchers found Mere Exposure coupled with intergroup contact reduces intergroup prejudice (Pettigrew & Troop, 2006); Pettigrew, Troop, Wagner, & Christ, 2011). Zebrowitz, White and Wieneke (2008), propose exposure may reduce racial prejudice by simply exposing people to other-race faces. Findings from this particular study are consistent with explanations for mere exposure effects as well as with the familiar face overgeneralization hypothesis (where prejudice is derived from negative reactions to faces that are of a different race). Similarly, Kinzler and Spelke (2011) examined the social preferences of children based on race. They found children begin to develop preferences based on race between the ages of 2.5 and 5-years old. These same-race preferences, in turn, affect social choices and interactions.

While the theory of Mere Exposure is versatile and can be applied to multiple scenarios, it may hold the key to some of the world’s cultural hostility issues. When something or someone is familiar, people unconsciously perceive that person or object as being more likable and friendly. Is it possible much of the cultural dissonance that exists today is simply due to the lack of familiarity of one culture with another?

**Purpose**

The purpose of this descriptive correlational study is to examine the relationship global exposure has on secondary agriculture students’ Intercultural Effectiveness. The guiding research questions for this quantitative study are as follows:

1) What international exposure have the participants experienced?
2) What are the results of the student participants’ perceived Intercultural Effectiveness?
3) What is the relationship between students’ Intercultural Effectiveness factors with one another?
4) What is the relationship between students’ Intercultural Effectiveness by their international exposure?

**Methods**

To determine the relationship between a student’s score on the Intercultural Effectiveness Survey and their global experiences and exposure. Before the collection data, the Office of Research Integrity (also known as IRB) approved the use of human subjects, following the acceptance of parental consent. During data collection, participants completed the IES questions in a Likert scale format, demographics, international exposure questions, and questions related to their agricultural education classrooms.
Instrument

The instrument utilized during this study was adapted from the original Intercultural Effectiveness Scale (IES) created by the Kozai Group, Inc. (2015). The IES assessment survey evaluates competencies critical for effective interaction with people who are from cultures other than one’s own based on their national culture, gender, generation, ethnic group, religious affiliation, etc. There are three main Intercultural Adaptability factors assessed by the survey: Continuous Learning, Interpersonal Engagement, and Hardiness. Each of these three is broken down into two additional dimensions for a total of six different constructs of assessment (Kozai Group, Inc., 2015). The following figure illustrates this breakdown of Intercultural Adaptability factors and their sub-sections.

![Intercultural Effectiveness Scale (IES)](image)

*Figure 1. Intercultural Effectiveness Scale (Kozai Group, Inc., 2015)*

Table 1 further defines the six constructs for interpreting Intercultural Effectiveness (Mendenhall, Stevens, Bird, Oddou, & Osland, 2012).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Awareness</td>
<td>The degree to which people are aware of their strengths and weaknesses in interpersonal skills, philosophies, and values, how past experiences have helped shape them into who they are as a person, and the impact personal values and behavior have on relationships with others</td>
</tr>
<tr>
<td>Exploration</td>
<td>An openness and active pursuit of the understanding of ideas, values, norms, situations, and behaviors that are new and different</td>
</tr>
<tr>
<td>Global Mindset</td>
<td>The degree to which one is interested in and seeks to actively learn about other cultures and the people that live in them</td>
</tr>
<tr>
<td>Relationship Interest</td>
<td>The degree to which people have a desire and willingness to initiate and maintain relationships with people from other cultures</td>
</tr>
<tr>
<td>Positive Regard</td>
<td>The predisposition to view other cultures from a positive perspective</td>
</tr>
<tr>
<td>Emotional Resilience</td>
<td>A person’s emotional strength and ability to cope with challenging cross-cultural situations</td>
</tr>
</tbody>
</table>
In terms of reliability measures for this instrument, the Kozai Group published reliability measures for the six intercultural effectiveness survey constructs and reliability scores are: self-awareness ($a = 0.76$), exploration ($a = 0.82$), global mindset ($a = 0.84$), relationship interest ($a = 0.80$), positive regard ($a = 0.79$), and emotional resilience ($a = 0.81$) (Mendenhall, et al., 2012). The instrument included all original Intercultural Effectiveness Survey questions in their entirety. Also, the PI added additional demographic questions, which were tailored for high school students as the original survey was created for adults ages 18 and up. The researchers also added questions related to the student’s agricultural education experiences. A panel of experts ($n = 9$) reviewed the questionnaire, as amended, for face and content validity. The panel consisted of college professors with international experience as well as future agriculture teachers. The panel provided feedback that resulted in minimal amendments to the questionnaire, but not, of which, affected the overall intent of the questions and questionnaire.

Population and Sample

For the context of this study, the researchers began by considering each agricultural education program ($N = 126$) in [STATE]; however, a variety of factors limited the overall population. Limitations that led to a decrease in the population were the presence of a teacher whose school’s employment was a minimum of four years. A four-year minimum was set to reflect the teacher’s influence on the student throughout their tenure of high school. Considering the schools that contained teachers with less than four years of teaching experience were pulled from the population, a stratified random sampling technique was installed (Singh & Masuku, 2014) within the population. From the narrowed list ($n = 76$), a random selection of 15 schools were selected and invited to participate. Due to scheduling conflicts or inability to gain administration permission for participation, 11 schools consented to participate.

From the selected 11 agricultural education programs, a total of 401 students participated in the study. Due to missing answers or the inability to complete the survey, 14 surveys were omitted from the dataset; thus, a total 387 responses were analyzed in the study with the majority identifying themselves as White ($f = 326, 84.24\%$) and males ($f = 226, 58.40\%$). The largest number of students had taken only one year of agriculture courses ($f = 181, 46.77\%$). The researchers requested seniors to complete the questionnaire. Seniors were purposefully selected because they are considered the face of four-year programs as they reflect the philosophies set forth by the leaders before them (Dhuey & Lipscomb, 2008). Considering most seniors were not 18 years of age, the researchers obtained parental consent followed by the student’s assent.

Once the researcher obtained school consent, a date was scheduled for a face-to-face visit. All students that provided parental consent participated in the online questionnaire. At some schools, students were provided with in-class computers while a designated computer lab was provided for the remaining. Before the completion of the questionnaire, the researchers provided the participants with the purpose, instructions, clarifying statements, and assistance in the form of proctoring.

Data Analysis

Data were transferred onto Google Forms and downloaded into a Microsoft Excel worksheet to allow for data analysis. Utilizing Google Forms allowed the researcher to see the breakdown of individual questions in a more user-friendly and readable format. Quantitative data from Likert scale and demographic questions were analyzed and correlations were derived using Pearson product-moment correlation and reported as an $r$. To provide a magnitude adjective to
explain the correlations sought, Miller’s (1994) descriptors were utilized. The descriptors, as provided by Miller (1994), are: 0.0-0.1 “very small”; 0.1-0.3 “small”; 0.3-0.5 “medium”; 0.5-0.7 “large”; 0.7-0.9 “very large”; 0.9-1.0 “nearly perfect.”

**Findings**

Research question 1 sought to describe a variety of international exposures the students encompassed. When evaluating the languages spoken, many were English only ($f_1 = 350; 90.4\%$), followed by students who spoke two languages fluently ($f_2 = 33; 8.5\%$). Most students had an agriculture teacher who had traveled outside of the U.S. ($f_3 = 271; 70.0\%$). Many students reported having no family members from another country ($f_4 = 318; 82.2\%$) as well as having no friends from another country ($f_5 = 260; 67.2\%$). When asked about the student’s family members’ military service overseas, the majority had a family member ($f_6 = 227, 58.7\%$) in the armed forces who had served, or are serving, overseas. Most students reported never living in another country ($f_7 = 374; 96.6\%$) nor had ever completed a high school study abroad trip ($f_8 = 386; 99.7\%$). The majority of students had never been outside of the U.S. ($f_9 = 280, 72.4\%$), followed by students who had taken one trip outside of the U.S. ($f_{10} = 48, 12.4\%$), students who had taken multiple trips outside of the U.S. ($f_{11} = 69, 17.8\%$). Table 2 expands upon the findings in research question 1.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Student participant demographics ($n = 387$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$f$</td>
</tr>
<tr>
<td>Languages Spoken</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>350</td>
</tr>
<tr>
<td>Two</td>
<td>33</td>
</tr>
<tr>
<td>Three</td>
<td>3</td>
</tr>
<tr>
<td>Four or more</td>
<td>1</td>
</tr>
<tr>
<td>Citizenship in Other Country</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>365</td>
</tr>
<tr>
<td>One</td>
<td>22</td>
</tr>
<tr>
<td>Ag. Teacher has Travelled Outside the U.S.</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>271</td>
</tr>
<tr>
<td>No</td>
<td>116</td>
</tr>
<tr>
<td>Do You Have Family from Another Country?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>318</td>
</tr>
<tr>
<td>Do You Have Friends from Another Country?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>127</td>
</tr>
<tr>
<td>No</td>
<td>260</td>
</tr>
<tr>
<td>Do You Have Family in the Armed Forces Who Have Traveled/Served Overseas?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>227</td>
</tr>
<tr>
<td>No</td>
<td>160</td>
</tr>
<tr>
<td>Have You Lived in Another Country?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>374</td>
</tr>
<tr>
<td>Participation in a High School Study Abroad Program?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 3 describes the Intercultural Effectiveness of student participants \((n = 387)\). The students responded to the six areas of Intercultural effectiveness: Self-Awareness, Exploration, Global Mindset, Relationship Interest, Positive Regard, and Emotional Resilience. Once this data was collected, the mean, standard deviation, and range of the data were determined. When looking at each construct from the Intercultural Effectiveness Survey (IES) the following mean, standard deviation, and range were found for: Self-Awareness \((m = 3.82; SD = 0.08)\); Exploration \((m = 3.95; SD = 0.46)\); Global Mindset \((m = 2.22; SD = 0.71)\); Relationship Interest \((m = 3.05; SD = 0.46)\); Positive Regard \((m = 3.47; SD = 0.60)\); and Emotional Resilience \((m = 3.32; SD = 0.51)\).

