

A CHANGING CLIMATE: A REVIEW OF THE ACCOMMODATION AND  
COMMUNICATION METHODS, FOR DISCUSSING COMPLEX, SCIENTIFIC TOPICS, IN  
COUNTY EXTENSION IN KANSAS AND OKLAHOMA

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KATIE ROHLING

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Approved by:

Co-Major Professor  
Dr. Lauri M. Baker

Approved by:

Co-Major Professor  
Dr. Peter J. Tomlinson

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## **Abstract**

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex, scientific topics like climate change. Four research objectives were used to determine 1) background and experience of agents/educators, 2) how agents/educators are communicating on complex, scientific topics, 3) climate-change information received and preferred method of receiving future training, and 4) agents'/educators' communication adjustment. This study was guided by Communication Accommodation Theory to understand how agents/educators are adjusting their communication when speaking to producers with varying education levels, grammar usage, and seeking different types of climate information. This study utilized a mixed method, quantitative and qualitative, survey (n = 42). Extension in Kansas and Oklahoma had not publicized an organizational stance on climate change. Kansas agents and Oklahoma educators had access to climate-change information through a variety of internal and external sources. Agents/educators had a strong background in agriculture and varying ranges of experience in the position. The main communication channel producers utilized to contact agents/educators was the telephone (52.24%). Both states indicated they are conducting an average of five on-farm visits a month. Over half (25) of agents/educators indicated they had received some form of climate-change information since becoming an agent/educator. Agents/educators indicated they received this information from sources external to Extension in Kansas and Oklahoma. They also indicated future trainings should be interactive and close to home. This study found agents/educators are accommodating in their responses to agricultural producers' requests for climate-change information, but also showed nonaccommodating tendencies. Agents/educators were viewed as nonaccommodating when they used improper grammar, improper email format, or told the

producer there was no need for concern on their perceived climate issue. Agents/educators offered to make site visits to the producers' field, referred to specialists, and worked to establish credibility. This study determined agents/educators have the background and information sources to adequately and effectively answer producers' questions about climate change. It was determined the reason agents/educators do not want climate-change conversations is because of a lack of formal training on the matter, and they do not feel comfortable. This study recommends Extension provide communication and climate-change training for agents/educators. It also recommends agents/educators continue to conduct on-farm visits as they are vital to interpersonal communication with agricultural producers. Extension should take steps to reach a younger audience and help young people become involved in agriculture.

Keywords: Extension communication, Communication accommodation theory, Climate change, Agricultural producers, Training, Adaptation

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## **Chapter 1 - Introduction**

The significance of a changing climate on production agriculture affects producers' "tools and techniques to protect their bottom line and ensure the future food security of our nation" (United States Department of Agriculture, 2015, p. 1). To provide factual, unbiased information about the future of agriculture due to the changing climate the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. The IPCC's mission, to provide scientific information about climate change, its impacts, and adaptation and mitigation practices, has changed little over the years (Intergovernmental Panel on Climate Change, n.d.). The IPCC's first report on the changing climate was published in 1990 highlighting the disturbance of the carbon cycle, natural and human-induced, and the impact it would have on agriculture, water, human settlements, and human health (Intergovernmental Panel on Climate Change, 1992). The IPCC has published four follow-up reports building off the organization's first findings of the changing climate. These IPCC reports and the scientists that compose them have maintained that the climate is changing (Intergovernmental Panel on Climate Change, 1990).

Since the Industrial Revolution, a drastic increase in greenhouse gases, methane, nitrous oxide, and carbon dioxide, in the atmosphere has raised concern for climate scientists (Barros et al., 2014). The burning of fossil fuels was the largest contributor to increasing greenhouse gases accounting for 35% of emissions (Edenhofer et al., 2014). Agriculture, forestry, and other land use accounted for 24% of greenhouse gas emissions (Barros et al., 2014). According to the IPCC, agriculture, forestry, and other land use are grouped as one sector of greenhouse gas emissions and only sector that had not increased its emissions since 2000.

The most significant impacts of a changing climate on the agricultural industry will be rising temperatures leading to drought, variability in - events, and changes in seasonality (Field et al., 2014). In the United States, the Great Plains is projected to see warmer days and nights which will have benefits and consequences for both crop and livestock producers. Great Plains' agriculture has a market value of 92 billion dollars. This market value was hit hard in 2011 when drought cost the southern Great Plains region 10 billion dollars in agricultural losses. Oklahoma agriculture was estimated to have lost 1.7 billion dollars in 2011 (United States Department of Agriculture, n.d.). Producers' willingness to recognize and implement adaptation and mitigation strategies to avoid these agricultural losses depend upon their beliefs regarding climate change and their perceptions of climate change related risks (Arbuckle et al., 2014).

Production agriculturalists in the United States and around the world face daily struggles that impede their abilities to continue farming as tradition dictates. Farming practices have evolved drastically over the centuries and will continue to do so in order to feed the growing population (Reicosky, Hanson, & Lal, 2007). Of the Earth's surface, 40% has been used for food production, a decrease in the amount of productive land or crop yields would vastly affect the global food supply (Parry et al., 2007). The United States government has a history of recognizing agricultural producers' need to become more efficient. The Cooperative Extension Service was established under the Smith-Lever Act of 1914 for the purpose of disseminating useful and practical information about agriculture and home economics to the public (National Research Council, 1995). The Cooperative Extension Service was a low-cost or free resource, shown to be a successful tool for educating adults.

Prawl, Medlin, and Gross (1984) described the Cooperative Extension Service as, “a unique partnership between the federal government, educational institutions, local governments, and the people” (p. 34). Extension services were established in each state at a land-grant university. Universities adapted names from the Cooperative Extension Service and established agents/educators in counties. In Kansas county Extension personnel held the title of agent. In Oklahoma, county Extension personnel held the title of educator. Agents/educators were tasked with taking university research to the public (Williams, 1968).

Since 1914, the Cooperative Extension Service has grown to disseminate information about community, disaster issues, energy, environment, family, farm, health and nutrition, lawn and garden, pest management, and youth (eXtension, 2015). Extension has been identified as a trusted information source for climate information by both small and large agricultural producers during focus groups on climate in Kansas (Campbell Hibbs et al., 2014). Extension was suggested to be a more trusted source than the federal government by one participant due to the lack of financial and political motives. The Cooperative Extension Service has been identified as the correct vehicle to deliver climate-change information to Extension constituents (Campbell Hibbs et al., 2014; Morris, Megalos, Vuola, Adams, & Monroe, 2014).

### **Statement of the Problem**

The market value of agricultural products produced in 2012 in the United States was 394 billion dollars. As for the states involved in this study, Kansas sold 18 billion dollars and Oklahoma sold 7 billion dollars of agricultural products in 2012 (United States Department of Agriculture,

2014). The United States exported 152.5 billion dollars of agricultural products in 2014 (United States Department of Agriculture: Economic Research Service, 2015). If agriculture is to be largely impacted by the changing climate, as predicted in all of the IPCC's reports since 1990, there has been concern for global food security (Edenhofer et al., 2014; Intergovernmental Panel on Climate Change, 1990).

Globally, rural areas are the most vulnerable to a changing climate due to a dependence on agriculture and natural resources (Barros et al., 2014). In rural areas those living in poverty, those with little education, non-English speaking persons, and the elderly will be the most vulnerable to the changing climate (U.S. National Climate Assessment, 2014). According to the 2010 United States census, 19.3% of the population lived in rural areas (United States Census Bureau, 2015).

In the United States, agriculture was a large part of the rural lifestyle but not the main source of income for rural families. Small farms do not often show a profit and off-farm income influences the use of technology and farming practices. There were over two million farms in the United States in 2012 and the majority were 10 to 49 acres (United States Department of Agriculture, 2014). In 2012, the United States' average farm income was \$25,695 while off-farm income was \$28,482 ("USDA Economic Research Service - Farm household well-being," n.d.). Off-farm income is a way for farm families to deal with the financial risks of farming, but it also limits the effectiveness of their farming practices.

Inefficiencies in farming practices contributed to agriculture's anthropogenic emissions, which has been under consideration by the United States government to be regulated (Fernandez-Cornejo, 2007). Studies have shown producers who earn the majority of their income off-farm used less precision agriculture and used more time-management practices. These producers used genetically modified crops and conservation tillage to save time in the field but lacked technological and management intensive practices such as global-positioning systems, yield monitors, variable rate fertilizer and spraying, and keeping detailed records (Fernandez-Cornejo, 2007; Goodwin & Mishra, 2004). These practices are mitigation options for agriculture's anthropogenic emissions and contribute less to the changing climate than conventional practices (Edenhofer et al., 2014). Conventional practices were associated with conventional tillage, which when practiced in the Great Plains contributes to loss of soil carbon, nitrogen and nutrients, organic matter, and runoff (Follett, Jantalia, & Halvorson, 2013).

Extension was tasked with introducing and educating producers on these more efficient farming practices and has been doing so professionally since before 1914. Extension had provided producers with more information about efficient farming practices and played a role in reducing greenhouse gas emissions and other environmental losses in the agricultural industry. Extension had cautiously approached the topic of climate change due to the ranging perceptions and beliefs surrounding the issue. Morris et al. (2014) suggested providing information about the changing climate to audiences lacking interest may be detrimental to Extension efforts. Instead the study recommended to providing "climate science information" (p. 5) to believers, while providing local information regarding "risk management" (p. 5) of specific threats to non-believers. To

adequately communicate climate-change information it requires an understanding of the issues and concepts (James, Estwick, & Bryant, 2014).

A study of 226 Kansas and Oklahoma Extension agents/educators indicated 67% believed the climate is changing and 61% believed it is due to natural causes (Becerra, Middendorf, Tomlinson, & Hibbs, 2015). When asked how agents/educators assessed their ability to address climate change with constituents, 64% reported low to no capacity. The study suggested Extension agents/educators think climate change is an important topic but need formal training before addressing climate change with their constituents (Becerra et al., 2015). Conversations within a community have shown to hold the most potential for educating about change and promoting nonformal learning (Merriam & Brockett, 2007).

### **Communication Accommodation Theory**

Communication Accommodation Theory is adjusting language, verbally or nonverbally to effectively and comfortably communicate with a certain audience (Giles & Coupland, 1991).

There are five types of communication accommodation. For the purpose of this study, four types will be analyzed in Extension communication. The four types are accommodation, nonaccommodation, convergence, and divergence (Soliz & Giles, 2014).

Agents'/educators' background and past experiences have played a role in their education and training on climate-change information (Merriam & Brockett, 2007). Individuals tend to only associate with those who share the same viewpoint as themselves. Extension agents/educators



often share the same viewpoint as the community where they work. This would be representative of the convergence tenet of Communication Accommodation Theory. For agents/educators who have a different belief of climate change than their community, it may limit their delivery of climate-change material. This would be representative of the divergence tenet of Communication Accommodation Theory. Agents/educators who have adapted to constituents' communication characteristics are striving to reduce social differences and communicate on the same level (Giles, Coupland, & Coupland, 1991). Extension agents'/educators' personal beliefs were a potential limitation to their providing climate-change information in their programs (Monroe, Plate, Adams, & Wojcik, 2014). This is representative of the divergence tenet of Communication Accommodation Theory. Agents/educators who do not provide climate information in their programs may be emphasizing social, educational, and other non-verbal differences between themselves and their constituents (Giles et al., 1991). Convergence and divergence identify verbal and non-verbal communication that can assist or impede communication efforts (Giles et al., 1991). Extension agents'/educators' communication preferences when covering scientific, controversial topics in their community remains unknown.

Extension agents/educators in Kansas and Oklahoma identified drought and high temperatures, uncharacteristic of historical norms, unseasonable weather, extreme rainfall events, other extreme weather events, and management practices as areas where more information and training were needed. They also identified print materials, online resources (including decision aids), presentations, webinars, on-farm demonstrations, videos, and podcasts as tools needed to cover the climate topics for which they lack information (Becerra et al., 2015). Training in communication accommodation can help agents/educators use the identified tools to present

climate-change information to a range of audiences. Agents/educators can do this by learning to adjust their communication style with each producer they speak to. Training in Communication Accommodation Theory can help agents/educators adjust their communication style. The communication training and educational material needed by Extension agents/educators to provide specific, local climate science information to producers remains unknown.

Some information on preferences of Extension agents'/educators' internal communication and use of common communication sources is available. A study of 232 K-State Research and Extension internal audiences including agents and board members in Kansas found traditional media was both used and trusted more than new-media sources (Settle, Baker, & Rohling, 2015). Websites were the most common traditional communications source; while Facebook was the most common new-media communication source for agents/educators. In order to communicate with agricultural producers who are doubtful about the changing climate, Extension agents/educators may need to realign their language to conform to the audience with which they are speaking. Communication accommodation is an effective way of adjusting language based on the individual or group one is speaking with. These adjustments can be verbal, physical, or voice effects and are generally made to make the person being spoken to feel more comfortable, which serves as motivation for making the adjustment (Soliz & Giles, 2014).

This may help bridge the communication gap between agricultural producers and Extension agents/educators. For agricultural producers barriers to adopting more efficient production practices regarding climate include legal constraints, lack of leadership and coordination, and

different perceptions of the climate issue (Barros et al., 2014). Communication Accommodation Theory can help agents/educators meet the agricultural producers where they were regarding their situations with legal constraints and perceptions of climate as well as being a source of leadership for farmers with varied beliefs.

### **Purpose of the Study and Research Objectives**

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex, scientific topics. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma.

The following research objectives guided this study:

- **RO1:** Determine the background and experience of Extension agents/educators.
- **RO2:** Determine how Extension agents/educators are communicating about complex, scientific topics, like climate change, with agricultural producers.
- **RO3:** Determine what climate information agents/educators have received and their preferred method of receiving future training.
- **RO4:** Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers in their county or district.

## **Definition of Key Terms**

**Accommodation:** “Refers to the behaviors in which one or both of the individuals enact (or are perceived to enact) positive-oriented or conversationally appropriate behavior (e.g., appropriate topics of conversation) toward the other person” (Soliz & Giles, 2014, p. 110).

**Anthropogenic Emissions:** “Emissions of greenhouse gases, greenhouse gas precursors, and aerosols caused by human activities. These activities include the burning of fossil fuels, deforestation, land-use changes, livestock production, fertilization, waste management, and industrial processes” (Agard et al., 2014, p. 1759).

**Climate Change:** “Any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer” (United States Environmental Protection Agency, 2014, para. 5).

**Climate:** “Average weather conditions in given locations over longer periods of time” (“Frequently Asked Questions about Climate and Climate Change | NRCS,” n.d, para. 1). The period for averaging weather conditions is 30 years, as defined by the World Meteorological Organization.

**Communication Accommodation Theory:** Is adjusting communication patterns, verbal and nonverbal, to match the communication patterns of those around us (Giles et al., 1991).

**Convergence:** “Strategy whereby individual adopt their communicative behaviors in such a way as to become more similar to their interlocutor’s behavior” (Soliz & Giles, 2014, p. 108).

**Divergence:** “Leads to the accentuation of speech and nonverbal differences between the self and the other” (Soliz & Giles, 2014, p. 108).

**Extension Agent/Educator:** Generally referring to a state’s county agent/educator working at the local level and in constant contact with constituents. Areas of expertise include agriculture, home-economics, 4-H/youth, community development, and areas of specialty. “The agent provides leadership and expertise in utilizing available resources to extend knowledge and solve problems. The county agents reports directly to a district or state-level administrator” (Seevers Graham, Gamon, & Conklin, 1997, p. 54).

**Extension:** “An extension of the USDA and the land-grant institutions of each state – the outreach partner of the land-grant institution with a role of reaching people and extending knowledge and other resources to those not on campus” (Seevers et al., 1997. p. 3).

**Farm:** “Any place from which \$1,000 or more of agricultural products, were produced and sold, or normally would have been sold, during the year” (United States Department of Agriculture Economic Research Service, 2015, para. 2).

**Nonaccommodation:** “Refers to behaviors typically categorized as underaccommodation in which individuals fail to attune their communication to others or overaccommodation in which individuals “overshoot” the needs and desires of a conversation partner” (Soliz & Giles, 2014, p. 110).

**Weather:** “Consists of the hourly and day-to-day variation in the meteorological conditions, such as precipitation or temperature” (“Frequently Asked Questions about Climate and Climate Change | NRCS,” n.d., para. 1).

## Summary

Scientists have reached a consensus that the climate is changing (Intergovernmental Panel on Climate Change, 1990; U.S. National Climate Assessment, 2014) and have published five detailed reports on how the changing climate will impact the Earth. The agricultural industry is expected to experience heavy impacts that will affect the global food supply (Barros et al., 2014; Parry et al., 2007). The Cooperative Extension Service was identified as a trusted source for climate-science information (Campbell Hibbs et al., 2014) and as the right vehicle to deliver information to constituents in preparation for these changes (Campbell Hibbs et al., 2014; Morris et al., 2014).

Extension agents/educators in Kansas and Oklahoma indicated they believed the climate is changing but have little formal training on the matter (Becerra et al., 2015). Agents/educators in Kansas and Oklahoma also indicated a variety of print, online, and face-to-face materials needed to communicate climate-science information to agricultural producers. In order to identify the communication training needed to provide specific, local climate-science information to agricultural producers this study will utilize a mixed methods, qualitative and quantitative, online survey to address these needs with agricultural and natural resource agents/educators in Kansas and Oklahoma. The study will also assess agents/educators communication accommodation methods, utilizing Communication Accommodation Theory, and how their background, education, and years of service might play a role in their results.

## Chapter 2 - Literature Review

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex, scientific topics. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma.

The following research objectives guided this study:

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- **RO4:** Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers in their county or district.

This chapter reviewed the salient research on climate change, adult education, Extension communication, and Communication Accommodation Theory surrounding this study.

### **Climate Change**

Climate change has been defined as, “Any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or

longer” (United States Environmental Protection Agency, 2014, p. 1). To understand climate change, it is important to first understand the difference between weather and climate. Weather is the behavior of the atmosphere at any given moment. Climate is the long-term unit of weather featuring wide variability (Tomlinson, Knapp, Sutherland, & Campbell, 2015). A common example for telling the difference between the two is climate is what a person has in their wardrobe and weather determines what a person wears each day. The standard convention to compare changes in the climate is to use a 30 year average that is reevaluated every 10 years. According to the World Meteorological Organization (n.d.), a 30 year period is necessary to account for any abnormalities or rarities.

The Great Plains, parts of Montana, North Dakota, Wyoming, South Dakota, Colorado, Nebraska, Kansas, Oklahoma, and Texas, have been subject to various day-to-day and year-to-year changes in the weather (U.S. National Climate Assessment, 2014). These normal changes present challenges for people living in the area. According to climate scientists, more predictable and un-predictable extreme weather events are on the horizon due to the changing climate (Intergovernmental Panel on Climate Change, 1990). Scientists have been and will continue to study and disseminate adaptation and mitigation options to lessen the impact changes in climate are expected to have in the upcoming decades. Adaptation has been defined as, “a means of coping with the changed conditions” (U.S. National Climate Assessment, 2014, p. 442). By adapting to the changing climate, no preventative efforts are taking place. Mitigation has been defined as, “reducing emissions of heat-trapping gases to reduce the speed and amount of climate change”(U.S. National Climate Assessment, 2014, p. 442). Through mitigation, an effort is made to prevent or reduce the factors contributing to the changing climate (U.S. National Climate



Assessment, 2014). Thus far, there has not been a way to reverse the greenhouse gases trapped in the atmosphere, ocean, and vegetation or the damage the gases will cause (Barros et al., 2014).