### Description of student intercultural effectiveness \((n = 387)\)

<table>
<thead>
<tr>
<th>Construct</th>
<th>(M)</th>
<th>(SD)</th>
<th>Range (Low – High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration</td>
<td>3.95</td>
<td>0.46</td>
<td>2.60 – 5.00</td>
</tr>
<tr>
<td>Self-Awareness</td>
<td>3.82</td>
<td>0.08</td>
<td>2.33 – 5.00</td>
</tr>
<tr>
<td>Positive Regard</td>
<td>3.47</td>
<td>0.60</td>
<td>1.44 – 5.00</td>
</tr>
<tr>
<td>Emotional Resilience</td>
<td>3.32</td>
<td>0.51</td>
<td>1.67 – 5.00</td>
</tr>
<tr>
<td>Relationship Interest</td>
<td>3.05</td>
<td>0.46</td>
<td>1.00 – 4.63</td>
</tr>
<tr>
<td>Global Mindset</td>
<td>2.22</td>
<td>0.71</td>
<td>1.00 – 4.57</td>
</tr>
</tbody>
</table>

Research question three sought to determine a relationship between the Intercultural Effectiveness constructs. Self-Awareness had a large, positive relationship with Exploration \((r = 0.575)\), a very small positive relationship with Global Mindset \((r = 0.087)\), a small positive relationship with Relationship Interest \((r = 0.179)\), and a very small positive relationship with Positive Regard \((r = 0.095)\). Self-Awareness has a very small negative relationship \((r = -0.044)\) with Emotional Resilience. Exploration had a small positive relationship with Global Mindset \((r = 0.178)\); a small positive relationship with Relationship Interest \((r = 0.163)\) and Emotional Resilience \((r = 0.109)\); and a very small positive relationship with Positive Regard \((r = 0.079)\). Global Mindset has a very small positive relationship with Self Awareness \((r = 0.087)\) and Positive Regard \((r = 0.058)\); a small positive relationship with Exploration \((r = 0.178)\) and Emotional Resilience \((r = 0.135)\); and a medium positive relationship with Relationship Interest \((r = 0.319)\). Relationship Interest has a very small positive relationship with Emotional Resilience.
Resilience ($r = 0.173$); and a small positive relationship with Positive Regard ($r = 0.225$). Positive Regard had a small positive relationship with Emotional Resilience ($r = 0.171$).

Table 4

<table>
<thead>
<tr>
<th>Relationship of intercultural effectiveness constructs</th>
<th>SA</th>
<th>EX</th>
<th>GM</th>
<th>RI</th>
<th>PR</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Awareness (SA)</td>
<td>-</td>
<td>0.575</td>
<td>0.087</td>
<td>0.179</td>
<td>0.095</td>
<td>-0.044</td>
</tr>
<tr>
<td>Exploration (EX)</td>
<td>-</td>
<td>-</td>
<td>0.178</td>
<td>0.163</td>
<td>0.079</td>
<td>0.109</td>
</tr>
<tr>
<td>Global Mindset (GM)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.319</td>
<td>0.058</td>
<td>0.134</td>
</tr>
<tr>
<td>Relationship Interest (RI)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.225</td>
<td>0.173</td>
</tr>
<tr>
<td>Positive Regard (PR)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.171</td>
</tr>
<tr>
<td>Emotional Resilience (ER)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Research question four sought to determine if a relationship existed among the various Intercultural Effectiveness Survey constructs (Self-Awareness, Exploration, Global Mindset, Relationship Interest, Positive Regard, and Emotional Resilience) and student characteristics (have/had citizenship in another country; high school agriculture teacher has traveled internationally; number of languages spoken; including having family from another country; having friends from another country; having family in the armed forces who have been overseas; having lived in another country; having participated in a school study abroad trip; traveled outside of the U.S.; and number of international experiences). As Table 5 provides that in the current student a small or very small relationship exists among the participants’ Intercultural Effectiveness and their student characteristics.

Table 5

| Relationship of intercultural effectiveness constructs to student characteristics |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                 | Teacher Travel | Family from Other Country | Friends from Other Country | Family in Armed Forces | Lived in Another Country | High School Study Abroad | Student Travel |                      |
| Self-Awareness                  | 0.036          | -0.035          | -0.006          | -0.024          | -0.106          | -0.054          | 0.047          |                      |
| Exploration                     | 0.024           | 0.028           | 0.147           | 0.018           | 0.056           | 0.016           | 0.068           |                      |
| Global Mindset                  | -0.051          | 0.064           | 0.051           | 0.055           | 0.051           | 0.056           | 0.019           |                      |
| Relationship Interest           | -0.166          | 0.010           | -0.020          | 0.035           | -0.062          | 0.036           | -0.093          |                      |
| Positive Regard                 | -0.080          | 0.013           | 0.046           | 0.035           | 0.067           | 0.017           | -0.028          |                      |
| Emotional Resilience            | -0.077          | 0.043           | 0.062           | 0.019           | 0.019           | 0.035           | -0.022          |                      |

Conclusion, Implications, and Recommendations

There is little to argue regarding the need to expand global mindsets within our youth; however, differences may exist as to the approach the profession should take at expanding the mindset. Within the context of the current study, the researchers examined the possible global surroundings of the secondary agricultural education students within random schools throughout [STATE] and assessed their intercultural effectiveness.
Of the six constructs questioned within the Intercultural Effectiveness Scale, students reported highest on Exploration, which refers to openness and active pursuit of the understanding of ideas, values, norms, situations, and behaviors that are new and different. In a study conducted by Kealey (1996), having an interest in Exploration was an important part of global competency and one’s willingness to explore their intrigue regarding different cultures, which normally lead to a desire to understand people and traditions. Furthermore, studies conducted by those in the education field suggest that overseas teaching experiences for pre-service teachers expand intercultural effectiveness, develop an appreciation for the location visited, and enhances the critique of their own culture in the process. The appreciation and reflection cause increased respect for diverse ways to include more cross-cultural examples within their classrooms and curriculum in addition to continuing to increase their level of intercultural effectiveness. As the Exploration data indicates, students are more interested in learning about other cultures or individuals who are culturally and globally different from them. One approach to the recommendation includes teachers incorporating examples of agricultural practices from other countries around the world and then comparing them to practices found in the U.S. teachers may also look to their local community for assistance in incorporating other cultures and international networks into their classrooms. The hosting of a cultural lunch/dinner where students learn to prepare a dish from another culture along with the ingredients origins, traditions and agricultural practices.

Closely following Exploration was the construct of Self-Awareness. According to Jokinen (2005) Self-Awareness was fundamental to one’s ability to effectively work with people from other cultures. Similarly, Varner and Palmer (2005) argued that “conscious cultural self-knowledge is a crucial variable in adapting to other cultures” (p. 1). Based on these findings, it is suggested that all teachers and students take an intercultural effectiveness survey to identify their strengths and weaknesses in intercultural communication and begin to work towards increasing their cultural competence in these six construct areas. High Self Awareness indicates that the students would be more comfortable with who they are as individuals and also more adaptable to situations when they were exposed to other cultures. Students who perform higher in self-awareness appreciate classroom discussions about global policies and issues affecting agriculture. Because of the significance of this data in Self-Awareness teachers should encourage their students to discuss more controversial and analytical topics within the agricultural classroom. Topics such as animal rights/welfare, the ethics of cloning, and the perception of antibiotics in conventional farming methods may be examples of controversial issues to discuss as they may be different around the world.

Global Mindset was the lowest scored construct, among the 387 secondary agriculture youth. In his research on international experiences in creating a teacher that is both culturally competent and internationally-minded, Cushner and Mahon (2002) believed “humans, as social beings, learn best in situations when the complexity of social reality is encountered, examined, and understood” (p. 36). Furthermore, he discovered that the lived intercultural experience is the most beneficial type of experience in gaining a meaningful understanding of other cultures. In 2007, Cushner further found that lived experiences expanded cross-cultural knowledge and developed a global perspective. According to Cushner’s work students who are familiar with other countries or cultures (through having family, friends, or other connections) will also be more likely to desire to maintain relevancy on the status of the countries or cultures; thus, Global Mindset improves. Teachers need to engage students in assignments that include participation in cultural interactions. The most beneficial and logical suggestion for increasing one’s Global
Mindset scores is to have students (and teachers) interact with people who are culturally different from them. This includes utilizing residents from the community (i.e. local restaurant and store owners for specialty foods), utilizing an educational trip that is centered on agriculture (i.e. a tour of the major agricultural regions of France to learn their major products and exports), or utilizing other means of technology to infuse cultural experiences into the classroom curriculum (i.e. video conference calls, videos, documentaries, or social media).

In terms of the relationships between the students’ Intercultural Effectiveness, as shown by Table 3, a positive relationship existed between Self-Awareness and Exploration; while students who scored high in Global Mindset positively scored high in Relationship Interest. Remember from the construct descriptions earlier that Relationship Interest refers to the degree to which people have a desire and willingness to initiate and maintain relationships with people from other cultures. People high on this dimension work have a more difficult time developing relationships with others (Mendenhall et al., 2012). Black, Morrison, and Gregersen (1999) describe it as the ability to emotionally connect with others. Based on the findings, it can be concluded that when students are more aware of themselves, they are also more likely to be interested in learning about other people. Students who have an elevated Global Mindset are also more likely to be interested in forming and keeping relationships with those who are culturally different from them. Therefore, the recommendation for all students to take the IES survey is strengthened. This will allow them to identify their cultural strengths and weaknesses and allow them to find ways in which they can improve their abilities in those lower-scoring constructs.

In addition to increasing our students’ Global Mindset scores, it may also be beneficial to increase our teachers’ Global Mindset scores. Throughout post-secondary institutions, educational abroad experiences immerse students in an environment that is different than that of their norm, but does it enhance teaching following the experience? Is intercultural effectiveness enhanced? And are the college students obtaining the ability to adapt to various situations, which transpires to the students they will one day teach? As a suggestion to [STATE] Department of Education Staff, it would be beneficial to offer an intercultural effectiveness professional development opportunity for current teachers.

The results of this study tell a story that can assist current educators to better understand the needs of their increasingly diverse student population, see where the average student ranks in terms of intercultural awareness, and introduce the conversation of increasing intercultural effectiveness both in and out of the classroom. Furthermore, in the ever-shifting cultural climate of America’s schools, agricultural educators must recruit and retain students from all races, ethnicities, genders, religions, and statuses. It is pivotal that youth gain a respect for agriculture as one of the oldest traditions allowed in an established society, and at the same time, learn to respect others for their diverse contributions, perspectives, and opinions no matter how similar or different they may be.

The findings are exploratory, but provide practicing scholars with discussion points for further exploration and theoretical development. To expand our preservice teachers for a multicultural classroom environment, further studies are needed to see the depth and breadth of cultural exposure (Zajonc, 1968) and further explore its role in intercultural effectiveness. How effective are our international experiences in helping expand an individual’s desire to talk to others who are culturally different?

References

Banks, J. A. (2004). Teaching for social justice, diversity, and citizenship in a global


Identifying Capacities an Extension Network May Need to Effectively Support the Professionalization of Extension Providers

Kevan W. Lamm
Alexa J. Lamm
University of Georgia

Kristin Davis
International Food Policy Research Institute

B. Jyothiswaroop
University of Florida

Leslie D. Edgar
University of Georgia

Abstract

Professionalization is a critical component of organizational capacity and productivity. Yet, rural advisory service (RAS) providers who are charged with disseminating research-driven techniques and ideas that enhance agricultural production and addressing local stakeholder needs are often overlooked in this area. One of the critical disconnects is the lack of consistent capacities for RAS networks to effectively support the professionalization of RAS providers. Based on a framework analyzing the typical milestones associated with professionalization efforts, capacity building, and social capital the study provides insights into the support mechanism needed for professionalization. Specifically, a Delphi a panel of 31 experts from 24 countries arrived at consensus on 33 specific capacities a RAS network may need to effectively support the professionalization of RAS providers. The results of the research provide a practical framework for RAS networks to consider from a professionalization and capacity building perspective.

Keywords: professionalization, delphi, evaluation, capacity assessment, extension, network
Introduction  
Rural advisory service (RAS) providers, also referred to as extension professionals in many parts of the world, aim to support farmers by collecting, organizing, and disseminating research-driven techniques and ideas that enhance agricultural production and help solve local stakeholder needs (Khurshid, Khan, Pervaiz, Khan, & Nawaz, 2017). According to Abbott (1991), “the core of the phenomenon of profession was a special relation between client and professional, and the core of professionalization was the evolution of guarantees for this relationship” (p, 356). However, unlike other professions that include more formal professionalization structures such as medicine (e.g. Marcus, 1999), law (e.g. Applemen, 2004), law enforcement (e.g. McClellan & Gustafson, 2012), and accounting (e.g. Cooper & Robson, 2006), there remains a fundamental gap as it relates to establishing the needs of RAS professionals, as well as the professionalization structures (Noordgraaf, 2011) necessary to address such needs (Davis & Sulaiman, 2014). Professionalization is therefore necessary in establishing, disseminating, and to a certain extent enforcing the knowledge and standards that legitimize a field by providing the necessary qualifications for a profession (L’Etang, 2008).  

Despite the need for professional standards and codes the ever changing landscape of agricultural development, particularly within international contexts, presents a fundamental challenge. For example, farmers have recently exhibited an increased need for technological information (Eastwood, Klerkx, & Nettle, 2017; Singh, Malhotra, & Singh, 2016). To address the technological information needs of farmers, RAS providers must build capacity within the farming communities they are a part of while delivering the latest information and addressing clientele needs (McCole, Culbertson, Suvedi, & McNamara, 2014). In an attempt to remain relevant to clientele, RAS professionals must have an orientation towards ongoing professional development to provide the best possible information and services to those they work with (Davis & Sulaiman, 2014). However, poor coverage of advisory services and low literacy rates have resulted in fragmented systems within many developing countries with the result being inconsistent levels of professional services provided by RAS professionals (FAO, 2014; McCole et al., 2014). Additionally, inconsistent coverage due to a lack of RAS providers in the field is a result of insufficient funds. The funding challenges are compounded when limited resources must be adjudicated between known coverage gaps or the further professional development of RAS professionals that are employed. At times finite resources are prioritized to fill gaps with professional development considered a secondary priority (Swanson, 2006). Therefore, the fundamental gap may not necessarily reside within the professionals themselves but rather within the professionalization infrastructure in which the professional resides (Abbott, 1991).  

Previously deemed a public responsibility, most governments supported and coordinated RAS providers (Umali-Deininger, 1997). However, escalating fiscal deficits and poor governance of public programs has redirected policy encouraging the potential privatization of RAS (Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubade, & Kyotalimye, 2011; Swanson & Rajalathi, 2010). This is observed even in developed countries, like the United States, where extension’s ability to perform has been challenged by reduced government budget allocations (Wang, 2014). To reduce the financial burden of public RAS providers, governments have started contracting out RAS services (Rivera & Alex, 2006). What is known about this change, is that RAS services have become demand driven and some small-scale farmers have been left behind (Labarthe & Laurent, 2013). As a result, many farmers are left depending on private information providers, such as retailers and Certified Crop Advisors, for information on the latest production technologies (Wang, 2014). These are individuals hired by companies who have not
received the same training that RAS providers had received in the past. Getting information from somewhat unreliable sources has impacted productivity of both farms and farmers around the globe (Klerkx & Jansen, 2010; Rivera & Sulaiman, 2009). Similar to other professional occupations, without an entity to provide and enforce standards and expectations of professional conduct within RAS efforts and to provide professionalization standardization, the value and credibility of RAS professionals is in jeopardy (Davis & Sulaiman, 2014; Forsyth & Danisiewicz, 1985; Freidson, 1988; Richardson, 2017).

Over time, a lack of standards for RAS networks has led to compartmentalized attempts to provide services without consistent professional development (GFRAS, 2015). In a needs assessment conducted by Conklin, Hook, Kelbaugh, and Nieto (2002) professional development was ranked as the top need for RAS providers; however, attendance for process skill training was not a priority. In a recent empirical study in Nigeria, “the findings revealed that although both public and private extension agents had a basic knowledge on the concept of professionalization and its components, the observed disparities in the level of knowledge between them needs to be addressed” (Olorunfemi & Oladele, 2018, p.46). These results are consistent with previous studies finding even when professional development training was available, which was severely limited, many RAS providers were not attending because of ineffective training delivery methods (Lakai, Jayaratne, Moore, & Kistler, 2012). These findings support the notion that there may be institutional challenges associated with professionalization that are distinct from the specific needs of RAS professionals themselves (Abbott, 1991). To address the fundamental gap in professionalization support and consistency some RAS networks have started to establish entities to support professionalization at the regional level (e.g., Davis & Terblanché, 2016). The preliminary evidence indicates RAS networks may serve as a viable platform for RAS professionalization to occur; however, there is currently no set of standard capacities an RAS network should embody to effectively support RAS professionalization activities across multiple geographies and stages of development. Therefore, there is a need to establish a set of common capacities for RAS networks to effectively support the professionalization of RAS providers (GFRAS, 2015).