Natural disturbances are the exchange of carbon dioxide between the atmosphere and Earth's land and water masses. This exchange is a natural effect and traps carbon dioxide in the atmosphere, keeping the Earth warm (Intergovernmental Panel on Climate Change, 1990).

Human disturbances and anthropogenic gases, are the cause of human produced gases adding to the greenhouse gases already trapped in the atmosphere. This added concentration has been increasing temperatures beyond natural disturbances causing changes in climate (Intergovernmental Panel on Climate Change, 1990). Carbon dioxide, methane, and nitrous oxide are the major greenhouse gases directly influenced by human activities and of the most concern for a changing climate (Council for Agricultural Science and Technology, 2004). The amount of anthropogenic gases in the atmosphere has been steadily increasing since the Industrial Revolution. Since 1750, carbon dioxide, methane, and nitrous oxide levels have increased by, 40, 150, and 20% respectively (Field et al., 2014).

At least 40% of greenhouse gases have been trapped in the atmosphere since 1750, leading to the un-natural warming of the climate. Ocean sinks and vegetation have absorbed the remaining portion of carbon dioxide not trapped in the atmosphere. Burning fossil fuels to generate energy for human consumption has emitted carbon dioxide into the air and about a quarter of that carbon dioxide has been absorbed by the oceans. This absorption, along with the absorption of 93% of the heat in the atmosphere created ocean sinks. Ocean sinks are the storage of carbon dioxide and

heat in oceans, which lead to acidification, increased surface water temperatures, loss of oxygen, and loss of nutrient supplies in the oceans (Field et al., 2014). Ocean sinks were beneficial for the storage of excess carbon dioxide, but the impacts of the sinks had ramifications on the world's food supply. The oceans provide approximately 17% of the world's meat supply and this supply had been negatively impacted by acidification, warmer surface temperatures, loss of oxygen and loss of nutrients (Field et al., 2014).

Another type of carbon dioxide sink is vegetation. Vegetation benefited as a sink of carbon dioxide. Vegetation can benefit from the increasing temperature, precipitation, and carbon dioxide levels associated with climate change (Field et al., 2014). Studies have shown increasing carbon dioxide levels were tied to increased yield response in certain types of vegetation. Research is also being conducted to determine if a response trait to increased carbon dioxide can be incorporated into the genetics of field crops (Malcolm et al., 2012).

## **Climate Change in Agriculture**

The leading cause of anthropogenic greenhouse gases has been a combination of fossil fuel combustion. Other leading causes are flaring (the burning of gas during the production of fuel), cement production, and the grouped sector land-use change, land use, and forestry. Land-use change can be a variety of things including change due to a wildfire, deforestation, bringing Conservation Reserve Program ground out of conversation, or switching from grass to farmland. Agriculture is not the largest contributor of greenhouse gases, but the agricultural industry has played a role in contributing to the changing climate. The agricultural sector, land use and

forestry, has been the only sector which has not increased its greenhouse gas emissions since 2000 (Barros et al., 2014). As of 2014, agriculture in the Great Plains had a market value of 92 billion dollars with more than 80% of the land utilized as cropland and pastures (U.S. National Climate Assessment, 2014).

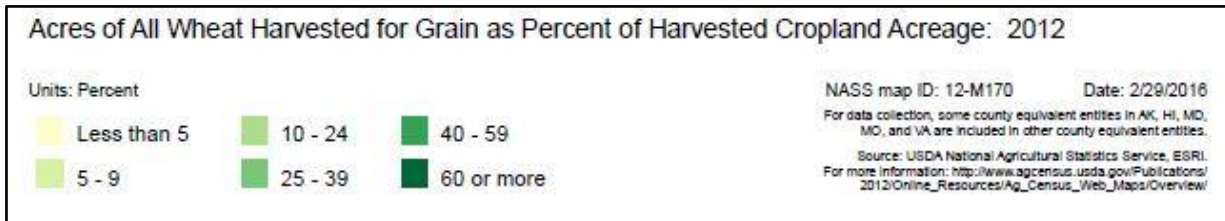
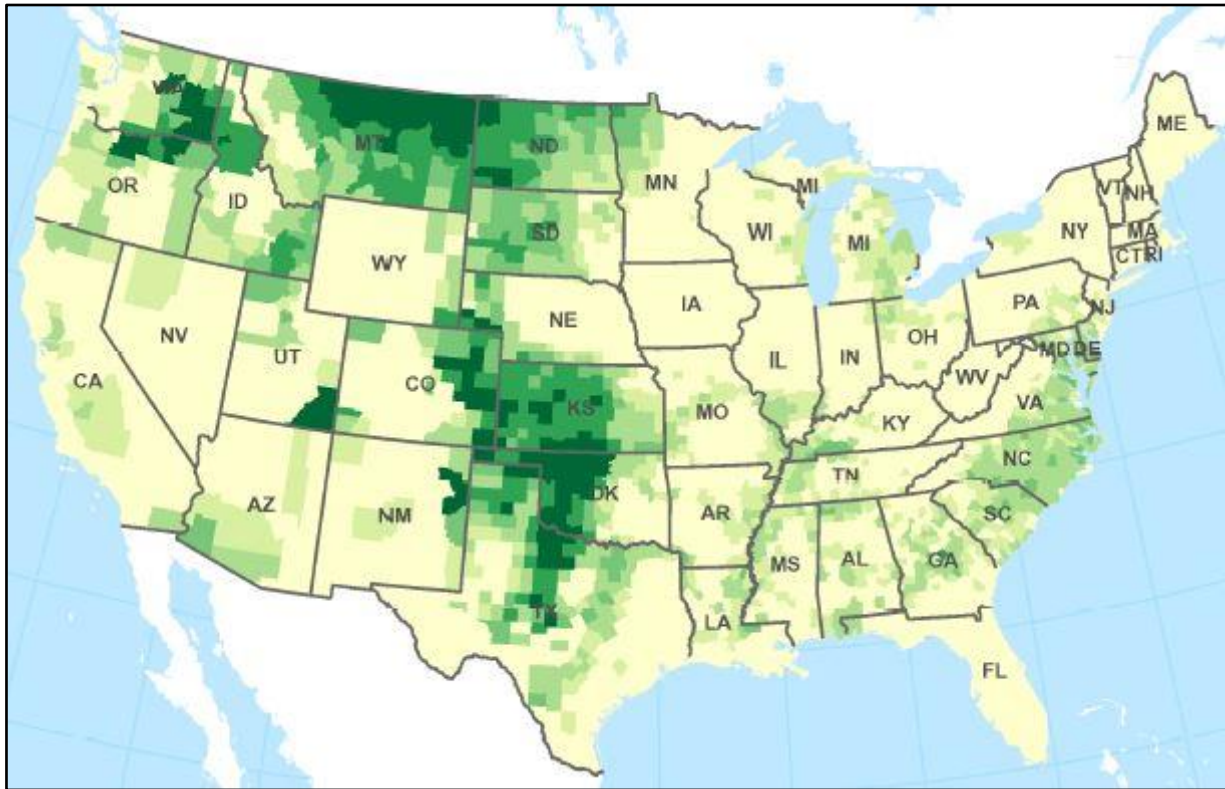
The USDA used the IPCC's four emissions scenarios to represent the future of the agricultural industry in the United States. These scenarios were designed to make projections about the future impacts of climate change based on assumptions of future greenhouse gases levels, technology development, and other factors (Parry et al., 2007). Cotton was the only field crop projected to benefit from the high temperatures and increasing carbon-dioxide levels caused by climate change in every scenario (Malcolm et al., 2012). Each scenario represented a different outcome for soybeans, wheat, and corn based on adaptation practices and parameters of the scenarios. In some scenarios soybeans, wheat, and corn independently had higher yields, lower yields, more acreage planted, less acreage planted, or regional growing shifts. The scenarios projected corn acreage would increase in regions where corn has not been the dominate crop. Northern regions of the United States were projected to be less sensitive to climate change than the southern regions, and therefore able to support a corn crop. Warmer temperatures have benefited states in the northern region allowing for longer growing seasons and increased crop variety (U.S. National Climate Assessment, 2014). Soybeans were expected to shift into the northern and southern plains (Malcolm et al., 2012). It was recommended farmers use the available adaptation strategies outlined in the report *Agricultural Adaptation to a Changing Climate: Economic and Environmental Implications Vary by Region* (Malcolm et al., 2012). These remmendations included, "changing crops, crop rotations, and tillage types, as well as expansion or contraction

of crop production acreage” (p. 53) to adapt to the changing climate in an effort to mitigate the negative impacts of climate change (Malcolm et al., 2012).

Other impacts of climate change on the Great Plains include the doubling of days over 100 degrees in the northern region and tripling the number of days in the southern region. Agriculture in Texas and Oklahoma will be the most heavily impacted by increasing temperatures in the Great Plains, where there are expected to be increased dry spells, five more days on average annually, by the midcentury. Night-time temperatures are also expected to rise which will impact crop germination, pollination, and increase crop vulnerability to pests and diseases. Summer and fall are expected to see little variability in rainfall events in the Great Plains. Spring and winter are expected to see an increase of heavy precipitation events by the midcentury on the Great Plains, especially in the northern region. The increased heavy precipitation can increase the soil water availability for crops but could also increase to soil erosion and nutrient runoff (U.S. National Climate Assessment, 2014).

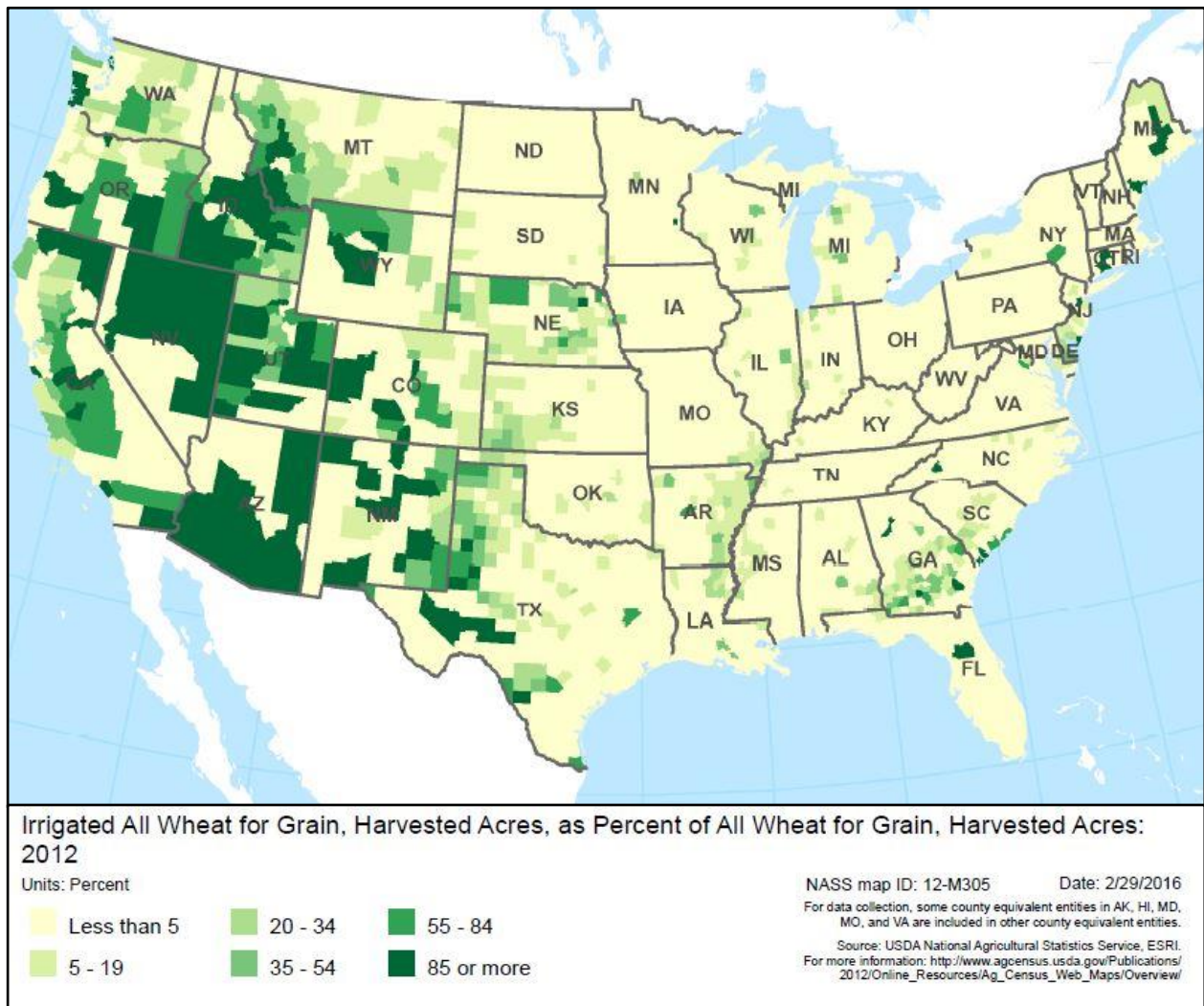
Producers in the United States planted 40,260,000 acres of winter wheat in 2015 (United States Department of Agriculture National Statistics Service, 2015). Of the total acreage, Kansas producers planted 9,400,000 acres of winter wheat but only harvested 8,800,000 acres. Oklahoma producers planted 5,400,000 acres of winter wheat but only harvested 3,700,000 acres. The difference in planted and harvested acres can be accredited to the changes in both weather and climate throughout the year. According to a detailed historic report of Kansas wheat, conducted since 1918, the 2015 winter wheat crop was exposed to unusually warm winter

temperatures and dry spells (United States Department of Agriculture National Agricultural Statistics Service Northern Plains Regional Field Office, 2015). Another reason for a difference in planted and harvested acres could be the use of wheat as forage for cattle. Figure 2.1 shows the dominance of winter wheat in Kansas and Oklahoma (United States Department of Agriculture, 2014). The two states provided a large portion of the wheat produced in the United States.



**Figure 2.1 Acres of All Wheat Harvested for Grain as Percent of Harvest Cropland Acreage** (United States Department of Agriculture, 2014)

Irrigation will be needed to reduce the vulnerability of crops to climate change (U.S. National Climate Assessment, 2014). In 2014, 14% (n = 2,109,303) of farms in the United States relied on irrigation to produce a crop (United States Department of Agriculture, 2014). As shown in Figure 2.2 in Kansas 1% (n = 61,773) and in Oklahoma 3% (n = 80,245) of farms used irrigation to produce a wheat crop.



**Figure 2.2 Irrigated All Wheat for Grain, Harvested Acres, as Percent of All Wheat for Grain, Harvested Acres: 2012** (United States Department of Agriculture, 2014)

Rainfall has not recharging the Ogallala Aquifer at a high enough rate to maintain current agricultural and industrial practices. The Ogallala Aquifer is a heavily relied on source for

irrigating crops in the southern and central Great Plains. The aquifer lies under 225,000 miles of the Great Plains and provides water for, “one-fifth of the wheat, corn, cotton, and cattle produced in the United States” (United States Department of Agriculture, 2012, p. 1). Producers can work to improve irrigation efficiency, reduce demand for irrigation water through genetically-modified crops, and reuse waste water to irrigate crops (Field et al., 2014). The Natural Resources Conservation Service, an agency in the United States Department of Agriculture, has developed the Ogallala Aquifer Initiative to reduce agriculture’s use of the aquifer and to ensure quality of the water. The issues observed with irrigation of crops from the Ogallala Aquifer are representative of ground water resource challenges with all major aquifers across the United States.

Increasing temperatures have also changed crop planting and harvest times along with types of pests and diseases that have the potential to damage the crop. Other changes include decreased soil fertility due to increasing temperatures accelerating the decomposition of organic matter and erosion rates due to increased rainfall events (Barros et al., 2014). Research has been conducted on crop varieties to improve tolerance of crops’ environmental stresses such as heat, carbon dioxide levels, drought, pests, and diseases. Overall, an agricultural producers’ ability to adapt to the changing climate will depend on the location, financial status, resources, and knowledge of the producer (Malcolm et al., 2012).



## **The Cooperative Extension Service**

The Cooperative Extension Service is a resource used to extend research from land-grant universities to the public through formal and informal means. In 1862, the United States government passed the Morrill Act, which gave public land to each state in order to establish a college focused on teaching agriculture and mechanical arts (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1995). Each state received 30,000 acres of land for each senator and representative in Congress. The land was to establish a college or the sold and the profit used to establish a college (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996). A total of 59 colleges were established, one in each state, the United States territories, and the District of Columbia (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996). In the 1860s, 48% of the United States population lived on farms and there was a high demand for agricultural education (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1995).

The majority of farmers in the 1860's were too small to conduct their own research to improve farming practices and products. The Hatch Act of 1887 added research as a component of the land-grant mission. The purpose of the Hatch Act was to establish "a nation-wide system of agricultural experiment stations, in association with the land-grant colleges" (Williams, 1968, p. 22). Agricultural experiment stations were developed in conjunction with each state's land-grant college to provide original research and experiments for the betterment of the agricultural industry. Each state received 15,000 dollars per year to fund the agricultural experiment stations (Committee on the Future of the Colleges of Agriculture in the Land Grant University System,

1996). Over the years, several acts and amendments were passed to increase the amount of funding for agricultural experiment stations and land-grant colleges.

When the Morrill Act was passed in 1862 many states had already established colleges. Instead of endorsing established universities many states choose to build new state colleges after the Morrill Act. This lead to poorly financed land-grant colleges and action was taken to provide funding. The Second Morrill Act was passed in 1890 so that each state would receive annual support for its land-grant college (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1995). The Second Morrill Act also forbade the discrimination of African-Americans, which lead to the development of 17 separate african-american land-grant colleges.

Slowly, the United States population shifted and the number of individuals involved in farming decreased. By 1910, only 35% of the population lived on a farm (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1995). As Americans moved into urban areas for careers not related directly to agriculture, land-grant colleges expanded to provide education for urban careers and the urban lifestyle. This movement led to the Smith-Lever Act of 1914 and the final component of the land-grant mission, the Cooperative Extension Service (Extension). Extension played a large role in educating the urban population on food distribution and conservation during World War II (Williams, 1968).

Extension was established as a “unique cooperative effort by federal, state, and local governments” (Committee on the Future of the Colleges of Agriculture in the Land Grant

University System, 1996, p. 67). Like the research experiment stations, Extension was established under each of the land-grant colleges, with the cooperation of the United States Department of Agriculture (Williams, 1968). Extension was tasked with sharing college-generated knowledge, education, and research related to agriculture and home economics beyond the campuses to the general public. Economic development and marketing later became a large portion of the information disseminated by Extension. Each state developed county Extension services, with different governing rules and officials. “The county agent is identified as an employee of the Cooperative Extension Service; his employment contract is with the land-grant college...” (Williams, 1968, p. 47). County Extension was a direct link to the general public and the functional unit of the Cooperative Extension Service. County Extension strived to supply information to meet local needs, which vary by county and state. “Extension staff divide their time among farm service, community development, and consumer education programs; while research scientists target crop and animal production” (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1995, p. 69).

The county Extension agent’s influence, therefore, has not been one of power or authority, but rather one of persuasion, and the prestige of a man of knowledge, whose main business is the communication of information, as a teacher, free of any stigma that might attach to other official functions (Williams, 1968, p.46).