**Conceptual Framework**

The conceptual framework for the present study is based on a synthesis of an ordering of professionalization proposed by Abbott (1991), a capacity building model proposed by Moyer, Coristine, MacLean, and Meyer (1999), and social capital (Lin, 2001; Lin, 2008; Woolcock, & Narayan, 2000). The integration of these concepts provided a diverse literature upon which to consider the development of RAS networks’ ability to support professionalization activities. In addition to providing a structure for the study the RAS network as an entity is also germane. The World Bank (2012) defined an innovation network as “a diverse group of actors that voluntarily contribute knowledge and other resources (such as money, equipment, and land) to jointly develop or improve a social or economic process or product” (p. 16), for the purposes of this research an RAS network was defined as: a diverse group of actors that share common beliefs, are affiliated through a formal or informal structure, and contribute knowledge or other resources to jointly develop or improve RAS practice within a particular geography whether at the local, country, region, or global level.
Ordering of Professionalization

The term professionalization is not only related to the roles of individuals, but also related to the structure and management needed to acquire and maintain power (Forsyth & Danisiewicz, 1985; Negrine & Lilleker, 2002). In an analysis of the professionalization of American medicine Abbott (1991) identified five critical milestones; however, the author emphasized that although the sequence of events may occur in an anticipated manner, the sequence is less important than the milestones. The basic milestones Abbott (1991) identifies are: association, control of work, interest in professional education, the pursuit of professional knowledge, and profession-dominated work sites.

The first milestone identified was association and the inherent need for a group of professionals to “exchange information, to provide mutual support, to lobby, to control practitioners, or to control work” (p. 361). However, association may or may not proceed the other milestones from a professionalization perspective. For example, the need for interest in professional education may precipitate the need for association. Within the international extension context an analysis of the network emergence of the Global Forum for Rural Advisory Services (Davis, Dolly, Lamm, & Lamm, 2018) identified similar themes, specifically: emancipation, consolidation, positioning, broadening, strengthening, deepening, and partnering outside of the network. The emancipation and consolidation themes are therefore similar to the association milestone (Abbott, 1991).

Control of work is the next milestone Abbott (1991) identifies. At this stage “there is a desire for professional and personal status and for economic security. There may also be a sincere professional desire to protect the public against dangerous quacks” (p. 362). Within a pluralistic endeavor such as extension, the desire to protect clientele from incorrect or potentially harmful information is a likely driver in the need for establishing professionalization. This milestone is therefore similar to the positioning theme from the GFRAS analysis (Davis et al., 2018).

Next, Abbott (1991) identifies interest in professional education as a core milestone. At this stage, “trained skill is necessary for practice and helps differentiate the officially competent from the unofficially competent as well as from the officially incompetent” (p. 363). Without a set of standards upon which to evaluate the competency of a professional there is the potential that incompetent individuals may present themselves as professionals. As it relates to the network emergence themes (Davis et al., 2018), strengthening is most closely associated. Establishing protocol, procedure, and norms are steps necessary to inform professional education as grounded within the network.

The pursuit of professional knowledge follows next (Abbott, 1991). For professionals “knowledge permits effective practice and may help legitimate professional authority” (p. 363), it may also “enable the defense of a profession’s jurisdiction and the potential seizure of others” (p. 363). In both contexts the pursuit of professional knowledge further establishes the differences between those within a profession and those outside of the profession. The themes of broadening and deepening are related from a network emergence perspective (Davis et al., 2018) as a network may seek to establish what is within the scope of interest and expertise, and what may not be appropriate from a professionalization perspective. Considering the diversity of professional backgrounds within RAS internationally the need for both a broad and simultaneously deep perspective is relevant (Cohn, Fehr, & Maréchal, 2017; Feder, Willett, & Zijp, 2001).
Lastly, Abbott (1991) proposes profession-dominated work sites as a milestone within the professionalization process. Under these conditions “organizations deliver services more effectively and so increase the efficacy of a fixed body of professionals” (p. 364). Identifying what is the purview of the profession and what is not establishes logical boundaries and supports the logical interaction between groups. In the case of GFRAS (Davis et al., 2018), partnering with organizations outside of the network may indicate the establishment of what the network represents and the value it can contribute to outside entities. The results of empirical studies further support this milestone within contexts such as non-profit organizations (Sanzo Pérez, Rey García, & Álvarez González, 2016) and public administration (Meier & O’toole, 2010).

**Capacity Building Model**

The United Nations (2010) defines capacity as “the ability of individuals, institutions, and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner” (p. 2). Therefore, capacity building is the process by which to improve, or increase, individuals, institutions, and societies capacity. Within a community health context Moyer, Coristine, MacLean, and Meyer (1999) propose a four-stage process to build capacity. First, there is a need to identify common ground. Specifically, identifying the areas in which there is general consensus on what is relevant, important, and feasible. Second, working cooperatively. Focusing on the role the actor or actors must fulfill in pursuit of the common objective. Third, working in partnership. Focusing efforts on a common endeavor ensures all actors are aligned. Lastly, working on a multi-agency/multi-sectoral project. As the scope of an effort increases the ability for local actors to manage all aspects of the effort deceases. Span of control limits what is reasonable to enforce therefore it is necessary to engage other actors and agencies.

Similar to the model proposed by Moyer and colleagues (1999), Ritter (1999) found the ability to orient organizational capacity building with external sources was important in professional development within a network. The exploration of the competencies needed to manage a network effectively provide input into suitable organizational structures within a network necessary to support professionalization (Chandler, 1990). Strengthening underperforming competency areas has been found to result in improved resource mobilization and utilization through collective action (Jenkins, 1983). For example, Gendron and Barrett (2004) studied a group of accountants and found that professionalization supported their communication processes with external audiences by developing extensive and secure internal networks. Similar expectations were found amongst public relations professionals (Fitch, 2016).

**Social Capital**

Social capital helps to understand the complexity of an issue within organizations and allows for the exploration of solutions (Allan, Ozga, & Smyth, 2009; Inkpen & Tsang, 2005; OECD, 2001) based on the premise “investment in social relations with expected returns” (Lin, 2001, p. 30). Social capital considers the value of the social contexts that exist within an organization, system or network including ties, relationships, and value systems (Tsai & Ghoshal, 1998). Social capital has been established as an important element in effective group, organization and network functioning (Borgatti, Everett, & Johnson, 2018; Curry, 1997; Curry & Winter, 2000; Penuel, Riel, Krausem, & Frank, 2009; Ritter, 1999; Tandi Lwoga, 2011).
Conceptual Synthesis

The integration of the three primary concepts associated with the study include: an ordering of professionalization proposed by Abbott (1991), a capacity building model proposed by Moyer, Coristine, MacLean, and Meyer (1999), and social capital (Lin, 2001; Lin, 2008; Woolcock, & Narayan, 2000). The core of the study is focused on the professionalization; however, the stages associated with professionalization are somewhat incomplete in isolation. Therefore, it is important to consider first, capacity building, or the capacities necessary for a RAS network to support professionalization efforts. However, capacity building is also incomplete as an antecedent condition because the nature and utility of the capacity information is dependent upon inputs from experts. Therefore, social capital is also considered as a component within the framework as the source for capacity insights that will ultimately inform RAS network support of professionalization activities. A visual representation of the framework is provided in Figure 1.

![Figure 1. Conceptual framework integrating social capital, capacity building, and professionalization.](image)

Purpose and Research Objectives

The purpose of this study was to identify the capacities needed for a RAS network to support the professionalization of RAS providers. The study was driven by the following research objectives:

1. Create a comprehensive list of potential capacities a network may need to effectively support the professionalization of RAS providers.
2. Arrive at a global consensus on the specific capacities necessary for a RAS network to support the professionalization of RAS providers.

Methods

The methods associated with this article are identical to those described in detail in Lamm, Lamm, Davis, and Swaroop, (2017), which was part of a larger project that gathered multiple thematic areas (Lamm et al., 2017). Nevertheless, in accordance with recommendations in the literature (Zhang, Jia, Lin, & Tan, 2013) a summary of the methods are provided; however, readers are encouraged to review the source manuscript (Lamm et al., 2017) for additional details.

A modified Delphi method research design was used to address the identified research objectives and gain consensus on the capacities needed for a RAS network to be effective in professionalization across a panel of experts. (Dalkey & Helmer, 1963; Ziglio, 1996). Based on the context of the research, RAS networks, experts were identified by the Global Forum for Rural Advisory Services (GFRAS) organization (Okoli & Pawlowski, 2004). The GFRAS
organization identified 31 individuals to constitute the expert panel. The individuals were identified based on a variety of considerations. Specifically, individuals were selected based on stakeholders, geographies, and experience levels among other considerations.

The 31 experts that participated in the panel represented RAS practitioners, funding organizations, farmer and advocacy groups, academic institutions, research institutes, policy makers, and other affiliated RAS support organizations (for example consultants and agricultural supply companies). Panelists had a range of experience with RAS exposure ranging from four to 45 years, with an average tenure of 18 years. Panelists represented the following countries:

Bangladesh, Belgium, Bulgaria, Ecuador, Fiji, Georgia, Ghana, Guyana, India, Ireland, Italy, Lao People's Democratic Republic, Malawi, Nicaragua, Nigeria, Pakistan, Philippines, Samoa, Solomon Islands, South Africa, Switzerland, Uganda, United States of America, and Uzbekistan. (Lamm et al., 2017, p. 97)

To arrive at consensus amongst the expert panelists a three round Delphi process was employed. Researchers followed literature recommendations to develop the processes and instrumentation (e.g. Delbecq, Van de Ven, & Gustafson, 1975; Lamm et al., 2017; Lamm, Lamm, Davis, & Swaroop, 2018; Nistler, Lamm, & Stedman, 2011). During the first round of the process, experts listed, using a short phrase or word, up to five of the most important capacities a RAS network should possess to be effective in professionalization (Gliddon, 2006). As an emergent process, respondents were allowed to provide insights according to their expertise and experience. Using the Dedoose qualitative analysis software program, responses were analyzed and aggregated, or expanded, where appropriate (Dedoose, 2016; Garson, 2014; Gliddon, 2006). There were 29 respondents to the first round for a response rate of 94%.

Results from the first round of the Delphi process were then used to develop the second-round questionnaire used to capture experts’ level of agreement with the capacities identified in round one. Panelists were asked to indicate their level of agreement or disagreement to each item, regarding the importance on a five point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree). The scores for each item were averaged, and each item had to receive a mean score greater than 3.25 for the item to continue to the third round (Garson, 2014). There were 27 respondents to the second round for a response rate of 87%.

The third, and final, Delphi round was used to establish expert consensus with the capacities identified in the second round. Panelists indicated whether or not each professionalization capacity should be kept or removed. Item with a minimum of 75% expert agreement to keep were retained (Garson, 2014). There were 29 respondents in the third and final round for a response rate of 94%.

Before initiating the research, Institutional Review Board approval was obtained from the University of Florida. All three rounds of the Delphi were administered online and were distributed according the Tailored Design Method (Dillman, Smyth, & Christian, 2008). In accordance with recommendations a pre-notice email sent to all panelists to initiate the process. The pre-notice message was followed by an email invitation to complete Round One of the Delphi approximately two days later. For all three rounds of the process the protocol included at least three reminder messages after the original invitation was sent. Results from the process were downloaded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 21 with further thematic analysis of responses in the Dedoose qualitative analysis software package (Dedoose, 2016). Overall the response rates for each round of the process were
deemed acceptable based on previous empirical study thresholds where response rates of 70% or greater per round are adequate (Keeney, Hasson, & McKenna, 2011).

Results

At the conclusion of the first round of the Delphi process there were 33 capacities identified by the expert panel (Table 1). Of the 33 capacities from Round One, all items achieved the minimum threshold with a mean score greater than or equal to 3.25 to be retained in Round Two. Therefore all 33 capacities identified were included in the third and final round. Mean values for the capacities ranged from 4.44 to 3.27 following the Round Two analysis (Table 1). The highest level of importance was the statement “A country fora or regional RAS network should...advocate for RAS professionalisation.”

Table 1

*Delphi Round One and Two Results: Level of Importance Associated with Capacities a RAS Network May Need to Effectively Support the Professionalization of RAS Providers (n = 33)*

<table>
<thead>
<tr>
<th>Capacity</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocate for RAS professionalisation</td>
<td>4.44</td>
<td>0.70</td>
</tr>
<tr>
<td>Provide an effective platform for information exchange and communication with other RAS professionals through face to face opportunities (e.g. sharing of ideas, tools, experiences, skills, approaches at meetings)</td>
<td>4.22</td>
<td>0.70</td>
</tr>
<tr>
<td>Provide a clear vision of the role of a RAS professional</td>
<td>4.15</td>
<td>0.66</td>
</tr>
<tr>
<td>Build leadership capacity (includes strategy development and managerial skills)</td>
<td>4.12</td>
<td>0.91</td>
</tr>
<tr>
<td>Offer an understanding of rural advisory services</td>
<td>4.07</td>
<td>0.68</td>
</tr>
<tr>
<td>Provide opportunities for networking with external stakeholders</td>
<td>4.00</td>
<td>0.83</td>
</tr>
<tr>
<td>Be aware of existing strengths and weaknesses within the RAS system</td>
<td>4.00</td>
<td>0.78</td>
</tr>
<tr>
<td>Provide an effective platform for information exchange and communication with other RAS professionals through asynchronous online platforms (e.g. sharing of ideas, tools, experiences, skills, approaches on a website)</td>
<td>3.96</td>
<td>0.90</td>
</tr>
<tr>
<td>Provide opportunities for collaboration with external stakeholders</td>
<td>3.93</td>
<td>0.87</td>
</tr>
<tr>
<td>Encourage partnerships with universities and learning institutes</td>
<td>3.93</td>
<td>0.96</td>
</tr>
<tr>
<td>Build relationships with universities and learning institutes to provide education, training and skill development for RAS professionals</td>
<td>3.93</td>
<td>1.04</td>
</tr>
<tr>
<td>Provide an effective platform for information exchange and communication with other RAS professionals through synchronous online platforms (e.g. sharing of ideas, tools, experiences, skills, approaches on Skype calls)</td>
<td>3.89</td>
<td>0.93</td>
</tr>
<tr>
<td>Offer a standardized set of materials for network members to use (e.g. training manuals, best practices, guidelines, tools, learning kits)</td>
<td>3.89</td>
<td>0.93</td>
</tr>
<tr>
<td>Provide opportunities for communication with external stakeholders</td>
<td>3.89</td>
<td>0.97</td>
</tr>
<tr>
<td>Encourage needs assessments</td>
<td>3.85</td>
<td>0.95</td>
</tr>
</tbody>
</table>
Assist in the development of facilitation skills (includes ability to build capacity of staff and stakeholders) 3.81 0.88
Offer opportunities to build partnerships with universities and learning institutes 3.74 1.06
Offer opportunities to build public/private partnerships 3.74 0.86
Enhance knowledge of educational practices (educational methods and program development expertise) 3.70 1.03
Provide standards for RAS performance 3.70 0.87
Support the identification of the resources needed to be successful 3.70 0.87
Offer professional development to enhance subject matter specific knowledge (e.g. farming practices, disease management, rural development, economics, etc.) 3.67 1.21
Support the development of appropriate program monitoring and evaluation systems 3.63 1.04
Offer opportunities for the development/education of new RAS professionals 3.63 1.28
Provide support for needs assessments 3.59 1.05
Provide incentives for engagement in best practices (awards, scholarships, certifications, etc.) 3.59 1.05
Bring experts in to deliver specific professional development training 3.48 1.09
Support and reward program monitoring and evaluation systems once in place 3.44 1.19
Provide opportunities for professional development plan management 3.41 0.97
Provide opportunities for professional development plan creation 3.37 0.97
Support the procurement of the resources needed to be successful 3.33 1.07
Reward positive attitudes 3.33 1.04
Offer research to support RAS efforts 3.27 1.25

Following the third and final round of the Delphi process there were 24 of the original 33 capacities retained. The nine capacities that were not retained failed to reach the minimum threshold of 75% consensus amongst panelists to keep the item. The results of the analysis are presented in Table 2.

Table 2
Delphi Round Three Results: Level of Consensus Associated with Capacities a RAS Network May Need to Effectively Support the Professionalization of RAS Providers (n = 33)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Consensus %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocate for RAS professionalisation</td>
<td>96.6</td>
</tr>
<tr>
<td>Provide an effective platform for information exchange and communication with other RAS professionals through face to face opportunities (e.g. sharing of ideas, tools, experiences, skills, approaches at meetings)</td>
<td>96.6</td>
</tr>
<tr>
<td>Provide a clear vision of the role of a RAS professional</td>
<td>96.6</td>
</tr>
<tr>
<td>Support the development of appropriate program monitoring and evaluation systems</td>
<td>93.1</td>
</tr>
<tr>
<td>Provide opportunities for collaboration with external stakeholders</td>
<td>93.1</td>
</tr>
<tr>
<td>Provide opportunities for networking with external stakeholders</td>
<td>93.1</td>
</tr>
</tbody>
</table>
Build relationships with universities and learning institutes to provide education, training and skill development for RAS professionals

Enhance knowledge of educational practices (educational methods and program development expertise)

Provide opportunities for communication with external stakeholders

Offer an understanding of rural advisory services

Build leadership capacity (includes strategy development and managerial skills)

Be aware of existing strengths and weaknesses within the RAS system

Assist in the development of facilitation skills (includes ability to build capacity of staff and stakeholders)

Provide an effective platform for information exchange and communication with other RAS professionals through asynchronous online platforms (e.g. sharing of ideas, tools, experiences, skills, approaches on a website)

Provide incentives for engagement in best practices (awards, scholarships, certifications, etc.)