Much of Extension has remained the same over the years. However, has been a noticeable turnover rate for the Cooperative Extension Service across the United States in the last ten years. A study of North Carolina agents found the majority (n = 180, 53.6%) had less than 11 years of experience in the position of an agent (Lakai, Jayarate, Moore, & Kistler, 2014). A similar study

in North Dakota found that 74.23% (n = 163) of Extension professionals planned to leave their job within ten years and less than 15% planned to seek another position in Extension (Borr & Young, 2010). This turnover rate can be accredited to low job satisfaction in the areas of salary and work-life balance (Strong & Harder, 2009). Extension agents are asked to work long days, weekends, nights, and travel frequently. Extension downsizing across the United States was also identified as a reason for agents leaving the industry (Strong & Harder, 2009).

## **Adult Education**

The Cooperative Extension Service is the largest form of adult education available globally (Seevers et al., 1997). Adult education is defined by Merriam and Brockett (2007) as, “activities intentionally designed for the purpose of bringing about learning among those whose age, social roles, or self-perception define them as adults” (p. 8).

In an official capacity, adult education has been around since the establishment of Harvard College in 1636. At the time, the school was for the training of religious ministers. Soon, other colleges were developed and the Massachusetts Law of 1642 demanded all children be taught to read. The Massachusetts Law of 1647 stated any town having at least 50 household members was to provide wages for a teacher to teach reading and writing (Knowles, 1976).

The first lyceum was established in Millbury, Massachusetts, in 1826. The lyceum was established by Josiah Holbrook as a channel of educational information and to provide educational materials across the country (Bryson, 1936). Lyceums were often regular town

meetings where ideas and information were shared. Citizens also developed materials such as maps, geographical, and agricultural information (Baughn, 1952). By 1834, more than 3,000 town lyceums had been established. It is thought these town lyceums played a vital role in convincing taxpayers of the importance of public schools (Bryson, 1936).

Agricultural societies started appearing after the American Revolution. The first agricultural fairs were documented as early as 1644, but had little educational significance (Knowles, 1976).

Today, agricultural fairs continue for the purpose of selling agricultural products. 4-H fairs are also held to teach participants and the public more about agricultural and home economics. The first agricultural society, The Philadelphia Society for Promoting Agriculture, was believed to have been started by Benjamin Franklin in 1785. Agricultural societies shared new information about crop and animal practices, published journal articles, and sponsored educational programs (Seevers et al., 1997). By 1860, 941 agricultural societies existed across the United States at county and state levels. These societies developed the idea of enlisting government aid for agricultural producers and developing state agricultural boards. By 1862, agricultural societies had started to give way to farmers' institutes and the land-grant colleges established by the Morrill Act (Knowles, 1976).

Adult education has been focused on educating adults to keep the United States at a competitive economic status (Merriam & Brockett, 2007). Researchers have found the best approach to teaching adults comes from learning about situational experiences, with teachers who act as guides rather than powers of authority. When facing an ethical dilemma surrounding the

recruitment of new learners, such as the changing climate, guides might need to help adult learners discover a need to learn or believe. An adults' need and motivation to learn is often associated with their employment (Merriam & Brockett, 2007).

## **Climate Education**

A study conducted by the Yale Project of Climate Change Communication, American Teens' Knowledge of Climate Change found 54% of teens and 46% of adults lack in-depth understanding of climate change (Leiserowitz, Smith, & Marlon, 2011). Whitmarsh (2005) believed this lack of understanding is due to climate change being, "scientifically complex and uncertain, not amenable to direct observations or personal experience and distant from everyday concerns and activities in both space and time" (p. 279). The educational community's understanding of this concept is evidenced by the development of the Next Generation Science Standards for K-12 grades in the United States to cover topics such as the changing climate.

Adopting Next Generation Science Standards was each state's decision. Kansas provided leadership to the development team and was one of the 26 states leading the movement for new standards. The Next Generation Science Standards, officially adopted by Kansas in 2013, introduces weather and climate concepts in the third grade. Oklahoma had not adopted the new science standards. Science standards need updated due to advances in science and technology, along with a better understanding of how students learn these subjects (Next Generation Science Standards, n.d.). As of July 2015, 13 states have adopted the New Generation Science Standards

(Academic Benchmarks, 2015). As elementary teachers work to educate upcoming generations, the problem becomes how to educate adults.

Anderson's (2012) study on climate-change education suggested climate-change education should be hands-on and interdisciplinary. Surveying farmers in three states about their learning preferences from Extension, Franz, Piercy, Donaldson, Westbrook, and Richard (2010) found 99% of farmers preferred to learn hands-on, 96% preferred demonstrations, 94% preferred farm visits, and 88% preferred field days. For these face-to-face methods of communication, it may be best to utilize county Extension agents/educators, who operate at the local level with location specific information.

## **Extension Education**

County Extension agents/educators must have independence within the organization and their program objectives in order to solve local problems. It is an agent's responsibility to help agricultural producers identify problems and address solutions. The more information an Extension agent/educator has, the better chance he/she has to provide assistance to the producer (Prawl et al., 1984). For Extension, getting producers attention by appealing to their needs and concerns is essential to arousing their interest in changing their behavior. Attention, interest, desire, conviction, and action are the five steps outlined by Wilson and Gallup (1954) to bring, "the desired changes in the behavior of people" (p. 7). In order to change a producer's desire to learn new information, agents/educators need to show producers how the new information applies directly to the producer. Agents/educators can convince the producer to act by outlining a

plan of action and its consequences together. The final objective of the agent/educator is to use the previous steps to entice action on behalf of the producer, thus putting a new idea into practice (Prawl et al., 1984). Extension agents/educators can influence the land, labor, capital, technology, production inputs, and markets involved in modern agriculture (Prawl et al., 1984).

In 1979, 61% of producers were being served by Extension agriculture programs (Prawl et al., 1984). In 2012, K-State Research and Extension reported zero workshops, web-based curricula, or field days on climate change (K-State Research and Extension, 2013). In the areas of crops, animals, and forestry K-State Research and Extension held 634 educational events, which included the documentation of distributed publications. The number of producers who attended personal consultations with Kansas Farm Management Association or Farm Analyst programs totaled 3,198 producers (K-State Research and Extension, 2013). To-date had not had any formal workshops or trainings on climate change (R. Taylor, personal communication, March 30, 2016).

The number of on-farm visits conducted by Extension agents/educators and their current relationship with farmers is unknown. It also remains unknown how many of the educational events were related to climate mitigation and adaptation practices.

When Extension first began, agents were required to have a degree from a four-year college or a certificate (Seevers et al., 1997). Today, the requirement differs from state-to-state, however; a large majority of states require a master's degree for Extension agents/educators. In Kansas,



agents are required to have a bachelor's degree and a master's is preferred but not required (Alexander, 2007). A study of all K-State Research and Extension agents (n = 241) indicated 88 agents held master's degrees. Of the 88 agents with a Master's degree, 51 agents completed their master's before becoming employed by K-State Research and Extension (Alexander, 2007). All agents/educators are required to attend in-service training throughout the year and many states require agents/educators to attend a set number of trainings (Seevers et al., 1997). K-State Research and Extension requires all new agents to attend new agent development. Agents cover five topic areas, orientation, basic 4-H operations, communications, local operations, and program development (Baker & Hadley, 2014). Based on Baker and Hadley's work, these topic areas were modified in 2016 (G. Hadley, personal communication, April 8, 2016) to cover orientation, the art of Extension, 4-H/youth development, programming with a purpose, and navigating differences.

It was found that education level of agents plays a role in agents' information seeking and communication practices (Radhakrishna & Thomson, 1996). Agents with a bachelor's degree were more likely to communicate with supervisors, local officials, and school teachers than agents with master's and doctoral degrees. Agents with a doctoral degree were more likely to reach out to agents in other counties and states than agents with bachelor's and master's degrees. Extension agents used a variety of information sources to communicate with constituents such as, clients, other agents, specialists, local-news agencies, local business organizations, federal agencies, and school teachers and officials (Radhakrishna & Thomson, 1996). It remains unknown if Extension agents/educators with a higher education level are more likely to reach out

to agents/educators in other counties and states when discussing complex scientific topics, like climate change.

Becerra et al.'s (2015) study of Extension agents/educators attitudes regarding climate change showed a need for climate-change training. In the study, agents/educators identified the need for a shared knowledge base and reliable resources for information. The number one topic agents/educators requested more information on was management practices for covering the subject of variable weather events. This was consistent with what agents/educators perceived as the number one topic of concern for constituents, weather variability which includes drought, heat, and excess water (Becerra et al., 2015). The amount or types of climate-change training being offered for agents/educators by Cooperative Extension Services in each state is unknown.

### **Extension Communication**

Extension agents/educators must be communication experts (Rasmussen, 1989). Communication is a large component of Extension agent's/educator's daily tasks. Agents/educators are not expected to know all the subject material. However, they are expected to adequately communicate that they will find the information and get back to the constituent (Rasmussen, 1989).

Communication is an important competency in Extension. A study of 180 (n = 274) North Carolina Extension agents found interpersonal skills and the ability to adapt to change were two of the most significant competencies needed as an agent (Lakai et al., 2014). Respondents only

had a moderate proficiency in communications which included, “making clear and convincing oral presentations, fostering an environment for open communication, write effectively for target audience, use the latest communications technology, and develop a marketing plan for programs” (Lakai et al., 2014, p. 79). The study found agents were highly proficient in subject matter expertise. This led the researchers to suggest Extension should move towards in-service training in areas such as communication and shift away from subject area training (Lakai et al., 2014). A study of K-State Research and Extension revealed agents used and trusted traditional media-sources more than new-media sources for communicating with constituents (Settle et al., 2015). Agents had low trust of new-media sources. Traditional media sources used by Extension agents to disseminate information in the study were newspapers (print and online), radio, television, and websites which were used the most. For traditional media, websites were used the most, but print newspapers were the most trusted source for Extension agents. Online newspapers were used and trusted the least in traditional media. New media in the study included Twitter, blogs, YouTube, smartphone apps, and Facebook. Facebook, a new-media source, was used and trusted the most by Extension agents. This is supported by Mains, Jenkins-Howard, and Stephenson's (2013) study of Facebook as a viable communication tool for Extension programming. The least used and trusted source of new media by Extension agents was Twitter. All traditional and new-media sources in this study were communication sources agents/educators perceived their audience to be using and are the sources agents/educators are comfortable using. As new media and methods of communicating with constituents continue to evolve for Extension, it is important to remember these methods can never replace one-on-one interactions (Rasmussen, 1989). A study of Oregon State Extension agents found that agents believed their audience wanted more traditional media. A follow-up study by Oregon Extension found Oregon producers, farmers, and

ranchers, wanted more technology delivered information (Diem, Hino, Martin, & Meisenbach, 2011).

A study conducted by Michigan State University Extension with dairy producers in Michigan found results similar to Settle et al.'s (2015) study. There was still a high dependence and presence of traditional materials given to Michigan dairy producers by Michigan State University Extension, but a change towards more Internet usage was starting to be seen (McCarthy, Beede, & Edgecomb, 2008). The biggest drawback to receiving information from Extension for these producers was Extension's use of PDF files. Producers preferred to be able to read the material online instead of downloading a PDF to access the information. McCarthy et al.'s (2008) study recommended all Extension content be available in HTML in addition to downloadable PDF forms. The preferred communication channel for Extension agents/educators to communicate about scientific and controversial topics remains unknown.

### **Communication Accommodation Theory**

Accommodating language, verbally or non-verbally, is adjusting one's communication to match those being spoken to or to create understanding. This accommodation can assist or impede communication efforts. Howard Giles, communication professor at the University of California, established Communication Accommodation Theory in 1987 based on variations of Speech Accommodation Theory which emerged in 1973 (Giles & Coupland, 1991). Speech Accommodation Theory originally focused on perceptions of an individual's environment and speech style. Adapting the accent of a communication partner in an effort for one's message to

be received more favorably was the first research conducted with the Speech Accommodation Theory (Giles et al., 1991). This favoritism was labeled convergence and used as a way to understand social psychological behaviors. Speech Accommodation Theory identified 11 features that a communicator could use as convergence to reduce personal differences such as, “utterance length, speech rate, information density, vocal intensity, pausing frequencies and lengths, response latency, self-disclosure, jokes, expressing solidarity-opinions-orientations, gesture, head nodding and facial affect and posture (Giles et al., 1991, p. 7). The convergence process can hamper a person’s proficiency in a second language, influence job productivity and satisfaction, and influence legal and medical matters (Giles et al., 1991).

There are five types of accommodation (Soliz & Giles, 2014). Accommodation is individuals who are perceived to be enacting in a positive or appropriate manner. These individuals are meeting the needs of their conversation partner. Nonaccommodation is the failure to meet the need of a conversation partner and is often lumped in the same category as underaccommodation. Also grouped under the nonaccommodation window is overaccommodation, the overbearing use of accommodation in which slower, less complex communication is used. This can have both positive and negative results depending on the situation. Reluctant accommodation is based on respect and cultural norms. When using reluctant accommodation, the communicator meets the needs of a conversation partner, but not in a positive way or in hopes of establishing a relationship. Avoidant communication is when no accommodation is taking place. The conversation will be ended as quickly as possible and all future interactions will be avoided (Soliz & Giles, 2014).

Communication Accommodation Theory was founded largely on the idea that convergence and divergence in communication is driven by how the communicator identifies themselves (Abrams, O'Connor, & Giles, 2003). Table 2.1 below shows the actions that might take place in a conversation based on how the communicator perceives their identity in the group. It is important for communicators to understand how they identify themselves in each group. Those who identify positively with a group may use divergence in an effort to set themselves apart from the rest of the group (Abrams et al., 2003). Those who identify negatively with a group may use convergence in an effort to be accepted (Abrams et al., 2003).

**Table 2.1***Communicating Identity* (Abrams et al., 2003)

	Nonverbal Behavior	Language	Paralanguage
Positive social identity	Crowd behavior Conflict Physical boundaries Outgroup rejection Ethnophaulisms Negative allocation bias Symbols	Patronizing speech Ingroup language with normal speech rate Non-language acquisition Labels	Accent, dialect, idioms, speech rate, pauses, utterance length, phonological variants can all be modified to signal positive social identity
Moderate social identity	Smiling, gaze, gestures Time	Ingroup language with slow speech rate Conversation interruptions Conversation turn taking Sarcasm, hostility, disagreement Code switching Language intensity Topic choice	Accent, dialect, idioms, speech rate, pauses, utterance length, phonological variants can all be modified to signal moderate social identity
Negative social identity	Ingroup rejection Positive allocation bias Assimilation	Outgroup language with native-like pronunciation Outgroup language with features of ingroup pronunciation Language acquisition	Information density Self-disclosure

Agents/educators will need to adjust their communication strategies to accommodate the comfort level of each audience. If an audience is doubtful, agents should address the impacts of climate change and the uncertainty of the future. If an audience is willing to learn about climate change, agents/educators local adaptation solutions (Morris et al., 2014). Agents/educators should address these local adaptation solutions by accommodating their communication to meet the needs of the producer.

Divergence was also investigated as a way in which speakers accentuate speech and nonverbal differences. Divergence is a strategy where an individual speaker draws attention to the speech and nonverbal differences between themselves and the listener (Giles et al., 1991). Nonverbal differences can range from physical differences such as appearance to lifestyle differences such as ownership of property. Using divergence to distance communicators can put meaning into the interaction or it can handicap the speaker. Divergence can also be used to bring another's behavior to an acceptable level or establish speech patterns with other communicators (Giles et al., 1991).

Communicators can both converge and diverge at certain levels, in the same message, based on the variables present (Giles et al., 1991). Speech Accommodation Theory covers a wide range of speech diversities in social settings. Throughout the years, researchers discovered there were more variables to accommodation when communicating such as how social norms, social costs, personal beliefs, and other psychological factors that impact communication. Communication Accommodation Theory was developed to include the tenets of Speech Accommodation Theory,



but it also includes non-verbal communication, psychological factors, and factors of group identity. Communication Accommodation Theory, “explores the different ways in which communicators accommodate, their motivations for doing so, and the consequences arising from those adjustments” (Soliz & Giles, 2014, p. 108).

A review of Communication Accommodation Theory by Soliz and Giles (2014) examined 149 articles using the theory between the years of 1973 and 2010. Half of the studies were completed since 2000. The study also found 40 % (n = 59.6) of research using Communication Accommodation Theory was related to culture and ethnicity. Inter-generational (32%, n = 47.68) was the second highest inquiry area, followed by a tie in the areas of family and gender/sexual identity (13%, n = 19.37) (Soliz & Giles, 2014). The third highest area of inquiry was professional/organizational research, which accounted for 12% (n = 17.88) of the studies, and the fourth, educational/instructional research accounted for 4% (n = 5.96) (Soliz & Giles, 2014). The review by Soliz and Giles (2014) found equal amounts of qualitative and quantitative work. This along with the theory being published in 67 journals across multiple topic areas proved the broad nature of the theory (Soliz & Giles, 2014).

## **Summary**

This chapter examined the salient research on climate change, adult education, and the Communication Accommodation Theory surrounding this study. The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex scientific topics. The results of this study

will be used to develop communication and education training for agents/educators in order that they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma. Doing this will inform Extension allowing greater success when working with agricultural producers on the subject of climate change and other complex topics.

This chapter began by reviewing current and projected impacts of climate change then reviewed climate literature specifically related to agriculture. Large portions of greenhouse gases have been trapped in the atmosphere since the Industrial Revolution in 1750 (Field et al., 2014) . The amount of carbon dioxide, methane, and nitrous oxide, trapped in the atmosphere has increased temperatures beyond normal disturbances. This caused temperature and climate shifts around the world (Field et al., 2014). Agriculture has been, and will continue to be, largely impacted by the changing climate with changes in growing seasons, precipitation, crop yields, pests, and disease (Barros et al., 2014). However, crops and vegetation can benefit from the effects of climate change. Agriculture in northern states will receive the most benefits, as increasing temperatures lengthens their growing season and allows a variety of crops' and vegetation's growing regions to shift north (Barros et al., 2014).

Agricultural experiment stations and land-grant colleges have been disseminating useful and practical information to agricultural producers since 1887. The Cooperative Extension Service was established as a way to better disseminate the information generated by the land-grant colleges and experiment stations to the general public (Williams, 1968). Extension is considered

the largest form of adult education available globally (Seevers et al., 1997). Climate-change education was lacking in the United States (Leiserowitz, Smith, & Marlon, 2011) but growing in K-12 education as states adopted new science standards to teach climate-change education (Next Generation Science Standards, n.d.). Adult education was still lacking. According to K-State Research and Extension's 2012 accomplishments, no material labeled as climate-change information was being shared with constituents (K-State Research and Extension, 2013).

Communicating with constituents was a large part of Extension agents/educators daily tasks. Research showed agents/educators have high subject matter expertise but lacked proficiency in communication (Lakai et al., 2014). Agents/educators also had a low trust of new-media sources. Agents/educators were most comfortable with traditional media sources, including websites (Settle et al., 2015). McCarthy et al. (2008) found the biggest drawback when agents/educators communicated with producers is their use of PDF documents. Producers preferred to have physical copies or read the document online instead of having to download it.

Communication Accommodation Theory was examined to inform in the development of Extension's communication and learning outcomes for climate-change material and influence of communication barriers. Communication Accommodation Theory is adjusting communication patterns, verbal and nonverbal, to match the communication patterns of those around us (Giles et al., 1991). Observation of behavior and experiences will play a role in Extension's training on climate-change material. The more effort made by Extension to speak in a manner understood by agricultural producers, the more producers will make an effort to understand.

## Chapter 3 - Methodology

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex, scientific topics. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma.

The following research objectives guided this study:

- **RO1:** Determine the background and experience of Extension agents/educators.
- **RO2:** Determine how Extension agents/educators are communicating about complex, scientific topics, like climate change, with agricultural producers.
- **RO3:** Determine what climate information agents/educators have received and their preferred method of receiving future training.
- **RO4:** Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers in their county or district.