Provide opportunities for professional development plan management

Provide an effective platform for information exchange and communication with other RAS professionals through synchronous online platforms (e.g. sharing of ideas, tools, experiences, skills, approaches on Skype calls)

Encourage partnerships with universities and learning institutes

Offer a standardized set of materials for network members to use (e.g. training manuals, best practices, guidelines, tools, learning kits)

Support the identification of the resources needed to be successful

Provide opportunities for professional development plan creation

Provide support for needs assessments

Encourage needs assessments

Offer opportunities to build public/private partnerships

Bring experts in to deliver specific professional development training

Provide standards for RAS performance

Offer opportunities for the development/education of new RAS professionals

Support and reward program monitoring and evaluation systems once in place

Offer opportunities to build partnerships with universities and learning institutes

Support the procurement of the resources needed to be successful

Offer professional development to enhance subject matter specific knowledge (e.g. farming practices, disease management, rural development, economics, etc.)

Offer research to support RAS efforts

Reward positive attitudes
Conclusions, Implications, and Recommendations

Although there are previous studies examining the professional needs for RAS providers, there has been limited analysis of the capacities RAS networks need to support the professionalization of RAS providers. As Abbott (1991) found, professionalization typically does not emerge spontaneously, rather it is typically a sequence of milestones that occur in support of the effort. The findings from the present study are intended to serve as a set of baseline capacity recommendations for RAS networks to consider when establishing and environment in which to support the professionalization of RAS providers.

The purposive targeting of RAS professionals with a diverse set of experiences and perspectives helps to ensure the results are applicable under various conditions. Additionally, acknowledging the social capital aspect of the data collection process to inform the development of professionalization capacity identification provides a model for future research within international agricultural and extension education contexts. Specifically, the development of common capacities that are appropriate under various conditions around the globe should be approached with care and caution. For both international agriculture academics and professionals, studies should provide value and an appropriate context upon which to evaluate the utility of the results (Bodin & Crona, 2009).

Most of the 24 capacities identified in this research revolve around common themes: access to knowledge, resources, or technologies (Inkpen & Tsang, 2005), resources which are embedded within a network that can be accessed for utilization (Lin, 2001), understanding the complexity of the profession (Allan et al., 2009), and communicating shared norms and values (OECD, 2001; Tsai & Ghoshal, 1998). A recommendation from the study would be to focus on not only the individual capacity items, but to consider common themes within the results. While it may not be appropriate for all networks to attempt to build capacity across all areas simultaneously, it is important to begin the process and start identifying and pursuing those capacities that are reasonable and appropriate. For example, using Abbott’s (1991) and Moyer and colleagues (1999) recommendations a RAS network may wish to first consider their level of maturity within the capacity building process. Is the network aligned? If so, are the right actors engaged? If so, is there collective effort to improve professionalization support? If all the criteria for capacity building in place an analysis of Abbott’s (1991) milestones may help to inform efforts. For example, is there an association of RAS professionals established? Is there interest in professional education? Are there opportunities to formalize and enforce professional standards with policymakers? A recommendation for RAS networks is to utilize not only the results of the study in isolation, but to also consider using the conceptual framework as a guide on other network capacity building endeavors such as improving knowledge management capacity (Lamm, Lamm, Davis, & Swaroop, 2017).

An additional recommendation for future study would be to analyze and formalize the individual capacities into a functional diagnostic instrument or scale that RAS networks could use to evaluate and plan their professionalization support capacity development activities. A robust and valid instrument would provide a consistent resource to RAS networks and would help promote knowledge sharing and communication using a common vernacular.

Although the results and approach in the current study provide both practical and theoretical insights, there are limitations that must be acknowledged. First, despite efforts to be inclusive and providing a platform for individuals representing RAS networks across the globe (Bodin & Crona, 2009), the quality of the result remains dependent on the knowledge and expertise of the panel of experts. Acknowledging this potential limitation, steps were taken to
minimize potential bias amongst panelists such as involving individuals familiar with the underlying content, but with differing roles, backgrounds, and perspectives (Garson, 2014). A second limitation is the utility of the results within the study, specifically, the need for RAS professionalization in a context of decreasing financial support and resources is well established in the literature (e.g. Rivera & Alex, 2006; Swanson & Rajalathi, 2010; Umali-Deininger, 1997; Wang, 2014). However, the intent of the study is not focused on the individual RAS provider, it is focused at the RAS network level, and in particular the capacities a RAS network needs to support the professionalization of RAS providers. Nevertheless, the conceptual overlap and potential for confusion should be acknowledged.

Overall, the results of the study provide an opportunity for RAS networks to begin meaningful dialog regarding the nature and needs of RAS professionalization, and the capacities needed to support the professionalization of RAS providers. As readily observed on a global scale, funding and financial support RAS professionals is declining (Swanson, 2006). While it is well established that there will always be other needs competing for limited resources the need for nations to adequately feed for their populations is paramount (FAO, 2014). Professions such as medicine, law, or accounting (e.g. Gendron, & Barrett, 2004) generally require rigorous professionalization standards, a recommendation from this research be that RAS networks globally consider doing the same using a thoughtful, pragmatic, and appropriate approach.

References
Cohn, A., Fehr, E., & Maréchal, M. A. (2017). Do professional norms in the banking industry favor risk-taking?. The Review of Financial Studies, 0(0), 1-23. https://doi.org/10.1093/rfs/hhx003


Intention Level of Farmers to Use Information Communication Technologies for Agricultural Risk Management in Malaysia

Muhammad Ali
PMAS-Arid Agriculture University Rawalpindi

Norsida Man
Farrah Melissa Muharam
Universiti Putra Malaysia

Abstract
Climate changes are changing intentions of farmers to tackle climate variations in various ways. Information and Communication Technologies are proving to assist farmers to manage agricultural risk timely and with fewer efforts. Intention of farmers to use ICTs in the context of agricultural risk management is important to understand. Therefore, the present study was designed to examine intention of the farmers from the context of Malaysia. The field survey of three selected states was conducted in which 350 farmers were chosen through multi stage cluster sampling technique. The Likert scale items measuring 1 as strongly disagree to 5 as strongly agree were used in the research instrument to assess intention of the respondents. The findings revealed that the farmers showed positive intention to use ICTs for agricultural risk management from the future lens. The overall level of intention was also high. However, internet speed, small screen display and battery issues could halt intention of the farmers to harness potential of digital technologies as reported by the farmers. Thus, the study recommends that agricultural extension service providers are required to introduce various digital skill development programs for the farmers exclusively resource poor and less digital familiar farmers to reduce the risk in the agricultural sector stem from climate changes.

Keywords: intention, farmers, ICTs, agricultural risk management, Malaysia
Introduction

Climate changes influence farmers to manage their agricultural risk through various ways. Farmers first try to use previous knowledge or experience and even local wisdom to curtail the impacts of climate changes on the agricultural sector. However, since the advent of agricultural innovations, they try to graft new technologies like mobile phone to solve the issues. So, intention of farmers to use various digital technologies could be the result of improved agricultural production and reduced adverse impacts of climate changes. According to Hu, Li, Zhang, & Wang, in press, El Bilali and Allahyari (2018), Zhang, Wang, & Duan (2016) and Li, Li, Westlund, & Liu (2015), new technologies like ICTs have been helping farmers to improve agricultural production, significantly contribute towards sustainable food production and may become instrumental in rural household poverty alleviation. Beza et al. (2018) argued that there is a need to empirically comprehend the intention of farmers to use new technologies like mobile phone.

Kabbiri, Dora, Kumar, Elepu, & Gellynck (2018) highlighted that new technologies have grabbed the interest of users (farmers) easily. Moreover, ICTs not only assist users to learn and share valuable agricultural information, but also keep users updated about farm inputs (Kante, Oboko, & Chepken, 2019) and agricultural innovations in the agricultural sector. In this regard, Aldosari and colleagues (2017) stated that extension service providers need to make aware farmers through various advanced digital technologies for agricultural development. In this way farmers could become equipped with not only new technologies, but also sensitized about new issues emerging from climate changes. That is why, Adenle, Wedig, and Azadi (2019) argued that technological innovations play important role in the development of sustainable agriculture. ICTs also create social productive linkages with farmers and extension agents which assist in new technology adoption as opined by Shikuku (2019). In this way, farmers can easily communicate to resolve abrupt issues in the agricultural sector. Moreover, farmers may also obtain market information by the use of ICTs.

Agricultural risk is naturally bounded with climate changes. The current era of digital technologies also offers numerous benefits embedded in ICTs for the agricultural sector. Farmers are now abreast of weather forecasts, market information, pest and disease solutions, activities of formal and informal social networks, input price fluctuation, availability of agricultural labor, updates of tentative natural disasters, package of drought and resistant varieties, credit information from financial institutions and government policies are names a few. Importantly, mental inclination towards ICT usage is not only diminishing rural and urban digital divide, but also increasing use of digital technologies in the developing countries. Thus, these advantages tilt mental inclination of farmers towards the usage of ICTs in the agricultural sector.