To determine these objectives, the study identified current communication accommodation practices of county agents/educators by asking agents/educators to respond to a constituents request for information through a mixed methods electronic format. The study also identified current communication practices of agents/educators and constituents methods of contacting agents/educators. The review of literature showed current and projected impacts of climate change on the agricultural industry, such as increased carbon dioxide levels in the atmosphere

leading to increased yields in some crops, increased temperatures leading to extended growing seasons, regional growing seasons shifting north, and in some areas more drought conditions.

The review of literature also showed Extension is a viable vehicle for communicating with and educating agricultural producers on climate change. Gaps in the literature indicated the number of farm visits currently conducted, the training and tools needed to provide specific, local information, and communication preferences when covering scientific and controversial topics.

The number of educational events held for producers related to adaptation and mitigation in Extension throughout Kansas and Oklahoma remains unknown.

### **Design of the Study**

In order to assess the research objectives, the study utilized a mixed method, quantitative and qualitative, survey methodology. The instrument was an online survey, developed in Qualtrics, an online data collection tool, with the population of county agricultural and natural resource Extension agents/educators in Kansas and Oklahoma. By using an online survey, agents/educators were able to participate in the office or away from the office. Using an online method allowed the survey to be mobile device compatible and participants were able to complete the survey from anywhere. There was no cost associated with making or distributing the online survey, unlike telephone and mail surveys. Given the dominance of the winter wheat crop in Kansas and Oklahoma, it was chosen as the crop to frame the scenario emails to Extension agents/educators.

To reduce question order effects, where participants may experience priming or carryover from previous questions, agents/educators viewed questions on a page-by-page basis, without the opportunity to return to previous questions (Dillman, Smyth, & Christian, 2009). Participants were not forced to answer questions before proceeding in the survey. Participants may disengage or drop out of a survey if forced to answer survey questions (Dillman et al., 2009). However, agents/educators were not be able to go back and change answers after they moved to the next page.

## **Sampling**

The study utilized a census sampling method to reach as many agents/educators as possible. A census, a study of the entire population, allowed for confidence of a complete sample (Ary, Jacobs, Razavieh, & Sorensen, 2006). Coverage error occurs when a survey does not reach all members of the population (Dillman et al., 2009). To ensure all agricultural and natural resource Kansas agents and Oklahoma educators were reached and to limit coverage error, the survey was sent out through the Program Leaders of agriculture and natural resource agents/educators in each state. Every agriculture and natural resource agent/educator in Kansas and Oklahoma received the survey and was provided the opportunity to respond with their input. The response rates, described in detail later in the paper, indicate which agents/educators chose to participate and their level of participation. The results of a census survey can be applied to the entire population with little fear of contradiction. However, due to the low response rates of this study the researcher cannot guarantee responses are representative of the entire population.

All Extension agents/educators have a land-grant university email address and access to Internet at their office. Working with the program leaders, the survey was sent to agents'/educators'

university email address. The link to the survey was sent in an email message from the program leader of each state explaining the survey and why agents/educators should participate.

Participants are more likely to comply if the request comes from an authoritative source (Dillman et al., 2009). Thus, the Agriculture and Natural Resource Program Leader from Kansas and Oklahoma were asked to deliver the survey in an effort to increase response rates.

The survey went out to a census of 106 agriculture and natural resource agents in Kansas (S. Warner, personal communication, February 22, 2016) and 75 agriculture and natural resource educators in Oklahoma (R. Taylor, personal communication, February 29, 2016). It should be noted that the 106 agriculture and natural resource agents in Kansas included 17 agents who specialized in horticulture. Of the 75 agriculture and natural resource educators in Oklahoma, 14 educators specialized in horticulture. The survey addressed climate-change issues with winter wheat growth and was specifically directed at agents who deal with agricultural producers growing wheat. Some horticulture agents had the background to complete the survey, some did not but referred to people who had the knowledge, and some dropped out of the survey without completing any questions. These horticulture agents may account for some of the dropouts, those who consented to the survey and then left without answering a question.

Since respondents were not forced to answer a question before moving on, the number of responses varied throughout the survey. In the survey one participant declined the consent form, the agent was from Kansas. In Kansas, 27 people answered the majority of the questions on the survey for a 25.47 % response rate. In Oklahoma, 15 people answered a majority of the questions on the survey for a 20% response rate. These low response rates are similar to other Extension

studies (Prokopy et al., 2015; Smathers & Lobb, 2015), and a 20% response rate was deemed acceptable.

The combined responses from the two states for the email scenarios and their follow-up questions can be viewed in Table 3.1. More agents/educators participated in the follow-up questions than writing an email reply to the scenario. A few agents chose not to participate in the email scenarios or the follow-up questions but participated in the rest of the survey.

**Table 3.1**  
*Response Rates for Email Scenarios and Follow-up Questions*

	Number of agents/educators
Answered majority of the survey	42
Replied to email scenario one	39
Replied to follow-up questions for email one	44
Replied to email scenario two	33
Replied to the follow-up questions for email two	38

Participants were encouraged to complete the survey through the implementation of social exchange, the benefits people expect to receive from participation as recommended by Dillman et al. (2009). Agents/educators will benefit because their input for this survey will be used to build on future communication and educational materials when working on climate change with agricultural producers. In an attempt to ensure participation in the study the initial email and follow-up emails included details on how the results will be used, provided contact information for questions, provided social validation, and showed appreciation for agents/educators time.



Dillman et al., (2009) suggested sending a link that, when clicked, opens the participant's browser taking them directly to the survey as an effective way to increase response rates. In the initial email and follow-up emails, a hyperlink to the survey was provided directly in the email. In an effort to make the survey as accessible as possible, the survey was mobile device compatible. Since the survey was sent out through Qualtrics, a private, online data collection tool, and since the responses were anonymous, respondents could not be removed from the follow-up emails upon completing the survey.

Dillman et al., (2009) stated ideal timing on follow-up emails had not been established. Dillman recommended a three-contact email strategy to be sent one week apart with the possibility of a fourth follow-up left to the discretion of the researcher. This study followed Dillman's (2009) three contact email strategy and opted out of the additional fourth contact. Kansas had three emails contacts while Oklahoma only had two email contacts by preference of the Oklahoma program leader.

Dillman (2009) suggests that surveys sent early in the morning before working hours are more likely to get completed than those sent out during the day. It is thought participants may have more time to complete the survey upon arriving at work before the demands of the day make them too busy to participate (Dillman et al., 2009). Therefore, the initial email and follow-up emails were sent to the program leaders the night before they were to be sent out or early in the morning, in hopes that the program leader had the time to send out the survey first thing in the morning.

Since climate change may be a controversial and a sensitive subject for some, every effort was made to ensure participants confidentiality and security of any information they provided (Dillman et al., 2009). Surveys covering sensitive topics may increase the costs for agents/educators to participate. A detailed explanation of why agent's/educator's participation was important was included in an effort to reduce the personal costs. Survey questions were arranged, in a specific order with no randomization, to ease participants into controversial and sensitive questions. Dillman (2009) found participants who have already spent the time to complete the majority of a survey are less likely to quit (Dillman et al., 2009).

## **Participants**

Of the 36 participants who indicated their age, ages ranged from 22 years of age to 65 years of age. The mean age of participants was 45.17 (SD = 13.63). When asked to provide their gender 36 participants responded. Results indicated that the majority (n = 24, 66.7%) of respondents were male and the remaining 12 respondents (n = 33.3%) were female.

In order to determine agent's/educator's areas of specialty, participants were asked to identify their areas of specialty by selecting yes or no for each specialty area (Table 3.2). The top areas of specialty were "Livestock" (n = 28, 75.7%), "Crops" (n = 26, 72.2%), "Lawn & Garden/Horticulture/Pest Management" (n = 25, 72.5%), and "Natural Resources/Environment/Ecology" (n = 24, 66.7%) (Table 3.2). No agents/educators indicated they had a specialty in "Family/Family Development/Consumer Science" or "Adult Development & Aging". Only Oklahoma agents indicated a specialty in "Nutrition/Food Safety/Health" (Table 3.2).

**Table 3.2***Areas of Specialty for Agents/Educators*

	n	%
Livestock	28	75.7
Lawn & Garden/Horticulture/Pest Management	25	73.5
Crops	26	72.2
Natural Resources/Environment/Ecology	24	66.7
Farm Management	22	62.9
4-H Youth and Development	17	47.2
Community/Rural Development	9	25.0
Biological & Agricultural Engineering	8	24.2
Weather	7	20.6
Nutrition/Food Safety/Health	1	2.9
Family/Family Development/Consumer Science	0	0.0
Adult Development & Aging	0	0.0

n = number of yes responses to area of specialty

**Instrument**

A single survey was administered to obtain results for the objectives in this study (Appendix A).

The survey was submitted and approved by the Institutional Review Board at Kansas State University (proposal number 8081) (Appendix B).

The first page of the survey served as the consent form. Participants were informed of the purpose of the study, informed that their participation was confidential and voluntary, provided an estimated time to complete the survey, provided a link to the survey, and provided contact information for any questions that arose. The participant was only granted access to the rest of the survey if they accepted and acknowledged that they understood these terms.

The second page of the survey contained an email from a producer with little to no formal education, who only occasionally sought information from his local Extension office, and was leery of change. In the email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance, the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used incorrect email format, improper grammar, and improper sentence structure. On the same page, in the space provided, Extension agents/educators were asked to type their email reply to the producer. Also on the same page, Extension agents/educators were asked a series of four questions relating to their perception and adjustment of communication in the interaction. These follow-up survey questions were identical to the survey follow-up questions for email two

The third page of the survey contained a second email from a producer who held a four year degree, frequently sought information from his local Extension office, and actively sought information on changing practices. In the email addressing the local Extension agent/educator, the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used correct email format, proper grammar, and proper sentence structure. Once again, agent/educators were asked the same series of four questions relating to their perception and adjustment of communication in the interaction.

The survey continued with modified scalar questions adapted from studies of communication accommodation between police and civilians (Barker et al., 2008; Giles et al., 2006; Giles, Hajek, Stoitsova, & Choi, 2010; Hajek et al., 2006, 2008; Kwon, 2012). The modified scalar

questions were utilized to understand the Extension agent's/educator's attitude, perceptions, and compliance in providing climate information in various climate-change conversations with agricultural producers. These variables were important to assess, as Extension agents/educators can be seen as authoritative figures on agricultural matters and have the ability to influence producers' acceptance or rejection of climate-change conversations and adaptation and mitigation efforts.

Extension agents/educators were then asked a series of questions related to how they conduct their job. This included methods in which producers contact agents/educators with questions, how many on farm visits were conducted, and any information they received related to climate change. Agents/educators answered questions related to their background and current involvement in agriculture. They also answered questions related to their education level, willingness to return to school for more training, and background in agriculture. Upon answering these questions agents/educators finished the survey with demographic questions before concluding with the debriefing statement. The entire survey can be viewed in its original form in Appendix A.

### **Panel of Experts**

A panel of experts was used to determine if the survey adequately met the objectives of this study. During the months of December 2015 and January 2016, six professionals in the agricultural industry including an Extension educator for Nebraska Extension, a former K-State Research and Extension agent, a K-State Assistant Professor in Agronomy with an Extension appointment, a K-State Assistant Professor in Agronomy with an Extension appointment as a

wheat and forages production specialist, a K-State Associate Professor of Agricultural Communications, the K-State Research and Extension Program Leader of Agriculture and Natural Resource agents, and two private crop consulting professionals reviewed the instrument. The panel covered all questions submitted to the Institutional Review Board. Professionals were provided with a paper copy and a link to complete the survey online through Qualtrics. The panel was conducted to determine readability, knowledge base, and to identify any issues.

## **Data Analysis**

**Qualitative Analysis.** All transcripts, up to three open-end questions per respondent, were imported into NiVivo 10 software,(NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10, 2012) to be analyzed using a comparative method which compared emergent themes. The three open-ended questions were agents’/educators’ replies to email one, email two, and additional information about climate-change conversations with producers. To analyze the data it was divided by state. The data divided into sections for emergent themes by email scenario one, email scenario two, and additional information about climate conversations with agricultural producers. The researcher read the email replies looking for similarities between participants’ for each section. When a similarity was identified, it was labeled and categorized for future reference. This same process was used to analyze accommodation themes, but the data was divided into sections by email scenario one and email scenario two. When all data had been labeled and categorized by state, the researcher combined common themes between the states. Themes that were state specific were also identified.

The first and second open-ended questions asked the agent/educator to reply in email format. The third open-ended question provided respondents with the opportunity to provide any additional comments on climate-change conversations with producers. The constant comparative method begins by looking for themes throughout all respondents' written answers. Themes were categorized and organized by research objective. Respondents' written answers were also analyzed for the major tenets of Communication Accommodation Theory. All respondents' first and second email replies were compared for changes in accommodation, climate-change information, and similarities. In an effort to keep the opened responses free of bias, climate change was not mentioned in the questions until the two opened email responses had been completed by the participant.

All participants were assigned a pseudonym for qualitative analysis. All participants in Kansas were assigned a pseudonym beginning with the letter J. All participants in Oklahoma were assigned a pseudonym beginning with the letter A. These letters were chosen because they offered the largest name banks.

**Subjectivity Statement.** The researcher was raised on a farming and cattle ranching operation in Kansas. The farm raised hard red winter wheat. The researcher had experience working with local Extension agents on farm matters. The researcher had a strong background in 4-H, FFA, and was an agriculture major in college, both undergraduate and graduate. The researcher might be more inclined to believe agents/educators are not doing on-farm visits as she has never experienced this or seen it in her geographic region of Kansas. The researcher also might be more inclined to think Extension professionals should reply to emails in proper format with

scholarly sources due to her formal education in undergraduate and graduate education being in agricultural communications. With a secondary degree in natural resources and environmental sciences, the researcher might also be more inclined to conclude that Extension agents/educators should be providing climate information to agricultural producers. Since the researcher was raised on a wheat, soybean, and cattle operation, and holds adequate knowledge of climate-change adaptation options, the researcher might be biased in determining what is an accommodating reply to the email scenarios. A subjectivity statement disclosed the personal bias a researcher might have. This statement allowed readers to draw conclusions about the researcher's credibility and the validity of the study overall (Preissle, 2008).

**Quantitative Analysis.** The scalar and demographic questions were analyzed using descriptive statistics to organize, summarize, and describe the data collected. Using IBM SPSS Statistics 23, descriptive statistics including mean, median, range, frequency, and standard deviation were calculated for all quantitative questions. Variables in this study were accommodation, nonaccommodation, divergent, convergence, communication channels used to contact agents/educators, areas of specialty, preferred training sessions, level of education, background in agriculture, years of experience as an agent/educator, agent/educator location, age, and gender. An independent t-test is a statistical comparison of two variable's means. Coefficient correlations were calculated to determine how strongly two variables were related (Ary et al., 2006). An independent t-test will be utilized to compare the means of the variables (Ary et al., 2006) in this study.



For the open-ended question, “How many times a month do you generally conduct on-farm visits?” some responses included ranges and text answers. The text answers were documented and then deleted in order to properly run the data in IBM SPSS Statistics 23, (IBM Corp, Armonk, NY). For the answers with ranges, the lower end of the range was selected for analysis. This decision was made because agents/educators were doing a minimum of the lowest number of on-farm visits monthly, while the top number was not a guarantee for every month.

To measure agent’s/educators’ accommodation of the email scenario, the study also utilized an eight variable modified interpersonal communication satisfaction inventory scale that was originally developed by Michael Hecht in 1978 (Goodboy, Martin, & San Bolkan, 2009). The interpersonal communication satisfaction inventory scale used in this study was adapted from the works of Allman (1991) and Goodboy et al. (2009). The eight modified variables of the scale were used to establish the four tenets of Communication Accommodation Theory used in this study. The eight variables were combined into four variables for the ease of running data. All eight variables were identified as accommodation, nonaccommodation, divergence, and convergence. Variables that were labeled as identical tenets of Communication Accommodation Theory were combined. To run correlations, “Nothing is accomplished” and “I am very dissatisfied with the conversations” were combined into the tenet divergence. “I do not enjoy the conversations” and “We talk about things I was not interested in” were combined into the tenet nonaccommodation. “The conversation flows smoothly” and “I would like other conversations like these” were combined into the tenet convergence. “I feel I could talk about anything” and “We each get to say what we want” were combined into the tenet accommodation – in group

language. The total means for nonaccommodation, accommodation, convergence, and divergence were also established.

To measure agents'/educators' communication adjustment when speaking with agricultural producers about climate change, a communication accommodation scale with four modified variables was used. This communication accommodation scale was utilized after each of the email scenarios. The variables used in the scale were realism, comfort, respect, and understanding. Two variables in the study had to be transposed to make comparable data. These variables were "The producer was respectful" and "Did you understand what the producer was asking you?" The scale used in this study was adapted from Kwon's (2012) scale with 10 modified variables for a thesis on law enforcement-subject encounters. After a mean and standard deviation were established for each variable an independent t-test was ran to see if there was statistical significance.

By utilizing an instructional manipulation check researchers were able to ensure participants were reading the instructions and the email scenario (Oppenheimer, Meyvis,& Davidenko, 2009). This is a confirmation from the respondent that they have read the scenario adequately. There were two email scenarios in the survey with different wording and purposes. This study utilized the question, "After reading the producer's email, did you understand what the producer was asking you?" after each email scenario.

## **Reliability**

The overall Cronbach's Alpha for all seven-point scale items was .62. Variables with multiple items were grouped and Cronbach's Alpha was run to determine variable reliability. This is reported in the sections below. Additionally, previous studies used some identical and/or similar questions with pre-established levels of reliability, thus a pretest was not necessary and post-hoc reliability analysis was conducted on the current study's variables. The Cronbach's alpha reliability estimate in Kwon's (2012) study for this scale was reported at .91 ( $M = 54.96$ ,  $SD = 15.34$ ).

**Nonaccommodation/Divergent.** Questions in the study related to the variable nonaccommodation were "I do not enjoy the conversations", "We talk about things I was not interested in", "Nothing is accomplished", and "I am very dissatisfied with the conversations". Allman's (1991) study on personal communication utilized the exact same questions. Allman's (1991) study had a Cronbach's Alpha reliability estimate of .93. The nonaccommodation/divergent variable's Cronbach's Alpha in this study was .61.

**Accommodation/Convergence.** Questions in the study related to accommodation were "I feel I could talk about anything", "We each get to say what we want", "The conversation flows smoothly", and "I would like other conversations like these". Allman's (1991) study on personal communication utilized the exact same questions. Allman's (1991) study had a Cronbach's Alpha reliability estimate of .93. Other questions in the study related to accommodation were "How realistic do you think this situation is?", "How comfortable are you with this conversation?", and "The producer was respectful". These questions were adapted from Kwon's

(2012) study which utilized the questions “How realistic do you think this type of situation is?”, “You feel like Officer Jacob made you feel comfortable during this conversation”, and “You feel like Officer Jacob was respectful during this conversation”. Kwon's (2012) study on the public's interactions with law enforcement also utilized the questions related to how “accommodative,” “respectful,” “comfortable,” “engaged,” “adaptive,” the person was. The Cronbach's Alpha reliability estimate in Kwon's (2012) study was reported at .96. The Cronbach's Alpha reliability estimate for accommodation/convergence was .80 in this study.

**Background.** To understand agents/educators background in agriculture they were asked to rate the following variables on a scale of 1 = strongly agree to 7 = strongly disagree. The variables were “Raised on a farming/ranching operation.”, “Participated in 4-H”, “Participated in FFA”, “Agriculture major in college”, and “Sold 1,000 dollars or more in agricultural products in the 2015 fiscal year”. These items were researcher developed because items with an established reliability were not available. The Cronbach's Alpha reliability estimate was .51 in this study.

### **Limitations of the Study**

Limitations of this study are similar to other studies using survey methodology. Surveys may lack detail and depth of data collected. Participant's responses may lack accuracy and honesty and the researcher may have limited ability to check accuracy of responses (Dillman et al., 2009). Open-ended responses may be shorter and less detailed than responses from a personal interview. Mobile views of the survey may not show the information in the same format as a bigger screen. This could be a source of error or a limitation when analyzing data (Dillman et al., 2009).

Other sources of limitation include the low number of responses (n) for each state. There were less than 30 responses for each state. Kansas had a total of 27 complete responses and Oklahoma had a total of 15 complete responses. T-tests were run to look at significant differences between states. Due to the small number of replies for each state, the results may have been affected. However, when analyzing the follow-up responses for email one and two, a modified communication accommodation scale with seven point differentials, the data was left combined in order to have enough responses, to adequately run repeated measures t-tests.

A small sample size and low number of responses to individual items may have contributed to the low reliability in the variables accommodation, convergence, nonaccommodation, divergent, and background. The literature shows that accommodation and convergence are similar variables and often used interchangeably in studies (Soliz & Giles, 2014). Therefore, these variables were combined to run reliability for the study. The same could be said for nonaccommodation and divergent, therefore, they were also combined to run reliability.

## **Summary**

This chapter looked at the methodology used in this study which was developed by considering previous research on climate change and communication accommodation. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma. Doing this will inform Extension allowing greater success when working with agricultural producers on the subject of climate.

This study utilized a mixed method, quantitative and qualitative, survey to reach the research objectives. The online survey constructed in Qualtrics and sent to agents'/educators' Extension email address in Kansas and Oklahoma. The survey was sent to 106 Agriculture and Natural Resource Agents in Kansas and 75 Agriculture and Natural Resource Educators in Oklahoma. There was a 25.47% (n = 27) response rate in Kansas and a 20% (n = 15) response rate in Oklahoma. Participant ages ranged from 22 to 65 years of age (n = 36). The mean for the age of participants was 45.17 (SD = 13.629). Results indicated the majority (n = 24, 66.7%) of respondents were male and the remaining 12 respondents (33.3%) were female. Results also indicated the top four areas of specialty for Agriculture and Natural Resource Agents/Educators were "Livestock", "Crops", "Lawn & Garden/Horticulture/Pest Management", and "Natural Resources/Environment/Ecology". No agents/educators indicated a specialty in "Family/Family Development/Consumer Science" or "Adult Development & Aging". Only one Oklahoma educator indicated a specialty in "Nutrition/Food Safety/Health".

Qualitative research variables were analyzed using a comparative method. Every participant was assigned a pseudonym. The data was divided by state, email scenario one, email scenario two, and the open-ended question for additional information about climate-change conversations. The researcher read through the email scenarios looking for common similarities between participants and identified themes based on these similarities. Themes were examined at by state and then similar themes were combined. Quantitative research variables were analyzed using IBM SPSS Statistics 23 descriptive statistics including mean, median, range, frequency, and standard deviation were calculated for all quantitative questions. T-tests were used to compare

mean differences between variables. All data was analyzed by state to compare differences. Data with no or low differences between Kansas and Oklahoma was combined and reported as a survey wide response.

## Chapter 4 - Results

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex, scientific topics. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma. The results of this study are presented by research objective in the following chapter.

The research objectives for this study were:

- **RO1:** Determine the background and experience of Extension agents/educators.
- **RO2:** Determine how Extension agents/educators are communicating about complex, scientific topics, like climate change, with agricultural producers.
- **RO3:** Determine what climate information agents/educators have received and their preferred method of receiving future training.
- **RO4:** Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers in their county or district.

### **RO1: Determine the background and experience of Extension agents/educators.**

In order to determine agents'/educators' background and current involvement in agriculture participants were asked, "Do you have a background in agriculture?". The responses for having a background in agriculture were "Raised on a Farm/Ranch", "Participated in 4-H", "Participated



in FFA”, “Agricultural Major” and “Sold \$1,000 in Agricultural Products in FY2015” (Table 4.1). Participants were able to respond on a scale of 1 = strongly agree to 7 = strongly disagree. “Agricultural Major” was the only variable that did not have a range. Every participant that responded to this question answered 1 = strongly agree.

The majority of participants selected 1 = strongly agree on the variables “Raised on a Farm/Ranch” (n = 28, 90.3 %), “Participated in 4-H” (n = 26, 76.5%), “Participated in FFA” (n = 28, 82.4%), and “Agriculture Major” (n = 37, 100%). The responses for variable “Sold \$1,000 in Agricultural Products in FY2015” (n = 34) were split between 1 = strongly agree and 7 = strongly disagree. Responses indicated 16 participants (48.5%) had sold \$1,000 in agricultural products and 17 participants (51.5%) did not (Table 4.1).

**Table 4.1**

*Background of Agents/Educators*

	n	Mean	SD
Sold \$1,000 in agricultural products in FY2015	34	4.12	3.00
Participated in 4-H	36	2.56	2.58
Participated in FFA	34	2.06	2.32
Raised on Farm/Ranch	34	1.65	1.63
Agriculture Major	37	1.00	.00

In order to run a paired samples t-test the background questions were combined and ran as one variable. The background of agents/educators (n = 37) had a mean of 2.24 (SD = 1.11), indicating they had a strong background in agriculture.

To determine the amount of experience participants had working as an Extension agent/educator, participants were asked to indicate the number of years they have held the position as seen in Table 4.2. Responses (n = 37) ranged from zero to 31+ years. The mean for the amount of experience was 3.22 (SD = 1.72), which was the range option 9-14 years. Of the total respondents, 15 were over the age of 50 and 13 of these respondents were male. Of the total respondents six were under the age of 30 and all of these respondents were female. There were no significant differences in years of service between Kansas and Oklahoma.

**Table 4.2**  
*Years of Experience as an Extension Agent/Educator*

Years	Frequency	%
21-30	9	24.3
0-3	8	21.6
4-8	8	21.6
15-20	5	13.5
9-14	4	10.8
31+	3	8.1

To determine agents'/educators' education level, participants were asked to indicate their highest level of completed education. Thirty-six agents/educators responded. One agent/educator selected other and provided the answer, "Bachelor's + Certificate". In Kansas, 22 agents provided their education level with the majority (n = 15, 68.2%) having a bachelor's degree. Six agents (27.3%) had their master's degree, and one agent (4.5%) provided an "Other" reply of "Bachelor's + Certificate". Of the respondents from Kansas, no agents had their doctoral degree. In Oklahoma, 15 educators provided their education level with the majority (n = 10, 66.7%)

having their master's degree. Of the remaining educators, four (26.7%) had a bachelor's degree and one (6.7%) had a doctorate degree.

When asked if agents/educators had plans to further their education, 35 participants responded. Responses were "No" (n = 24, 68.6%), "Yes, Online" (n = 8, 22.9%), and "Yes, On-Campus" (n = 3, 6.8%). In Kansas, 21 agents responded to the question and the majority (n = 14, 66.7%) indicated they had no plans to further their education. Five (23.8%) agents indicated they planned to further their education online and two (9.5%) agents planned to further their education on-campus. In Oklahoma, 14 educators responded to the question and the majority (n = 10, 71.4%) indicated they had no plans to further their education. Three (21.4%) educators indicated they planned to further their education online and one educator (7.1%) planned to further their education on-campus.

**RO2: Determine how Extension agents/educators are communicating about complex topics, like climate change, with agricultural producers.**

To determine how Extension agents/educators were communicating with agricultural producers overall, agents/educators were asked to indicate the percent of time spent with each of the communication channels telephone, email, and office visits. Agents/educators indicated their response using a sliding bar for each variable, usage of all three variables had to equal 100 percent. In Kansas, communication using the telephone ranged from 36% to 81% (n = 22). The mean for telephone communication was 51.64% with a median of 45% (SD = 14.03). Communication using email ranged from 0% to 40% (n = 22). There was only one agent who

indicated producers did not contact them via email. The Kansas agent was female, had zero to three years of experience, and was 23 years old. The mean for email communication was 21.00% with a median of 20.50% (SD = 11.9). Communication during office visits ranged from 5% to 50% (n = 22). The mean for office visits was 27.36% with a median of 29% (SD = 12.83).

In Oklahoma, communication using the telephone ranged from 30% to 80% (n = 15). The mean for telephone communication was 53.13% and the median was 51% (SD = 14.15).

Communication using email ranged from 0% to 61% (n = 15). There was only one educator who indicated producers did not contact them via email. The Oklahoma educator was female, had four to eight years of experience, and was 22 years old. The mean for email communication was 21.67% and the median was 20% (SD = 21.94). Communication during office visits ranged from 4% to 60% (n=15). The mean for office visits was 25.20% with a median of 20% (SD = 15.76).

Agents/educators were also asked how many on-farms visits they generally conducted in a month's time frame. In Kansas, the responses ranged from zero to 20 (n = 21) and in Oklahoma the responses ranged from zero to 15 (n =14). In Kansas, agents were completing a mean of 5.00 (median, 4.00, SD = 4.51) on-farm visits each month with four agents mentioning the number of visits depends on the season. In Oklahoma, educators were completing a mean of 5.43 (median = 4.00, SD = 4.93) on-farm visits each month with one educator mentioning the number of visits depends on the season. The combined mean of on-farm visits for both states was 5.17 (median = 4.00, SD = 4.61). Responses to the communication channel question were combined for both states to determine a survey mean response (Table 4.3).

**Table 4.3***Combined Communication Channels*

	Mean	SD
Telephone	52.24	13.91
Office Visits	26.49	13.92
Email	21.27	16.43
On-Farm Visits	5.17	4.61

Agents/educators were provided the opportunity, in an open-ended question, to add any thoughts or comments on conversations they were currently having with agricultural producers on climate change, climate-change adaptation, or climate-change impacts. This open-ended question was analyzed qualitatively for emergent themes as shown in Table 4.4. There were no major themes to report. Minor themes were “Not having Climate Conversations” (n = 9), “Varied Farmer Beliefs as Climate is an Evolving Management Practice” (n = 8), “Answer Adaptation Questions without Saying Climate Change” (n = 8), and “Leery of Climate Change” (n = 5). It should be noted the themes “Answer Adaptation Questions without Saying Climate Change” and “Leery of Climate Change” only appeared in the Kansas data (Table 4.4).

**Table 4.4***Additional Comments on Climate-Change Conversations with Agricultural Producers*

Theme	Example Responses	No. of Responses in Category
Not having Climate Conversations	Conversation rarely happens, “hot button” topic it’s difficult to get involved, we don’t have much to offer on the subject, the less said the better	9
Varied Farmer Beliefs as Climate is an Evolving Management Practice	Most farmers do realize that change is happening, not seeing a big change in yields, farmers should talk with university plant breeding programs to encourage new varieties, just like religion and politics	8
<sup>a</sup> Answer Adaptation Questions Without Saying Climate Change	Discussion on how to deal with warmer climates and less on why the climate is warmer, discuss treatment short term then leave the door open to discuss longer term management, address how this will affect their current crops	8
<sup>a</sup> Leery of Climate Change	Chances of changing climate in middle of Kansas is slim, climate conversations seem futile, unknown what will happen, need to remain profitable and sustainable thru change	5

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a = Theme only appeared in Kansas data

### **RO3: Determine what climate information agents/educators have received and their preferred method of receiving future training.**

Kansas agents and Oklahoma educators were asked to identify if they have received any climate-change information since becoming an agent/educator. In Kansas, of the 22 responses, 15 (68%) participants indicated they had received some form of climate information since becoming an agent, and seven (32%) indicated they had not. Of the 15 who indicated they had received information, 14 provided the type of information including reading various farm publications (n = 1), KSRE annual conference (n = 4), in-service training (n = 2), NC Climate Change Regional Group Conference (n = 1), Kansas Environmental Leadership program (n = 1), KSRE weather

data library (n = 1), Ranch Management Workshops (n = 1), EDEN on-line trainings (n = 1), National Weather Service presenter (n = 1), and the Farmers' Almanac (n = 1). Years for receiving this information ranged from 2010-2015.

In Oklahoma, of the 15 responses, 10 (67%) participants indicated they had received some form of climate-change information since becoming an educator and five (33%) indicated they had not. Of the 10 who indicated they had received information, nine provided information about the type of training including USDA Conference and NRCS various horticulture shows (n = 1), Oklahoma Mesonet training (n = 3), No-Till Conference (n = 1), an online course from the University of Minnesota (n = 1), one-day Extension workshop on cattle and climate (n = 1), and the National Weather Service Center in Norman (n = 2). Years for receiving this information ranged from 2008-2015.

A paired samples t-test was ran between, "How many years have you held a position as an Extension Educator?" and "Have you received any form of climate change information since becoming an Extension agent/educator?". There were no similarities between these variables and no statistical significance.

To determine agents/educators preferred method of attending training sessions, agents/educators were asked to select one option including "Face to face at land-grant university", "Webinar", "Online Class", "Face to face at location other than land-grant university", or "Other" as shown in Table 4.5. A "Webinar" was defined in the survey as "a presentation on the Internet, allowing participants in different locations to see and hear the presenter and other classmates, ask

questions, and answer polls”. An “Online Class” was defined in the survey as “a course delivered electronically using the Internet with little to no face to face communication. Student questions are asked through email/inbox format”.

Thirty-six agents/educators responded to the question. Kansas and Oklahoma responses were combined because there were no significant differences in the responses between states. Fifteen (41.7%) of respondents indicated they would prefer to attend training sessions “Face to face at location other than land-grant university”. Ten respondents (27.8%) indicated they would prefer to attend training sessions “Face to face at the land-grant university”. Nine (25%) respondents indicated they would prefer a “Webinar” training, and two (5.6%) respondents provided an “Other” response. The two respondents who selected the “Other” response included the answers, “No preference. All options have pros and cons” and “face to face is always good and it doesn’t have to be at the college, but I don’t mind webinars for some subject training/updates”. No respondents indicated they would prefer a training session in the form of an online class.

**Table 4.5**

*Kansas and Oklahoma Preferred Method of Attending Training Sessions*

	Frequency	%
Face to face at location other than land-grant university	15	41.7
Face to face at land-grant university	10	27.8
Webinar	9	25.0
Other	2	5.6
Online Class	0	0

**RO4: Determine Extension agents’/educators’ accommodation processes**

**when communicating with agricultural producers.** To determine agents’/educators’ communication accommodation process, an interpersonal communication satisfaction inventory



scale was adapted from the works of Allman (1991) and Goodboy et al. (2009). The modified eight variable scale ranged from: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree or disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree. There were 21 Kansas and 14-15 Oklahoma respondents for this question (Table 4.6). One educator did not reply to the variable “Nothing was accomplished” (n = 14) causing some response variation in the scale (Table 4.6). Four variables were transposed “I am very dissatisfied with these conversations”, “I do not enjoy these conversations”, “Nothing was accomplished”, and “We talk about things I was not interested in”. An independent t-test established significant differences at the  $p < .05$  level for “Nothing was accomplished”.

**Table 4.6**

*Communication Satisfaction for General Climate Conversations*

	Kansas			Oklahoma		
	n	Mean	SD	n	Mean	SD
<sup>a</sup> I am very dissatisfied with these conversations	21	4.76	1.45	15	5.13	.990
The conversation flows smoothly	21	4.52	1.33	15	4.73	1.34
<sup>a</sup> I do not enjoy these conversations	21	4.43	1.50	15	5.07	1.49
I feel I could talk about anything	21	4.38	1.67	15	4.00	1.81
We each get to say what we want	21	4.33	1.53	15	5.53	1.25
<sup>a</sup> Nothing was accomplished*	21	4.29	1.31	14	4.07	1.21
I would like other conversations like these	21	3.81	1.25	15	4.33	1.40
<sup>a</sup> We talk about things I was not interested in	21	3.71	1.32	15	4.27	.961

a = Scale transposed toward positive

Scale was from 1 to 7, where 1 is “strongly disagree” and 7 is “strongly agree”; n = number of respondents for each item

\* Significant difference between the states at the  $p < .05$  level

In order to run crosstabs on tenets of Communication Accommodation Theory (Table 4.6), the researcher established combined means for major tenets of Communication Accommodation Theory. The variables “I am very dissatisfied with these conversations” and “Nothing was accomplished” were combined as the tenet nonaccommodation. The variables “The conversation flows smoothly” and “I would like other conversations like these” were combined as the tenet accommodation. The variables “I do not enjoy these conversations” and “We talk about things I

was not interested in” were combined to form the tenet divergence. The variables “I feel like I could talk about anything” and “We each get to say what we want” were combined to form the tenet convergence. These means are represented in Table 4.7. The combined means were utilized to run crosstabs with other research variables (4.13).

**Table 4.7**

*Communication Accommodation*

	Mean	SD
Convergence	4.32	1.10
Accommodation/In group language	4.32	1.26
Nonaccommodation	3.74	1.05
Divergence	3.42	1.14

To determine Extension agents’/educators’ accommodation process when communicating with agricultural producers, the study used Communication Accommodation Theory to identify how agents/educators were adjusting their language. This adjustment could be converging to meet the needs of agricultural producers or diverging to acknowledge a knowledge gap between the agent/educator and producer. In an effort to identify how agents/educators adjusted their language when communicating with agricultural producers about crop production issues related to the changing climate, participants were asked to respond to producers’ emails seeking help on their winter wheat.

There were two email scenarios from different producers seeking different types of information from Extension agents/educators. From agents/educators email replies, major and minor emergent themes were identified for email one as seen in Table 4.8. Major themes were themes that appeared in the majority of the participants. The first email scenario was from a producer with little to no formal education, who only occasionally sought information from his local

Extension office, and was leery of change. In an email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used incorrect email format, improper grammar, and improper sentence structure. The second email scenario a producer who held a four year degree, frequently sought information from his local Extension office, and actively sought information on changing practices. In an email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used correct email format, proper grammar, and proper sentence structure.

In the qualitative data analysis, the only major emergent theme identified in email one was “Offer to Make a Site Visit” (Table 4.8). This theme appeared in 21 instances. In her email reply to the producer Jessica said, “Let’s meet at the field and we can discuss the topic further.” Adrain had a similar response at the closing of his email reply, “I would like to come out and make a site visit at a time that is convenient for you.” Julia offered to speak with the producer and his neighbor (the producer referred to his neighbor in the email scenario), “I would like to visit with you and your neighbor and look at the wheat as it is in the field so that we can discuss your concerns and options. Please let me know what days and times work best for you.” Minor themes determined from the email replies were “Identify Aphids and Economic Thresholds” (n = 19), “Refer to a Specialist” (n = 16), “Use Wheat to Graze or Hay Cattle” (n = 14), “Extended Growing Periods” (n = 8), “Agents/Educators had Specific Questions for the Producers” (n = 6), “No need for Concern” (n = 6), “Environmental Conditions” (n = 6), “Provided or Attached

Additional Information” (n = 4), and “Out of Agents’/Educators’ Area of Expertise” (n = 3)

(Table 4.8).