Conversely, there are numerous barriers in the use or adoption of new technologies face by male and female users like ICTs in the agricultural sector. Numerous authors (Lwoga & Chigona, 2019; Rotz et al., 2019; Kante et al., 2019; Rahman, Barau, & Noman, 2019; Awan, Ahmed, and Hashim, 2019; Mwalupaso, Wang, Rahman, Alavo, & Tian, 2019; Aldosari et al., 2017) highlighted the barriers in the use of ICTs or latest technologies such as lack of ICT skills and trainings, low speed of internet, cost, a language issue, lack of linkages with agricultural extension service providers are names a few. Furthermore, according to Eitzinger et al. (2019), although there are many hurdles that exist in the use of ICTs, the use of mobile phone as a popular form of ICTs is increasing among the farming community. Thus, there could be many barriers which could inhibit farmers to use or adopt ICTs in the agricultural sector.
To this backdrop, the study was designed to examine the intention of farmers to use ICTs for the management of agricultural risk. Although previous researchers have tried to assess the intention of farmers in various other agricultural aspects, but usage of ICTs in the domain of agricultural risk management is hard to find. Therefore, the present research was designed to bridge the gap in the body of existing literature. The findings would be helpful for a variety of stakeholders to understand the intention of farmers to utilize ICTs in the context of risk management in the agricultural sector. It is important to mention here that agricultural risk mostly stem from adverse impacts of climate changes not only in Malaysia but also other parts of the globe. Thus, this kind of study is important from the empirical lens of Malaysia, and findings would be useful for other neighboring countries.

**Theoretical Framework**

The intention is perceived as a most important predictor of behavior of an individual (Gkargkavouzi, Halkos, and Matsiori, 2019) and used by some of the recent researchers in the agricultural sector, such as Faham & Asghari (2019), Tiraieyari, Ricard, & McLean (2019), Maleksaeidi & Keshavarz (2019), Rezaei, Safa, Damalas, & Ganjkhanloo (2019), Borges et al. (2019), Ruby, Abidin, Lihan, Jambari, & Radu (2019), Bagheri, Bondori, Allahyari, and Damalas (2019), and Yaghoubi, Yazdanpanah, & Komendantova (2019). Importantly, this predictor of human behavior used by Ajzen (Ajzen, 1991) in his both behavioral models, namely Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB). The intention is also visible in Technology Acceptance Model (TAM) and its extensions, plus in Unified Theory of Acceptance and Use of Technology (UTAUT). These models have been widely used by the researchers in different contexts. From the lens of agriculture, Adnan et al. (2017) stated that most of the researchers have utilized TRA and TPB to examine attitudes and behavioral intention of farmers. Thus, understanding future intention of farmers to use ICTs for agricultural risk management is important.

**Purpose and Objective**

The main purpose of this research was to determine the intention of Malaysian farmers to use digital technologies for management of agricultural risk from the future lens. The specific objective was to empirically analyze behavioral intention of the farmers to use ICTs for agricultural risk management.

**Methods**

The research was carried out in selected states of Malaysia through multi stage cluster sampling technique. In the multi stage cluster sampling technique, firstly, the clusters were chosen geographically. Secondly, three states were selected namely East zone (Pahang, Terengganu), South zone (Johor) and North zone (Kedah). In the next stage, the areas from each three states were selected randomly. Lastly, 360 respondents were chosen through simple random sampling technique. So, these chosen respondents were representing various areas of three states.

The pre designed questionnaire was used to collect research data from all 360 farmers. The research instrument was designed by following work of various researchers who have used TPB. The research instrument was designed in English language, however the medium of a questionnaire was changed into the local language (Bahasa Melayu) for proper understanding of the questions. After the pre testing of the research instrument through pilot study, some of the
questions were changed and few were deleted with the expert consultation and results of reliability analysis. The experts who were consulted were from the field of agricultural extension and rural development. In the questionnaire, 13 statements were asked about intention which were measured through five point Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree). These statements were taken into consideration after a rigorous review of literature. Before final data collection, a pilot study was done on 50 farmers but could not be counted in the final administration of the statistical analysis. The reliability analysis was carried out with SPSS and Cronbach alpha was used as a yardstick. Hair, Anderson, Tatham, & Black (1998) stated that if the value of the statement is more than 0.60 then it may be considered as reliable and 0.70 or above is reflected as good and that statement may be appropriate for the research instrument. Thus, the alpha value was 0.818 and included in the created instrument. The data were collected from the field with the assistance of pre trained enumerators (local Malay). Finally, in order to obtain statistical results, SPSS (version 21) was administered to get the frequency, percentage, mean, standard deviation and levels of intention (low, moderate and high).

As far as level of intention is concerned, the Likert scale data were transformed into three levels namely low, moderate and high. So, the following class interval formula was used.

C. I = HSV-LSV/K

Class Interval width=Highest Scale Value-Lowest Scale Value/number of categories (K)

So, C. I = (5-1)/3 =1.33

C. I = 1.33

All in all, the range for level boundary was measured as low =1.00-2.33, moderate = 2.34-3.66 and high = 3.67-5.00.

Results

According to Ajzen (1991) the main element to check the ultimate behavior of an individual is intention. The intention of the farmers to use ICTs for agricultural risk management was also assessed. In this regard, the results are shown in Table 1. According to the findings, there were 48.9% of the farmers who strongly agreed that they intended to utilize ICTs in the future as these ICTs are comparatively useful to existing traditional technologies for agricultural risk management. However, 5.6% of the farmers were still uncertain in this context. The mean (4.42) also supports that the respondents had positive inclination towards ICTs to manage agricultural risk. The main reason could be the importance of ICTs in the current era as these are speedy, cheap and useful in obtaining and sharing useful information about natural disasters (floods, land sliding, cyclones, heat waves etc.), insect and disease attacks, drought, water shortage are names a few among the farming community.

<table>
<thead>
<tr>
<th>I have intention to use ICTs in the future as these are relatively useful to existing traditional technologies regarding</th>
<th>Strongly Disagree F (%)</th>
<th>Disagree F (%)</th>
<th>Uncertain F (%)</th>
<th>Agree F (%)</th>
<th>Strongly Agree F (%)</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(5.6)</td>
<td>(45.0)</td>
<td>(48.9)</td>
<td>4.42</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>In my expectation, ICTs would be better than past methods for seasonal forecasts</td>
<td>4.37</td>
<td>0.81</td>
<td>3</td>
<td>0.8</td>
<td>46</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>I expect, ICTs can give quick awareness about solutions of agriculture risk</td>
<td>4.36</td>
<td>0.76</td>
<td>3</td>
<td>0.8</td>
<td>34</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>I intend to use ICT for agricultural risk management in coming time because it is cheaper than the available options</td>
<td>4.34</td>
<td>0.83</td>
<td>2</td>
<td>0.6</td>
<td>49</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>I have intention to continue using ICTs as these are helpful for better communication regarding agricultural risk management</td>
<td>4.29</td>
<td>0.75</td>
<td>2</td>
<td>0.6</td>
<td>34</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>I intend to use in the next 6 months because I trust in using ICTs</td>
<td>4.25</td>
<td>0.80</td>
<td>2</td>
<td>0.6</td>
<td>41</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>I anticipate ICTs are useful in understanding different aspects of agricultural risk management</td>
<td>4.24</td>
<td>0.80</td>
<td>3</td>
<td>0.8</td>
<td>51</td>
<td>14.2</td>
<td></td>
</tr>
<tr>
<td>I plan to carry my ICT anywhere to receive agriculture information</td>
<td>4.21</td>
<td>0.84</td>
<td>3</td>
<td>0.8</td>
<td>54</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>I want easy access to current ICTs even at my farm</td>
<td>4.20</td>
<td>0.89</td>
<td>6</td>
<td>1.7</td>
<td>51</td>
<td>14.2</td>
<td></td>
</tr>
<tr>
<td>It is difficult for me to use ICT for agricultural risk management</td>
<td>3.35</td>
<td>1.09</td>
<td>14</td>
<td>3.9</td>
<td>161</td>
<td>44.7</td>
<td></td>
</tr>
<tr>
<td>I am reluctant to prefer due to internet speed</td>
<td>3.35</td>
<td>1.11</td>
<td>11</td>
<td>3.1</td>
<td>136</td>
<td>37.8</td>
<td></td>
</tr>
<tr>
<td>It may be difficult to use ICTs due to small screen display</td>
<td>3.12</td>
<td>1.10</td>
<td>21</td>
<td>5.8</td>
<td>164</td>
<td>45.6</td>
<td></td>
</tr>
<tr>
<td>I might stop using ICTs due to battery issue</td>
<td>3.01</td>
<td>1.14</td>
<td>28</td>
<td>7.8</td>
<td>142</td>
<td>39.4</td>
<td></td>
</tr>
<tr>
<td>Total Average Mean</td>
<td>3.96</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Scale is 1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree
There were more than half of the research population (54.4%) who strongly agreed that ICTs would be better than past methods for seasonal forecasts. Though, 13.6% of the farmers were uncertain at this point. Agriculture is a profession which depends upon various seasons for different crops so farmers grow and harvest based on seasonal calendars. The irregularity or sudden change in weather affects directly agricultural products. Thus, latest digital interventions could assist farmers in advance weather forecasting and planning accordingly. Moreover, nearly half of the research population (49.7%) shown strongly agreement that ICTs could provide quick awareness about solutions of agricultural risk. Conversely, 9.4% of the farmers were uncertain at this point. Indeed, ICTs have become instrumental in creating awareness about various solutions of agricultural risks. Farmers in one area share experiences with other farmers even at different locations so that farmers may replicate the procedure to ultimately reduce the risks.