**Table 4.8**

*Emergent Themes from Email One*

Theme	Examples of Responses	No. of Responses in Category
Offer to Make a Site Visit	I can look at it with you, come visit the field, let’s meet at the field, I’ll give you a call, give me a call with your availability	21
Identify Aphids and Economic Thresholds	Identify pest to determine treatment, identify kind of aphid, aphid management practices, threshold of aphids, economic threshold	19
Referred to a Specialist	Give me time to check with wheat specialist, invite entomologist to field, I did check with our climatologist – Mary Knapp, I have forwarded your email to our Crop Production Agent	16
Use Wheat to Graze or Hay Cattle	Grazing wheat in the fall or spring, many local producers have grazed their wheat, flash graze, cut for hay,	14
Extended Growing Periods	Planting dates are getting pushed back, warm mild winter, unseasonably warm fall	8
Agents/Educators had Specific Questions for the Producers	Planting dates, fertilizer program, herbicide application, used this variety in the past	6
No need for concern	No need for concern, not much that can be done, I would not worry	6
Environmental Conditions	Available soil moisture, weather changes drastically, late freeze is possible, drought related stress	6
Provided or attached additional information	You can follow this link, I’ll gladly forward that to you, I have attached a Wheat Production Handbook	4
Out of Agents’/Educators’ Area of Expertise	I can’t answer your question as I’m the horticulturist, I am not covering crops, not very familiar with wheat protocols	3

Using a modified four variable communication accommodation scale (Kwon, 2012) researchers were able to determine adjustment by agents/educators for email scenario one (Table 4.9).

Variables in this scale were comfort , realism, respect, and understanding. Participants were able to select their response based on a 1 to 7 scale that varied for each variable. For the variable comfort, the scale ranged from 1 = not very comfortable to 7 = very comfortable.

Agents/educators combined mean was 5.23 (SD = 1.60), 5 = somewhat comfortable, for their comfort level in answering the producer's email. For the variable realistic, the scale ranged from 1 = not very realistic to 7= very realistic. The combined mean for how realistic the email scenario was 5.07 (SD = 1.50), 5 = somewhat realistic. For the variable respectful, the scale ranged from 1 = strongly agree to 7 = strongly disagree. The combined mean for how respectful the agents/educators perceived the producer to be was 3.59 (SD = 1.98), 3 = somewhat agree to 4 = neither agree or disagree. . For the variable understand, the scale ranged from 1 = understood completely to 7 = didn't understand at all. The combined mean for agents'/educators' understanding of what the producer was asking them was 3.11 (SD = 1.57), 3 = somewhat understood. An independent t-test was run and there were no significant differences for the variables comfort, realism, realism, respect, and understand between Kansas and Oklahoma for email one.

**Table 4.9***Follow-up Questions for Email Scenario One*

	Kansas (n = 27)		Oklahoma (n = 17)	
	Mean	SD	Mean	SD
Respectful	6.00	.83	5.53	.80
Understand	5.70	.99	5.24	.83
Comfortable	5.52	1.50	4.76	1.68
Realistic	5.19	1.60	4.88	1.36

From agents/educators email replies, emergent themes were identified for email two (Table 4.10). There were no major emergent themes identified in email two. Minor themes were “Offer to Make a Site Visit” (n = 14), “Refer to Specialist” (n = 12), “Check Source of Study Referred to in Email Scenario” (n = 10), “Weather Forecasts are Predictions” (n = 9), “Warmer Temperatures Affect Winter Wheat Development” (n = 8), “Extended Growing Periods” (n = 8), “Manage Climate Changes” (n = 8), “Environmental Conditions” (n = 7), “Referred to Weather Sources of Information” (n = 6), “No Need for Concern” (n = 5), “Provided or Attached Additional Information” (n = 4), “Weather vs. Climate” (n = 4), “Climate Change is Debated” (n = 4), “Use Wheat to Graze or Hay Cattle” (n = 3), and “Climate Change is Happening” (n = 3). The theme “Weather vs. Climate” only appeared in the Kansas data. The themes “Managing Climate Changes” and “Use Wheat to Graze or Hay Cattle” only appeared in the Oklahoma data.

**Table 4.10***Emergent Themes from Email Two*

Theme	Example of Responses	No. of Responses in Category
Offer to Make a Site Visit	I can head out to your field, I'd like to make a site visit, let's get together, let's make an appointment	14
Refer to Specialist	Consult area or state wheat specialist, SW area agronomist, state climatologist, our climate folks	12
Check Source of Study Referred to in Email Scenario	Share the source, check validity, where did you find it, I'll look into it	10
Weather Forecasts are Predictions	Hard to predict, we all know what can happen to a long range weather forecast, changes daily, predictions for the future are just that, predictions	9
Warmer Temperatures Affect Winter Wheat Development	Look at neighboring states to the south to see changes they have made, can and will affect yield, heat stress, necrosis, degree day accumulation	8
Extended Growing Periods	Planting date, variety selection, maturity, look at neighboring states to the south, plant later in approved planting window	8
<sup>b</sup> Managing Climate Changes	Choose management practices based on experience, look at neighboring states to the south, anticipation, degree days accumulation, act on personal results	8
Environmental Conditions	Environmental conditions, weather's effect on crop growth, moisture, heat, growing conditions	7
Referred to Weather Sources of Information	Consult Mesonet site, KSU Weather Lab, NOAA forecasts, state climatologist	6
No Need for Concern	Crop looks healthy to me, I would not be concerned based on articles, I hadn't heard about the rising temperature, excellent yield potential	5
Provided or Attached Additional Information	Enclosing fact sheet, attached her comments and a chart, the last producer was watching aphids so keep an eye out	4
<sup>a</sup> Weather vs. Climate	Year to year changes is weather differences, over time you can see effects of climate change, short and long term effects, won't see drastic changes in our lifetimes	4
Climate Change is Debated	Much debate about the topic, I am not convinced those points are accurate, I'll leave it to the people already doing that, normal weather cycle or impacts from humans	4

**Table 4.10**

Continued from page 76

<sup>b</sup> Use Wheat to Graze or Hay Cattle	Dual purpose wheat, bale wheat, high protein feed or sale as hay	3
Climate Change is Happening	Climate is now warmer than it once was, climate change is occurring, we have been experiencing a warmer climate	3

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 a = Theme only appeared in Kansas data

b = Theme only appeared in Oklahoma data

Using a modified four variable communication accommodation scale (Kwon, 2012), researchers were able to determine adjustment by agents/educators for email scenario two (Table 4.11).

Variables in this scale were comfort level, realism, respect, and understanding. Participants were able to select their response based on a 1 to 7 scale that varied for each variable. For the variable comfort, the scale ranged from 1 = not very comfortable to 7 = very comfortable.

Agents/educators combined mean was 4.42 (SD = 1.55), 4 = comfortable or uncomfortable in answering the producer's email. For the variable realistic, the scale ranged from 1 = not very realistic to 7 = very realistic. The combined mean for how realistic the email scenario was 4.37 (SD = 1.60), 4 = neither realistic or unrealistic. For the variable respectful, the scale ranged from 1 = strongly agree to 7 = strongly disagree. The combined mean for how respectful the agents/educators perceived the producer to be was 3.84 (SD = 1.88), 3 = somewhat agree to 4 = neither agree or disagree. For the variable understand, the scale ranged from 1 = understood completely to 7 = didn't understand at all. The combined mean for agents'/educators' understanding of what the producer was asking them was 3.55 (SD = 1.55), 3 = somewhat understood to 4 = neither understood or didn't understand. An independent t-test was run and the variable realistic was significantly different in email scenario two between Kansas and Oklahoma.



**Table 4.11***Follow-up Questions for Email Scenario Two*

	Kansas (n = 23)		Oklahoma (n = 15)	
	Mean	SD	Mean	SD
Respectful	5.65	.935	5.60	.910
Understand	5.26	.964	5.33	.976
Realistic*	4.26	1.89	5.53	1.06
Comfortable	4.22	1.73	4.73	1.22

\* Significant at the  $p < .05$  level between Kansas and Oklahoma

In order to run crosstabs and compare the data based on communication accommodation email one follow-up responses from Kansas and Oklahoma were combined (Table 4.12). The same was done for email two. T-test were run to determine significant differences. The mean difference between states for the variable “Respectful” was significant at the  $p < .001$  level. The variables “Understand”, “Comfortable”, “Realistic” were significant different at the  $p < .01$  level (Table 4.12).

**Table 4.12***Comparing States’ Communication Adjustment for Combined Emails One and Two*

	Email 1 (n = 38)		Email 2 (n = 38)	
	Mean	SD	Mean	SD
Respectful**	5.79	.843	5.63	.913
Understand*	5.24	.950	5.29	.956
Comfortable*	5.13	1.65	4.42	1.55
Realistic*	5.03	1.46	4.37	1.60

\*Significant at the  $p < .01$  level

\*\*Significant at the  $p < .001$  level

The background variable was ran against the combined variables of the interpersonal communication satisfaction inventory scale, nonaccommodation, accommodation, convergence, and divergence (Table 4.13). None of the variables were statistically significant. There were weak correlations between each of the variables.

**Table 4.13**

*Comparison of Agent/Educator Background and Communication Satisfaction Scale*

	R	R <sup>2</sup>
Nonaccommodation	.21	.21
Accommodation	-.17	.34
Convergence	-.12	.47
Divergence	.18	.30

The background variable was also run against emails one and two separately (Table 4.14). For email one, the background variable had very little correlation with the accommodation follow-up questions and there were no significant differences. For email two, the background variable had weak correlations with the accommodation follow-up questions and there were no significant differences.

**Table 4.14**

*Comparison of Agent/Educator Background and Follow-up Questions for Emails One and Two*

	Email 1		Email 2	
	r	R <sup>2</sup>	r	R <sup>2</sup>
Realistic	.11	.51	.05	.79
Comfortable	-.13	.45	.03	.87
Respect	-.02	.89	-.03	.85
Understanding	.25	.13	.07	.66

After email one was analyzed for emergent themes, it was then analyzed for specific tenets of Communication Accommodation Theory (Table 4.15). A major theme identified was “Accommodation”. Alec’s email below is a good example of accommodation,

Mr. Doe,

First i would like to come out and show you a sampling method to determine the threshold of aphids in you wheat field. This can help in showing how bad your aphid problem is and determine if a herbicide is your best option. As far as your wheat being to large for the time of year i would like to know which variety you planted and what time of year you planted it. You can follow this link to learn more on how to sample the field pods.[dasnr.okstate.edu/docushare/dsweb/Get/Document.../CR-7191.pd](http://dasnr.okstate.edu/docushare/dsweb/Get/Document.../CR-7191.pd)

Just give me a call or send me back an email with a time that you could meet.  
XXX\*XXX\*XXXX

Thanks,

John was more specific in his reply, “The correct answer to this question is that it depends.” He then described a few different scenarios to the producer. John was also careful not to create a knowledge gap between himself and the producer describing in detail the process of vernalization, “Winter wheat requires a vernalization period. You might ask what is that? Vernalization is a requirement of some period of cold in order to flower...” Jordan worked to establish rapport with the producer, “John, It’s good to hear from you again!”

Another major theme identified was “Hospitality”. Joshua was hospitable, “I would be happy to come out and look at the field, or invite our Entomologist out. We could help you identify if the problem needs treatment.” Alec indicated this theme by, “First i would like to come out and show you a sampling method to determine the threshold of aphids in you wheat field. This can help in showing how bad your aphid problem is and determine if a herbicide is your best option.” Jose offered to provide additional information in his email reply, “Research done in our area has

shown a link between planting date and disease pressure, If you would like, I would be glad to forward that to you.” Minor themes included “Grammar Errors” (n = 15), “Credibility (n = 13), “Nonaccommodation” (n = 12), “Limited/Reluctant Accommodation” (n = 12), “Friendly, Passionate Tone” (n = 11), “Convergence” (n = 11), “Group Identity” (n = 7), “Dismissive Tone” (n = 7), “Divergence” (n = 5), and “Terminology” (n = 3). The minor themes “Friendly, Passionate Tone” and “Group Identity” were only present in the Kansas data.

After email two was coded for emergent themes, it was then recoded for specific tenets of Communication Accommodation Theory (Table 4.15). A major theme identified was “Accommodation”. Justin provided an example of accommodating the producer in his email reply,

John,

Thanks for contacting K-State Research and Extension with your wheat questions.

According to our KSU Weather lab, the predicted temperatures does appear to be on the rise for the next 6-8 weeks.

As you are aware, there are several factors that can affect the development of your wheat including moisture, fertility, disease development, insects along with environmental conditions.

So the first classic symptom of how the hot temperatures affect any plants including your wheat is the color and the condition of the leaves. Wilting may be the first noticeable condition along with a "bluish" tinge to the wheat is a sure sign of drought. The bottom leaves can then start yellowing and browning which is "mother nature's" way of coping with the environmental conditions.

If you would like me to come out and visit with you and look at the field, or if you have further questions, just let me know.

Thanks,

Joshua also demonstrated accommodation and indicated, “Let me know what I can do to help!”

Adam did not admit to knowing about the warming climate but did offer to check with more

credible sources leaving personal opinion out of his response, “I haven't heard that about the temperature. I will do some checking with our Mesonet people and see what they have to say.”

Minor themes were “Hospitality” (n = 19), “Nonaccommodation”, “Grammar Errors” (n = 17), “Credibility” (n = 12), “Reluctant/Limited Accommodation”, “Terminology” (n = 10), “Group Identity” (n = 9), “Convergence” (n = 8), “Dismissive Tone” (n = 7), “Divergence” (n = 7), and “Friendly, Passionate Tone”, (n = 5). The themes “Group Identity” and “Friendly, Passionate Tone” only appeared in the Kansas data.

**Table 4.15**

*Tenets of Communication Accommodation Emails One and Two*

Tenets of Accommodation	Example Responses	No. of Responses in Email One	No. of Responses in Email Two
Accommodation	Thanking producers for the email, proper email format, adequately answering the question, suggesting other problems, providing additional materials, explained materials, explained terminology	30	46
Nonaccommodation	Told the producer there was no need for concern, did not answer the producer’s question, did not answer all of the producer’s questions, improper email format	19	12
Hospitality	Offer to make a site visit, please let us know if we can be of further assistance, please let me know what I can do to help	19	23
Grammar Errors	Spelling, grammar, punctuation, sentence structure, improper use of quotations, shorthand, emphasis of words	17	15
Credibility	Consult area or state specialist, enclosed fact sheet, I’ll do some checking with Mesonet, according to KSU Weather Lab	12	13

**Table 4.15**

Continued from page 82

Limited/Reluctant Accommodation	Short answers, didn't provide additional information, offer to follow-up, pass off to the local agronomist in abrupt manner, asks the producer to call them, offers to get back to the producer next week	12	12
Terminology	Necrosis (die back), winter pending, nil, vernalize, global warming, climate change, ambient, El Nino, La Nina	10	3
<sup>a</sup> Group Identity	K-State Research and Extension, KSU Weather Lab, K-State Climatologist	9	7
Convergence	Made an effort to meet the producer at their knowledge level, explained in simple terms, offered to follow-up, thanked them for their concern	8	11
Dismissive Tone	You cannot prevent what is happening, I'll leave that to the people already doing it, I will get back with you next week, if you would like more information please contact me	7	7
Divergence	Did not meet the producer at their knowledge level, presented a knowledge gap, use of jargon or technical terminology, offered scientific resources but did not explain them in common terms to producer	7	5
<sup>a</sup> Friendly, Passionate Tone	Good question, thank you for reaching out, Good day, I'll call you and we can look at some options	5	11

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a = Theme only appeared in Kansas data

## Summary

This chapter contains the results of a mixed methods survey to determine how background and experience of agents/educators played a role in their responses to the agricultural producers.

Producers' preferred methods of communicating with agents/educators was also determined. The survey determined the amount of climate-change training agents/educators had received and their preferred method of attending training sessions. Kansas and Oklahoma Agriculture and Natural

Resource Agents'/Educators' communication adjustment when speaking with agricultural producers was also determined.

In addressing ROI, background and experience, the survey provided findings related to past and present involvement in agriculture, years of service, education level, and plans to further their education. The majority of participants selected 1 = strongly agree on the variables "Raised on a Farm/Ranch" (n = 28, 90.3%), "Participated in 4-H" (n = 26, 76.5%), and "Participated in FFA" (n = 28, 82.4%). All agents/educators that responded (n = 37, 100%) to the background question indicated they were an agricultural major in college. The responses for variable "Sold \$1,000 in Agricultural Products in FY2015" (n = 34) were split. Responses indicated 16 participants (48.5%) had sold \$1,000 in agricultural products and 17 participants (51.5%) did not. The amount of experience as an agents/educators ranged from less than 3 years to more than 31 years (n = 37).

A paired samples t-test was run between the variable background and the four identified tenets of communication accommodation in this study. There were weak correlations and no significant differences. A paired samples t-test was also run between the variable background and the four follow-up questions for emails one and two, separately. There were weak correlations and no significant differences.

The majority of agents/educators (n = 18, 97.3%) indicated they held a bachelor's, master's, or doctorate degree. One agent/educator selected an "Other" response and provided the answer,

“Bachelor’s + Certificate”. Agents/educators was asked if they had any plans to further their education (n = 35). The majority (n = 24, 68.6%) of participants do not intend to further their education. Some agents/educators intend to further their education online (n = 8, 22.9%) and some planned to further their education on-campus (n = 3, 6.8%).

In addressing RO2, how agents/educators are communicating, the study found agents/educators use a variety of channels, but the percent of usage for each channel varied. Email is the only channel where the range started at zero percent. Of the channels, telephone had a combined mean for Kansas and Oklahoma of 52.24% (SD = 13.91), email had a combined mean of 21.27% (16.43), office visits had a combined mean of 26.49% (SD = 13.92), on-farm visits had a combined mean of 5.17 (SD = 4.61).

Agents/educators were provided an open-ended question to add any thoughts or comments on conversations they are currently having with agricultural producers on climate change, climate-change adaptation, or climate-change impacts. The question was analyzed for emergent themes and there were no major themes to report. Minor themes were “Not having Climate Conversations”, “Varied Farmer Beliefs as Climate is an Evolving Management Practice”, “Answer Adaptation Questions without Saying Climate Change”, and “Leery of Climate Change”. The themes “Answer Adaptation Questions without Saying Climate Change” and “Leery of Climate Change” only appeared in the Kansas data.

In addressing RO3, climate-change information and preferred method of training, the majority of Kansas agents (n = 15, 65%) and Oklahoma educators (n = 10, 67%) indicated they had received



some form of climate-change information. If agents/educators indicated they had received climate-change information they were asked to provide years and types of information they received. Years of receiving this information ranged from 2008 to 2015 and types ranged from Extension in-service training to conferences. The top three preferred methods of attending training sessions were “Face to face at location other than land-grant university”, “Face to face at land-grant university”, and “Webinar”.

In addressing RO4, agents’/educators’ communication accommodation, the study strived to understand how agents/educators are adjusting their language when discussing climate change with agricultural producers. The study utilized a modified eight variable interpersonal communication satisfaction inventory scale. There were mean differences for the variables “I am very dissatisfied with these conversations”, “I do not enjoy these conversations”, “We each get to say what we want”, and “We talk about things I was not interested in” between Kansas and Oklahoma. The variable “Nothing was accomplished” was significantly different at the  $p < .05$  level between Kansas and Oklahoma.