Similarly, there were more than half of the target population (53.1%) who demonstrated strongly agreement that ICTs are cheaper than the existing options so they intend to use ICTs for agricultural risk management in coming time. On the other side, negligible percentage (1.9%) of the farmers displayed disagreement. It could be due to the reason that farmers always search for an affordable solution for the agricultural problem, so ICTs would be an acceptable option in the current scenario. Thus, the responses of farmers about ICT usage from the future lens are an encouraging factor in the agricultural sector.

In addition, the farmers containing 45.3% were agreed that they had intention to continue using ICTs as these are helpful for better communication about management of agricultural risk(s). However, 9.4% of the respondents were still unclear and only 1.7% of the farmers exhibited disagreement in this regard. Actually, communication is an important element in the agricultural sector, and farmers have to communicate with a variety of stakeholders such as fellow farmers, agriculture extension advisors, input dealers, buyers and so on for various purposes. Thus, instead of physically approaching, they prefer to use ICTs like a mobile phone to quickly communicate which could serve the purpose and it does.

Trust is an important element in the adoption or use of any technology. In this perspective, 42.8% of the farmers revealed strongly agreed and agreed that they intend to use ICTs in the next 6 months on account of trust though 2.5% of the farmers disagreed. Therefore, the farmers had trust ICTs which influenced them to continue using in the approaching months. Trust level increases with the use and the passage of time exclusively when the user receives benefits.

ICTs offer to understand different aspects of agricultural risk management so there were 43.3% of the farmers who strongly agreed that they anticipated ICTs as useful in understanding different aspects of agricultural risk management yet 14.2% of the respondents remained uncertain. Additionally, 43.1% of the farmers revealed that they planned to carry their any kind of ICT anywhere to receive agriculture information. Nevertheless, 15% of the farmers were uncertain. It depicts that mobile phone, which is widely used form of ICTs, is easy to carry and helpful to receive required information even at the farm.

There were 43.9% of the farmers who strongly showed agreement that they want easy access to ICTs even at their farms, but 2.5% of the farmers demonstrated disagreement along with 14.2% of the farmers who were uncertain in this point. With the passage of time, urban rural digital divide is diminishing as public and private sectors are trying their level best to minimize the gaps through huge physical and financial investments. Farmers want ICTs in their easy access as they have to perform various activities like knowing weather forecasts, booking of agricultural inputs, paying loans online or farm related financial transactions, transporting their
produce to the markets, receiving and/or sharing of valuable information, consulting agricultural advisors, minimizing harvest losses, enhancing value chain and receiving updates about government policies and compensating schemes in the context of agricultural disasters are names a few. Drones and new agricultural machines are enticing farmers to not only improve their agricultural incomes but also to become resilient. All in all, it seems difficult to remain isolated from the digital world by the farming community in the current scenario.

Furthermore, farmers might not positively be inclined to use ICTs due to various grounds. Like, there were 15.6% of the farmers who agreed that it is difficult for them to use ICTs in the context of agricultural risk management however, 14.7% of the farmers negated (disagreed). Similarly, 18.6% of the farmers highlighted agreement that they are reluctant to prefer ICTs due to internet speed, though 19.4% of the farmers had shown disagreement on this point. Likewise, 11.7% of the farmers agreed that it could be difficult for them to use ICTs on account of small screen display yet 20.6% of the farmers remained disagreed. Plus, there were 11.4% of the respondents agreed that they might stop using ICTs due to battery issue still, 25.8% of the farmers demonstrated disagreement in this regard.

In conclusion, the farmers in the research area had positive intention to use ICTs for the management of their agricultural risk(s) as inferred from the field results as well as average mean (3.96). It is expected that more farmers would start using ICTs on account of numerous benefits embedded in ICTs for the management of agricultural risks.

**Intention Level**

Intention level of the farmers regarding ICTs usage in agricultural risk management is displayed in Table 2. The result in the table shows that an overwhelming majority of the farmers (80.3%) possessed a high level of intention to utilize ICTs though 18.9% of the farmers had moderate level and which is followed by the negligible percentage (0.8%) of farmers who adhered to low level of intention to use ICTs. The mean result (3.96) also reveals that farmers were agreed and anticipated to use ICTs for agricultural risk management in the context of Malaysia. In a nutshell, high level of intention was prevailing among the farmers in the research area to use ICTs for agricultural risk management. It may be due to many reasons like minimizing rural and urban divide by public and private sectors of Malaysia, investing wisely in the technology sector, sensitizing and familiarizing with the various ICTs, building and improving good physical and digital infrastructure and creating interest of the users particularly farming community.

<table>
<thead>
<tr>
<th>Level</th>
<th>F</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (3.67-5.00)</td>
<td>289</td>
<td>80.3</td>
<td>3.96</td>
<td>0.425</td>
</tr>
<tr>
<td>Moderate (2.34-3.66)</td>
<td>68</td>
<td>18.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (1.00-2.33)</td>
<td>03</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion, Implications and Recommendations**

Intention of farmers to use various ICTs is important to determine the ultimate behavior of the farmers in any context. The current study aimed to unveil intention of the farmers to use ICTs for the management of agricultural risks. The findings showed that farmers had a positive
and high level of intention to use various ICTs to manage agricultural risk(s) from the context of Malaysia. Still, climate variations may negatively influence intention of the farmers not to use advanced digital technologies from the future lens. Thus, agricultural stakeholders are needed to remain in contact with the farming community and guide accordingly for reducing the adverse impacts of climate change which in the result may lead to low agricultural production. In this regard, agriculture and rural advisors may inform the farmers in advance about resilient techniques by the use of digital technologies. Plus, agricultural advisors could also prepare farmers to manage agricultural risks through various training programs. The study recommends that wide awareness programs should be initiated by public and private sectors to easily use digital technologies to tackle agricultural risks. The study also recommends agricultural advisory service providers to establish partnerships with various agricultural players and mobilize financial assistance for resource poor farmers with limited digital skills. Lastly, it is suggested that similar kind of study may be conducted in other countries to empirically examine the role of agricultural advisors to use ICTs for agricultural risk management.

References


district, Malaysia. *Food Control, 106*, 106696. https://doi.org/10.1016/j.foodcont.2019.06.022


Manuscript Submission Guidelines

The *JIAEE* is the official refereed journal of the Association for International Agricultural and Extension Education (AIAEE).

**General Requirements**

**Microsoft Word** files only may be submitted. All manuscripts must indicate the type of article—Feature; Commentary; Tools of the Profession and Book Review—on the title page of the manuscript. **All articles must be submitted online at** [http://jiaee.expressacademic.org/login.php](http://jiaee.expressacademic.org/login.php)

Manuscripts cannot be published or be under consideration for publication in another journal. The *Journal of International Agricultural and Extension Education (JIAEE)* follows the standards set forth in the *Publication Manual of the American Psychology Association* (6th ed.). Online manuscript submission guidelines are posted at [http://www.aiaee.org/guidelines.html](http://www.aiaee.org/guidelines.html). **Authors must follow these formatting requirements** prior to submitting manuscripts to the *JIAEE*.

**Feature Articles**

A feature article reports the findings from a fully investigated study. **Conceptual/Theoretical** and **Methodological manuscripts** are also encouraged as submission for feature articles. A title page with manuscript title, authors’ names, institutions, and city/state/country is required. The manuscript must include an **Abstract** (a succinct idea of the article’s content) not exceeding 250 words, followed by 5-7 **Keywords** (selected from a list of topics available on the submission log on page), **Introduction**, **Theoretical/Conceptual/Operational Framework, Purpose and Objectives, Methods, Findings/Results, Conclusion, Recommendations/Implications, and References**, or similar appropriate headings. There is no fee charged for submitting a feature article. Feature articles cannot be longer than **20 double-spaced** (12-point font) pages (not including title page) with **one-inch margins** on all sides, excluding references.

**Research Notes**

A research note is a concise but complete description of a limited investigation that will not be included in a later manuscript. A title page with manuscript title, authors’ names, institutions, and city/state/country is required. The manuscript must include an **Abstract** (a succinct idea of the article’s content) not exceeding 250 words, followed by 5-7 **Keywords** (selected from a list of topics available on the submission log on page). There is no fee charged for submitting a research note. Research notes should be no longer than **10 double-spaced** (12-point font) pages (not including title page) with **one-inch margins** on all sides, excluding references.

**Page Fees**

There is no submission charge for the manuscript, but there will be a $10.00/publication page ($20.00 for non AIAEE members) fee assessed to the corresponding author if accepted for publication after the peer review process.