The study also utilized two email scenarios which were analyzed for emergent themes, and tenets of Communication Accommodation Theory. For email scenario one, the major emergent theme identified was “Offer to Make a Site Visit”. There were nine minor emergent themes identified for email one. Major themes in email one for tenets of Communication Accommodation Theory was “Accommodation” and “Hospitality”. Ten minor themes were identified for tenets of Communication Accommodation Theory. For email scenario two, no major emergent themes were identified and 15 minor emergent were identified. A major theme in email two for tenets of

Communication Accommodation Theory was “Accommodation”. Eleven minor themes were identified for tenets of Communication Accommodation Theory. After each email scenario agents/educators were asked to complete a communication accommodation scale. Variables in this seven-point scale were comfort level, realism, respect, and understanding. For email scenario one, there were mean differences for all four variables between Kansas and Oklahoma but no significant differences. For email scenario two, three variables had similar means between Kansas and Oklahoma. For the fourth variable, “Realistic”, there was a significant difference between Kansas and Oklahoma. After determining the results between Kansas and Oklahoma on the communication accommodation scale, responses to the email scenarios for the states were combined to create one set of means for the fourth variable. There were significant differences between emails one and two for the variables “Realistic”, “Comfortable”, and “Understand” at the  $p < .01$  level. There was a significant difference between emails one and two for the variable “Respectful” at the  $p < .001$  level.

A paired samples t-test was run between the variable background and the four identified tenets of communication accommodation identified in the interpersonal communication satisfaction inventory scale. There were weak correlations and no significant differences. A paired samples t-test was also run between the variable background and the four follow-up questions for emails one and two, separately. There were weak correlations and no significant differences.

## Chapter 5 – Conclusion, Discussion, and Recommendations

The purpose of this study was to determine specific communication accommodations used by county agricultural and natural resource agents/educators when discussing complex scientific topics. The results of this study will be used to develop communication and education training for agents/educators so they can effectively address climate-change mitigation and adaptation practices with agricultural producers in Kansas and Oklahoma.

The following research objectives guided this study:

- **RO1:** Determine the background and experience of Extension agents/educators.
- **RO2:** Determine how Extension agents/educators are communicating on complex, scientific topics, like climate change, with agricultural producers.
- **RO3:** Determine what climate information agents/educators have received and their preferred method of receiving future training.
- **RO4:** Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers in their county or district.

Scientists have reached a consensus that the climate is changing (Intergovernmental Panel on Climate Change, 1990; U.S. National Climate Assessment, 2014), and the agricultural industry is expected to experience significant impacts that will affect the global food supply (Barros et al., 2014; Parry et al., 2007). The change in climate has been attributed to the large portions of greenhouse gases that have been trapped in the atmosphere since the Industrial Revolution (Field et al., 2014). These rising temperatures are predicted to impact the Great Plains by doubling the

average number of days over 100 degrees Fahrenheit in the northern region and tripling the number of days in the southern region. Rising temperatures are predicted to impact growing seasons and crop yields. Night-time temperatures are expected to rise which will impact crop germination, pollination, and increase crop vulnerability to pests and diseases. Increased temperatures has the potential to worsen drought-like conditions in southern Great Plains (U.S. National Climate Assessment, 2014) Spring and winter are expected to see an increase of heavy precipitation events by the midcentury on the Great Plains, especially in the northern region. The increased heavy precipitation has the potential to increase the soil water availability for crops but could also increase soil erosion and nutrient runoff (U.S. National Climate Assessment, 2014).

Extension is considered the largest form of adult education available globally (Seevers et al., 1997) and has been identified as a trusted source for climate-science information (Campbell Hibbs et al., 2014). Adult climate-change education is still lacking across the United States. There are currently no climate-change programs or trainings in place in Kansas or Oklahoma Extension (K-State Research and Extension, 2013; R. Taylor, personal communication, March 30, 2016).

Communication Accommodation Theory was used, quantitatively and qualitatively, to determine how agents/educators are adjusting their communication with agricultural producers when discussing scientific topics. An online survey was sent to 106 Agricultural and Natural Resource agents in Kansas and 75 Agricultural and Natural Resource educators in Oklahoma. There was a 25.47% (n = 27) response rate in Kansas and a 20% (n = 15) response rate in Oklahoma. The

conclusions, discussion, and recommendations to this research will be presented in the following chapter.

## **Conclusions**

**RO1: Determine the background and experience of Extension agents/educators.** The majority of participants indicated they were “Raised on a Farm/Ranch” (n = 28, 90.3%), “Participated in 4-H” (n = 26, 76.5%), “Participated in FFA” (n = 28, 82.4%), and had an “Agriculture Major” (n = 37, 100%) in college. Sixteen participants (48.5%) indicated they had sold \$1,000 in agricultural products in fiscal year 2015 and 17 participants (51.5%) indicated they did not. One participant (2.9%) indicated a neutral response to having sold \$1,000 in agricultural products. All the background variables’ means were combined to make one mean variable. The combined mean variable was used to run an independent t-test against other variables in this study to compare the effect of background.

Participants’ experience in the position of an agent /educator ranged from zero to 31+ years (n = 37). The average the amount of experience as an agent/educator was a range response of 9-14 years. In Kansas, 22 agents provided their education level and the majority (n = 15, 68.2%) held a bachelor’s degree. Six agents (27.3%) had their master’s degree and the remaining agent (4.5%) provided the other reply of “Bachelor’s + Certificate”. Of the respondents from Kansas, no agents had their doctoral degree. In Oklahoma, 15 educators provided their education level with the majority (n = 10, 66.7%) having their master’s degree. Of the remaining educators, four (26.7%) had a bachelor’s degree and one (6.7%) had a doctorate degree.

When asked if agents/educators had plans to further their education, responses ranged from “No” (n = 24, 68.6%), “Yes, Online” (n = 8, 22.9%), and “Yes, On-Campus” (n = 3, 6.8%). In Kansas, 21 agents responded and the majority (n = 14, 66.7%) indicated they had no plans to further their education. Five (23.8%) agents indicated they planned to further their education online and two (9.5%) agents planned to further their education on-campus. In Oklahoma, 14 educators responded to the question, and the majority (n = 10, 71.4%) indicated they had no plans to further their education. Three (21.4%) educators said they planned to further their education online and one educator (7.1%) planned to further their education on-campus.

**RO2: Determine how Extension agents/educators are communicating about complex topics, like climate change, with agricultural producers.** Agents and educators were asked to indicate the percent of time spent with each of the communication channels of telephone, email, and office visits. In Kansas, communication using the telephone ranged from 36% to 81% (n = 22). The mean for telephone communication was 51.64% with a median of 45% (SD = 14.03). Communication using email ranged from 0% to 40% (n = 22). The mean for email communication was 21% with a median of 20.50% (SD = 11.90). Communication during office visits ranged from 5% to 50% (n = 22). The mean for office visits was 27.36% with a median of 29% (SD = 12.83).

In Oklahoma, communication using the telephone ranged from 30% to 80% (n = 15). The mean for telephone communication was 53.13% and the median was 51% (SD = 14.15). Communication using email ranged from 0% to 61% (n = 15). The mean for email communication was 21.67% and the median was 20% (SD = 21.94). Communication during

office visits ranged from 4% to 60% (n=15). The mean for office visits was 25.20% with a median of 20% (SD = 15.76). Agents/educators were also asked how many on-farms visits they generally conducted in a month's time frame. In Kansas, the responses ranged from zero to 20 (n = 21), and in Oklahoma the responses ranged from zero to 15 (n =14). In Kansas, agents were completing a mean of 5.00 (median, 4.00, SD = 4.51) on-farm visits each month with four agents mentioning the number of visits depends on the season. In Oklahoma, educators were completing a mean of 5.43 (median = 4.00, SD = 4.93) on-farm visits each month with one educator mentioning the number of visits depends on the season. The combined mean for monthly on-farm visits for both states was 5.17 (median = 4.00, SD = 4.61).

Agents/educators were provided the opportunity, in an open-ended question, to add any thoughts or comments on conversations they are currently having with agricultural producers on climate change, climate-change adaptation, or climate-change impacts. This open-ended question was analyzed quantitatively for emergent themes. There were no major themes to report. Minor themes were “Not having Climate Conversations” (n = 9), “Varied Farmer Beliefs as Climate is an Evolving Management Practice” (n = 8), “Answer Adaptation Questions without Saying Climate Change” (n = 8), and “Leery of Climate Change” (n = 5). It should be noted that the themes “Answer Adaptation Questions without Saying Climate Change” and “Leery of Climate Change” only appeared in the Kansas data.

**RO3: Determine what climate information agents/educators have received and their preferred method of receiving future training.** In Kansas, of the 22 responses, 15 (68%) participants indicated they had received some form of climate information since becoming an

agent and seven (32%) indicated they had not. Of the 15 who indicated they had received information, 14 provided information about the type of information including reading various farm publications (n = 1), KSRE annual conference (n = 4), in-service training (n = 2), NC Climate Change Regional Group Conference (n = 1), Kansas Environmental Leadership program (n = 1), KSRE weather data library (n = 1), Ranch Management Workshops (n = 1), EDEN on-line trainings (n = 1), National Weather Service presenter (n = 1), and the Farmers' Almanac (n = 1). Years for receiving this information ranged from 2010-2015.

In Oklahoma, of the 15 responses, 10 (67%) participants indicated they had received some form of climate information since becoming an educator and five (33%) indicated they had not. Of the 10 who indicated they had received information, nine provided information about the type of information including USDA Conference and NRCS various horticulture shows (n = 1), Oklahoma Mesonet training (n = 3), No-Till Conference (n = 1), an online course from the University of Minnesota (n = 1), one-day Extension workshop on cattle and climate (n = 1), and the National Weather Service Center in Norman (n = 2). Years for receiving this information ranged from 2008-2015.

A paired samples t-test was run between, "How many years have you held a position as an Extension Educator?" and "Have you received any form of climate-change information since becoming an Extension agent/educator?" There was no correlation between these variables and no significance differences between the variables.



To determine agents/educators preferred method of attending training sessions, agents/educators were asked to select one option including “Face to face at land-grant university”, “Webinar”, “Online Class”, “Face to face at location other than land-grant university”, or “Other”. The majority (n = 15, 41.7%) of respondents indicated they would prefer to attend training sessions “Face to face at location other than land-grant university”. Ten respondents (22.7%) indicated they would prefer to attend training sessions “Face to face at the land-grant university”. Nine (25%) respondents indicated they would prefer a “Webinar” training and two (5.6%) respondents provided an “Other” response. The two respondents who selected the “Other” response included the answers, “No preference. All options have pros and cons” and “face to face is always good and it doesn’t have to be at the college but I don’t mind webinars for some subject training/updates”. No respondents indicated they would prefer a training session in the form of an online class.

**RO4: Determine Extension agents’/educators’ accommodation processes when communicating with agricultural producers.** An interpersonal communication satisfaction inventory scale was adapted from the works of Allman (1991) and Goodboy et al. (2009) to address this research. Four variables were transposed in analysis: “I am very dissatisfied with these conversations”, “I do not enjoy these conversations”, “Nothing was accomplished”, and “We talk about things I was not interested in”. An independent t-test run for all eight variables established in the interpersonal communication satisfaction inventory scale, found the variable “Nothing was accomplished” was significantly different from the others at the  $p < .05$  level.

In order to run crosstabs on tenets of Communication Accommodation Theory addressed in the interpersonal communication satisfaction inventory scale, the researcher established combined means for the variables convergence ( $M = 4.32$ ,  $SD = 1.10$ ), accommodation/in group language ( $M = 4.32$ ,  $SD = 1.26$ ), nonaccommodation ( $M = 3.74$ ,  $SD = 1.05$ ), and divergence ( $M = 3.42$ ,  $SD = 1.14$ ). The combined means were utilized to run crosstabs with other research variables.

To determine Extension agents'/educators' accommodation process when communicating with agricultural producers, the study used Communication Accommodation Theory to identify how agents/educators were adjusting their language. This adjustment could be converging to meet the needs of agricultural producers or diverging to acknowledge a knowledge gap between the agent/educator and producer. To identify how agents/educators adjust their language when communicating with agricultural producers about crop production issues related to the changing climate, participants were asked to respond to producers' emails seeking help on their winter wheat. From agents/educators email replies, major and minor emergent themes were identified for each email scenario. Major themes were themes that appeared in the majority of the participants' responses.

The first email scenario was from a producer with little to no formal education, who only occasionally sought information from his local Extension office, and was leery of change. In an email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used incorrect email format, improper grammar, and improper sentence structure. The only major emergent theme identified

was “Offer to Make a Site Visit”. This theme appeared in 21 instances. In her email reply to the producer Jessica said, “Let’s meet at the field and we can discuss the topic further.” Adrain had a similar response at the closing of his email reply, “I would like to come out and make a site visit at a time that is convenient for you.” Julia offered to speak with the producer and his neighbor, “I would like to visit with you and your neighbor and look at the wheat as it is in the field so that we can discuss your concerns and options. Please let me know what days and times work best for you.” Minor themes determined from the email replies were “Identify Aphids and Economic Thresholds” (n = 19), “Refer to a Specialist” (n = 16), “Use Wheat to Graze or Hay Cattle” (n = 14), “Extended Growing Periods” (n = 8), “Agents/Educators had Specific Questions for the Producers” (n = 6), “No need for Concern” (n = 6), “Environmental Conditions” (n = 6), “Provided or Attached Additional Information” (n = 4), and “Out of Agents’/Educators’ Area of Expertise” (n = 3).

After email one was analyzed for emergent themes it was then analyzed for specific tenets of Communication Accommodation Theory. Major themes identified were “Accommodation” and “Hospitality”. Content for the theme “Accommodation” included responses that thanked producer for their email, adequately answer the producer’s questions, and explained any attached materials. Content for the theme “Hospitality” included agent/educator responses that offered to make a site visit, offered to help identify pests, and offered to send additional information. Minor themes included “Nonaccommodation” (n = 19), “Grammar Errors” (n = 15), “Credibility” (n = 13), “Limited/Reluctant Accommodation” (n = 12), “Friendly, Passionate Tone” (n = 11), “Convergence” (n = 11), “Group Identity” (n = 7), “Dismissive Tone” (n = 7),

“Divergence” (n = 5), and “Terminology” (n = 3). The minor themes “Friendly, Passionate Tone”, and “Group Identity” were only present in the Kansas data.

Using a modified four variable communication accommodation scale (Kwon, 2012) researchers were able to determine communication adjustments by agents/educators for email scenario one. Variables in this scale were comfort level (1 = not very comfortable to 7 = very comfortable), realism (1 = not very realistic to 7 = very realistic), respectful (1 = strongly agree to 7 = strongly disagree), and understanding (1 = understood completely to 7 = didn't understand at all).

Agents/educators combined mean was 5.23 (SD = 1.60), 5 = somewhat comfortable, for their comfort level in answering the producer's email. The combined mean for how realistic the email scenario was 5.07 (SD = 1.50), 5 = somewhat realistic. The combined mean for how respectful the agents/educators perceived the producer to be was 3.59 (SD = 1.98), 3 = somewhat agree to 4 = neither agree or disagree. The combined mean for agents'/educators' understanding of what the producer was asking them was 3.11 (SD = 1.57), 3 = somewhat understood.

The second email scenario was from a producer who held a four year degree, frequently sought information from his local Extension office, and actively sought information on changing practices. In an email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used correct email format, proper grammar, and proper sentence structure.

Email two was analyzed for emergent themes and no themes were found in the majority of the responses. Minor themes were “Offer to Make a Site Visit” (n = 14), “Refer to Specialist” (n = 12), “Check Source of Study Referred to in Email Scenario” (n = 10), “Weather Forecasts are Predictions” (n = 9), “Warmer Temperatures Affect Winter Wheat Development” (n = 8), “Extended Growing Periods” (n = 8), “Manage Climate Changes” (n = 8), “Environmental Conditions” (n = 7), “Referred to Weather Sources of Information” (n = 6), “No Need for Concern” (n = 5), “Provided or Attached Additional Information” (n = 4), “Weather vs. Climate” (n = 4), “Climate Change is Debated” (n = 4), “Use Wheat to Graze or Hay Cattle” (n = 3), and “Climate Change is Happening” (n = 3). The theme “Weather vs. Climate” only appeared in the Kansas data. The themes “Managing Climate Changes” and “Use Wheat to Graze or Hay Cattle” only appeared in the Oklahoma data.

After email two was analyzed for emergent themes, it was then analyzed for specific tenets of Communication Accommodation Theory. The only major theme identified was “Accommodation”. Content in the theme “Accommodation” highlights agents/educators who adequately addressed the producer’s concerns. These agents/educators used proper email format, suggested various solutions, and explained any terminology. Minor themes were Hospitality” (n = 19), “Grammar Errors” (n = 17), “Nonaccommodation” (n = 12), “Credibility” (n = 12), “Reluctant/Limited Accommodation”, “Terminology” (n = 10), “Group Identity” (n = 9), “Convergence” (n = 8), “Dismissive Tone” (n = 7), “Divergence” (n = 7), and “Friendly, Passionate Tone”, (n = 5). The themes “Group Identity” and “Friendly, Passionate Tone” only appeared in the Kansas data.

Using a modified four variable communication accommodation scale (Kwon, 2012) researchers were able to determine communication adjustment by agents/educators for email scenario two. Variables in this scale were comfort, realism, respect, and understanding. The means of these variables from the follow-up questions to emails one and two were combined for an overall mean. Agents'/educators' combined mean was 4.42 (SD = 1.55), 4 = neither comfortable or uncomfortable, for their comfort level in answering the producer's email. The combined mean for how realistic the email scenario was 4.37 (SD = 1.60), neither realistic or unrealistic. The combined mean for how respectful the agents/educators perceived the producer to be was 3.84 (SD = 1.88), 3 = somewhat agree to 4 = neither agree or disagree. The combined mean for agents'/educators' understanding of what the producer was asking them was 3.55 (SD = 1.55), 3 = somewhat understood to 4 = neither understood or didn't understand. These combined means were then used to run an independent t-test for email one between Kansas and Oklahoma. There were mean differences for the variables "Respectful", "Comfortable", and "Realistic". However, there were no statistical differences between the states for email one. The same process was used for the same set of variables asked after email two. There was a mean difference for the variable "Realistic" for email two between Kansas and Oklahoma. There was also a statistical difference at the  $p < .05$  level between the states for the variable realistic.

In order to run crosstabs and compare the data based on communication accommodation, email one from Kansas and Oklahoma was combined. The same was done for email two. The variable "Respectful" was significantly different at the  $p < .001$  level between emails one and two. The variables "Understand", "Comfortable", and "Realistic" were significantly different at the  $p < .01$  level between emails one and two.

The combined mean variable for background was used to run an independent t-test with communication accommodation variables: nonaccommodation, accommodation, convergence, and divergence, associated with the interpersonal communication satisfaction inventory scale. There were weak correlations and no significant differences when comparing these variables. The background variable was also ran against the follow-up questions related to realism, comfort level, respect, and understanding for email scenarios one and two. The tests were run independently. There were weak correlations and no significant differences.

## **Discussion**

### **RO1: Determine the background and experience of Extension agents/educators.**

*Experience.* The background and experiences of Extension agents/educators were not significantly related to the way they responded to the accommodation, interpersonal, and background scales in this survey. Participants' ages ranged from 22 years of age to 65 years of age. The majority (n = 24, 66.7%) of participants were male and the remaining 12 participants (n = 33.3%) were female. This finding is similar to Becerra et al.'s (2015) study of 226 Kansas and Oklahoma Extension agents/educators which found the majority (n = 149, 65%) of the participants were male.

The majority of participants in the study specialized in livestock (n = 28), crops, (n = 26), lawn and garden/horticulture/pest management (n = 25), or natural resources/environment/ecology (n = 24) which fits the parameters of this study. Although it should be noted many horticulture

agents identified they did not feel comfortable addressing the winter wheat development questions in the email scenarios. It should also be noted that based on the number of replies several agents picked more than one area of specialty. This is not an unusual discovery as agents are expected to be capable of covering a broad range of subjects (Rasmussen, 1989).

This study found the amount of experience as an Extension agent/educator ranged from zero to 31+ years; the average was nine to 14 years of experience. It is not surprising that the amount of agent/educator experience is low because of the noticeable turnover rate in Extension across the United States. This turnover has been attributed to low job satisfaction on account of working evenings, weekends, and frequent travel (Strong & Harder, 2009). It was an interesting find that 15 of the respondents were over the age of 50 and a majority of those (n = 13) were male. There were six agents/educators under the age of 30 and all were females. This might indicate that Extension is transitioning for an older male agent/educator population to a younger female population.

This study found the majority of Kansas agents (n = 15, 68.2%) held a bachelor's degree and six (27.3%) held a master's degree. In Oklahoma, the majority of educators had their master's degree (n = 10, 66.7%) and one educator (6.7%) held a doctorate degree. The majority (n = 24, 68.6%) of agents/educators in this study have no plans to further their education. This data is similar to Alexander's (2007) study on K-State Research and Extension (n = 241) which found 88 agents (36.5%) held a master's degree. Of the 88 agents with a master's degree, 51 agents completed their master's before becoming employed by K-State Research and Extension. This finding is consistent with responses in this study which indicates agents/educators do not plan to



further their education. However, this finding is more significant for Kansas agents since the majority held a bachelor's degree where as in Oklahoma the majority of educators were found to hold a master's degree. Agents and educators may not plan to further their education for several reasons. The biggest reason is that further education is not required to apply for a position as an Extension agent or educator. Both states prefer a master's degree but it is not required. Other reasons include money and time commitment.

Eight agents/educators (22.9%) indicated they planned to further their education online. The majority of these agents (n =7, 87.5%) who were going to be working towards their master's degree, were under the age of 40 (n = 7, 87.5%), and had been in the position of an agent/educator for less than three years (n = 4, 50%). These agents/educators could be seeking to further their education online for an increase in pay. Three (6.8%) agents/educators planned to further their education on-campus. An interesting find in this study was of the three people returning to campus to continue their education, two were coming back to compete a doctorate degree. One was from Kansas had worked as an agent for less than three years, was 31 years old, and male. The other was from Oklahoma had worked as an educator for less than eight years, was 53, and female. The third respondent differed from the others and was a 24 year old female, who had been an agent for less than three years, and was going back to get her master's degree. Since a doctoral degree is not required for county Extension work, unless they are trying to reach administration, it can be assumed these agents/educators will be leaving Extension to seek employment elsewhere.

**Background.** The scale to determine agents'/educators' background in agriculture was researcher developed for this study. It was initially thought there would be correlations between an agent/educators background and how they answer accommodation scales in this study. Therefore, background was also provided in a similar seven point scale. However, this was not the case and the majority of participants indicated a 1 = strongly agree or 7 = strongly disagree to the background variables. Participants were asked to indicate on a scale of 1 = strongly agree to 7 = strongly disagree if they had been raised on a farm or ranch, participated in FFA, participated in 4-H, if they held an agriculture major, and if they had sold at least 1,000 dollars in agricultural products in the fiscal year 2015. The majority of agents/educators in this study were raised on a farm/ranch (n = 28, 90.3%), participated in 4-H (n = 26, 76.5%), participated in FFA (n = 28, 82.4%), and held a degree in agriculture (n = 37, 100%). Results indicated agents/educators have a strong background in agriculture, but only half of the participants were currently operating a farm or ranch. According to the United States Department of Agriculture Economic Research Service (2015) a farm is defined as, "any place from which \$1,000 or more of agricultural products, were produced and sold, or normally would have been sold, during the year" (para. 2). As for currently being involved in agriculture, only 16 (48.5%) agents/educators indicated they sold 1,000 dollars of agricultural products in the last year. Seventeen participants (51.5%) indicated that they had not sold 1,000 dollars of agricultural products. This is not a surprising find as most people are three generations removed from the family farm (USDA Secretary Tom Vilsack, 2014).

Additional explanations for why the seventeen respondents were not actively involved in production agriculture could have been due to high start-up costs and the availability of land in

their area. Agents/educators may perceive they don't have enough time to be efficiently involved in production agriculture.

**RO2: Determine how Extension agents/educators are communicating about complex topics, like climate change, with agricultural**

*Communication Channels.* To determine how agents/educators are communicating with producers, agents/educators provided the percent of time they spend on the telephone, email, and office visits. The mean for Kansas's percentage of time communicating on the telephone was 51.4% (SD = 14.03) and 53.13% (SD = 14.15) for Oklahoma. There were some differences between the states related to the emphasis placed on communicating with email. Email use ranged from 0% to 40% in Kansas and from 0% to 60% in Oklahoma. Although, both state's mean percentages were near 21%. Kansas's mean for email usage was 21% (SD = 11.90) and Oklahoma's mean was 21.67 (SD = 21.94). It is an interesting find that one Kansas agent and one Oklahoma educator are not using email at all to communicate with constituents. The Kansas agent was female, had zero to three years of experience, and was 23 years old. The Oklahoma educator was female, had four to eight years of experience, and was 22 years old. It could be agent/educators have not been in their position long enough to communicate via email with their producers and would prefer to have personal interactions. Agents/educators could also not be publishing their email address or providing it to producers. However, since the average age of farmers in Kansas and Oklahoma was almost 60 (United States Department of Agriculture, 2014) it could be producers are not comfortable using email as a communication channel. Office visits also had similar means in Kansas and Oklahoma. Kansas had a mean of 27.36% (SD = 12.83), and Oklahoma had a mean of 25.20% (SD = 15.76). These means indicated producers preferred

to contact agents/educators in order of telephone, office visits, and then email. A study of farmers found that they prefer to learn in a more hands-on, personal manner (Franz et al., 2010) which could be more indicative of why agents/educators spend more time on the telephone than communicating by email. A 2014 study of Extension agents found they only had moderate proficiency using communication technology (Lakai et al., 2014). This could account for agents'/educators' low use of email in this study as producers might prefer more personal methods of communicating.

A component of communicating with agricultural producers is the amount of on-farm visits being conducted by agents/educators each month. Both states are conducting a mean of five on-farm visits each month. It should be noted that five agents'/educators' responses were not included in this mean because they indicated the number of on-farm visits depends on the season but did not provide numeric values. The number of on-farm visits ranged from zero to 20 in Kansas and zero to 15 in Oklahoma. Only one agent in Kansas indicated they conduct zero on-farm visits. This agent specialized in horticulture, has been an agent for over 20 years, and was male. This agent may not be making on site visits since he specialized in horticulture, instead of crops and livestock. Maybe constituents are not requesting agents to look at their gardens and flower beds. In Oklahoma, only one educator indicated they conduct zero on-farm visits. This educator specialized in crops, livestock, horticulture, and farm management, had been an agent less than three years, and was a female. One could assume this educator is not making on-farm visits because they are not familiar with the local producers yet.

*Climate Conversations.* Agents/educators were provided the opportunity, in an open-ended question after completion of the email scenarios, to provide any additional thoughts or comments on climate conversations with agricultural producers. This data was analyzed qualitatively for emergent themes. No major themes were identified. This study recognized that both Kansas agents and Oklahoma educators were aware of farmers' varied beliefs in climate change, but only Kansas agents indicated they were working to address climate issues in a tactful manner. Nine agents/educators indicated they are not having climate conversations, and five Kansas agents indicated they are leery of climate change. It could be agents/educators were not having these conversations and were leery of the topic because they don't have an understanding of the issues and concepts (James et al., 2014). A study of 226 Kansas and Oklahoma agents/educators found 61% believed climate change has been due to natural causes (Becerra et al., 2015). Scientists have proved human involvement, such as the Industrial Revolution, had contributed to climate change (Field et al., 2014). Another minor theme identified for this question were farmers' have varied beliefs because climate is an evolving management practice. Other studies have also recognized farmers' varied beliefs in climate and recommended that producers only be provided the information they are ready to accept (Morris et al., 2014). Kansas agents indicated they answer the farmers' questions without saying climate change. This could be because the majority (n = 226, 64%) of agents in Kansas and Oklahoma indicated in a previous study that they had little to no capacity to address climate-change issues with constituents (Becerra et al., 2015).

**RO3: Determine what climate information agents/educators have received and their preferred method of receiving future training.**

*Information Received.* The majority (n = 15, 68%) of Kansas agents indicated they had received some form of climate information in their role as an agent. A similar response was received from the majority (n = 10, 67%) of Oklahoma educators. The first year either state indicated they started receiving climate information was in 2008. Agents/educators in both states provided similar information as to where they received these trainings and responses ranged from conference speakers to external online courses. This was consistent with K-State Research and Extension's (2013) annual report which indicated that of the 643 educational events held in 2012 none were reported as climate-change training or programming. Kansas and Oklahoma Extension does not appear to be making climate change an important subject for agents/educators or a part of their programming. This could be due to a lack of administration or local Extension's belief in climate change or lack of pressure from constituents to provide information on the topic. Kansas Extension programming areas were controlled at the local level. Local Extension units' preferences for programming areas were made a priority for Kansas Extension, taking a bottom up approach to programming (G. Hadley, personal communication, April 8, 2016). In this instance it could be local Extension agents do not think climate-change programming should be implemented in Kansas. Oklahoma programming areas were controlled at the administration level. Administration establishes programming areas for local Extension units, taking a top down approach to programming (G. Hadley, personal communication, April 8, 2016). In this instance it could be Extension administration do not think climate-change programming should be implemented.

The reliability of the information received by agents/educators is unknown. One Kansas agent listed the Farmers' Almanac as a source for climate information. There was little association between years in the position of an agent/educator and having received some form of climate information. This find is not significant because according to Extension research, including this study, most agents have been in an agent/educator position for 20 years or less and 2008 is the first indication of receiving climate information. If the year for receiving climate information was more dated then there could be more association between the two variables. There was also no association between agents'/educators background and whether or no they had received climate information.

***Preferred Method of Receiving Training.*** When asked to indicate how agents/educators would prefer to attend future trainings 15, (41.7%) indicated face to face trainings at a location other than the land-grant university and nine (25%) indicated webinars were the preferred method. No agents/educators indicated they would like to take a class online and the researcher speculates this is because of the definitions provided. While it seemed logical agent/educators would know the difference, the researcher chose to provide definitions to set the variables apart. A webinar was described as interactive with both other peers and the teacher and an online class was not. This explanation could have swayed agents/educators away from the online class option, but it also indicates agents/educators are looking for interaction during trainings. The response webinars or online classes was expected as research showed spending nights and evenings away from family is one of the reasons for the turnover rate of Extension agents/educators (Strong & Harder, 2009) and it could be assumed agents/educators would not want to travel for training. Ten (22.7%) agents/educators indicated they preferred trainings face

to face at the land-grant university and two (5.6%) responded other saying all options have pros and cons. Like producers, this finding indicates that ten agents/educators would prefer personal interactions and hands-on learning.

**RO4: Determine Extension agents'/educators' accommodation processes when communicating with agricultural producers.**

*Agents' and Educators' Communication Satisfaction.* An interpersonal communication satisfaction inventory scale utilized in Allman's (1991) study on interpersonal relationships was modified for this study. The scale was used to understand how agents/educators are adjusting their communication patterns in interpersonal conversations with producers. The means for the variable "I am very dissatisfied with these conversations" was different for Kansas and Oklahoma. The Kansas mean for this variable lent itself to the answer, 4 = neither agree or disagree to 5 = somewhat disagree. The Oklahoma mean for this variable was somewhat agree. The study found that the variable, "Nothing was accomplished" was statistically significant at the  $p < .05$  level from the rest of the variables in this scale. Oklahoma educators indicated they are at least a little dissatisfied with climate conversations, such as the ones provided in the email scenarios. This could be because they don't feel capable of addressing climate issues as indicated in Becerra et al.'s (2015) study. There are currently no climate-change programs or trainings in place in Kansas or Oklahoma Extension (K-State Research and Extension, 2013; R. Taylor, personal communication, March 30, 2016).

Other differences between states included the variable "I do not enjoy these conversations. The Kansas response lent itself towards neither agree or disagree. The Oklahoma response lent itself



towards somewhat agree. Oklahoma educators did somewhat agree “We each got to say what they wanted” in climate-change conversations. While Kansas neither agreed or disagreed that both parties got to say what they wanted. There were no significant differences between all eight variables on the communication satisfaction scale. It is interesting that Oklahoma educators somewhat agreed that they do not enjoy these conversations but felt they each got to say what they wanted in the conversation. These results indicate agents/educators felt they could speak freely to producers about climate change, indicating personal beliefs from either party do not hamper the conversation. Each party was allowed to voice their opinion which indicates good interpersonal communication skills. Agents/educators may not enjoy climate conversations because they perceive they don’t have a good understand of the issue, don’t have good resources to refer to, or a local specialist to seek advice from.

The same situation applies to the final two variables with mean differences between states. The Kansas response for “I would like other conversations like these” indicated a mean response of somewhat disagree to neither agree or disagree. The Oklahoma responses indicated a mean of 4.33 (SD = 1.40), 4 = neither agree or disagree. For the final variable “We talk about things I was not interested in”, Kansas responses indicated a mean response of somewhat disagree to neither agree nor disagree. Oklahoma responses indicated a mean response of neither agree or disagree. Kansas agents indicated they are not looking for climate conversations, but if the conversations happen then there are parts of the conversation they do not find interesting. Overall, neither Kansas agents nor Oklahoma educators are looking for climate-change conversations with agricultural producers in their county, which is consistent with Extension not approaching the climate-change subject due to the varying ranges of beliefs. A study of Kansas and Oklahoma

agents (n = 226) found that 45% believed their mind could easily be changed on the subject of climate change, while 55% believed their mind would not be easily changed (Becerra et al., 2015).

*Email Scenario One Emergent Themes.* Agents/educators were asked to reply to an email scenario from a producer with little to no formal education, who only occasionally sought information from his local Extension office, and was leery of change. Addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used incorrect email format, improper grammar, and improper sentence structure.

The major theme identified in the responses to this scenario was offering to make a site visit. Agents/educators offered to make a site visit 21 times in their email replies to the producer. There were some agents/educators who never offered to make a site visit with producer. One of these agents/educators was the same agent who indicated they make zero on-farm visits. The Oklahoma educator who indicated they make zero on-farms visits did not reply to the email scenarios. The data showed these two participants were outliers in not making on-farm visits and not offering to make site visits. Agents/educators who indicated they only make one on-farm visit (n = 3) a month still offered to make a site visit in their reply to the email scenarios. These results indicate agents/educators are offering to make site visits because they are connected with the producers or they are being trained to do so. Agents/educators are communicating with producers one-on-one and establishing personal relationships.

There were nine minor themes found in agents'/educators' email reply to the producer. Agents/educators recommended producers identify the aphids and establish economic thresholds. They also recognized the extended growing periods that are happening across the United States. Both of these themes are important to note as they are components of the impacts of climate change. As the climate continues to change, so will the pest and disease pressures that on winter wheat and over crops. Due to warmer temperatures, the onset of pests could come earlier in the year (Barros et al., 2014). Warmer temperatures will benefit northern states by extending their growing seasons and allowing more crop variety. The warmer temperatures will negatively impact southern states' ability to grow certain crops (U.S. National Climate Assessment, 2014). Many agents/educators recognized these environmental conditions in their email response to the producer. Agents/educators identified soil moisture, drastic weather changes, and changing freeze or planting dates as environmental conditions that must be adapted to. Agents/educators also had specific questions for producers in order to determine planting dates, varieties planted, and other management programs. Agents/educators referred to a specialist in their email replies to the producer. Once again, since Kansas agents and Oklahoma educators were found to have little to no capacity to address climate issues with producers this is not a surprising find (Becerra et al., 2015). Another theme identified in the study was agents/educators admitting the email scenario was out of their area of expertise. This was consistent with Becerra et al.'s (2015) study which found Kansas agents and Oklahoma educators felt they had little to no capacity to address climate issues.

A recommendation provided by the agents/educators was to graze the wheat or cut it for hay. In

2015, Kansas planted 9,400,000 acres of winter wheat but only harvested 8,800,000 acres. Oklahoma producers planted 5,400,000 acres of winter wheat but only harvested 3,700,000 acres (United States Department of Agriculture National Statistics Service, 2015). The difference in acres planted and acres harvested could be crops lost due to warm winter temperatures, drought, or not taking the crop to grain and grazing it instead (United States Department of Agriculture National Agricultural Statistics Service Northern Plains Regional Field Office, 2015). Agents/educators were also willing to attach additional information for producers such as PDF handbooks on wheat, links for other resources, or offers to forward information received from specialists.

There were six instances where agents/educators did not find any of the above themes relevant to the producer and informed the producer there was nothing to be concerned about. One agent who expressed there was no need for concern dropped out of the survey after answering email one and the follow-up questions for email one. It should be noted that climate-change terminology was left out of these early questions. A plausible explanation was that he identified the scenario was discussing climate-change issues and left the survey or was busy and never made it back to the survey. Two other agents/educators who expressed there was no need for concern also indicated they do not want other conversations like the email scenarios, are dissatisfied with these conversations, and think nothing is accomplished in these conversations. These agents/educators do not believe in climate change and their email replies reflected their personal opinions. There was one outlier for expressing there was no need for concern. This educator indicated they enjoy climate conversations, feel like they can talk about anything, and think the

conversation flows smoothly. Research suggests this educator did not based his email reply off his own opinion of climate change but rather general knowledge of the crop.

***Email One Accommodation Scale.*** A four variable accommodation scale followed email scenario one. While there were no significant differences in the way Kansas and Oklahoma answered this scale, there were mean differences in the variables. For Kansas, the variable respectful was a mean response of disagree, and Oklahoma had a mean of response of somewhat disagree to disagree. The variable comfortable for Kansas was a mean response of somewhat uncomfortable to comfortable, and Oklahoma was a mean response of neither comfortable or uncomfortable to somewhat comfortable. The variable realistic for Kansas was a mean of somewhat realistic, and Oklahoma was a mean of neither realistic or unrealistic to somewhat realistic. Kansas and Oklahoma had similar means for understanding the email scenario. Both states indicated a range response of they understood a little to didn't understand what they producer was asking them. These results indicate that agents/educators do not think the producer was respectful, they felt slightly uncomfortable answering the email, thought the scenario was slightly unrealistic, and had some misunderstanding as to what the producer was asking them. It would be interesting to know why the agent/educator thought the producer was not being respectful. Agents/educators could feel uncomfortable answering the email because as they indicated earlier in the study email was their third communication choice out of three options. This scenario might have been more realistic to the agents/educators if the scenario was a producer calling or coming in for an office visit, since those were their first two communication choices. Agents/educators lack of understanding could be due to a lack of climate change or adaption knowledge. It could also be due to the lack of knowledge using email as a

communication source. Agents/educators might be misinterpreting the producer's respect level and the message.

***Email Scenario One Tenants of Accommodation.*** Email one was re-analyzed for tenets of Communication Accommodation Theory. A major theme was "Accommodation". There were 46 instances of agents/educators working to adequately address the producer's questions, suggesting solutions, and explaining attached materials. Another major theme was "Hospitality". There were 23 instances of agents/educators offering to make site visits, asking producers when meeting times are convenient for them, and offering to forward additional resources. This finding suggested agents/educators set aside their personal beliefs on climate change and tried to answer the producer's questions to the best of their ability.

A minor theme identified was nonaccommodation which appeared in 19 instances. This theme featured agents/educators told the producer there was no need for concern and used improper email format. It also suggests that agents/educators were unable to leave their personal beliefs out of the replies that were provided by telling the producer there was no need for climate or crop concerns. Since there was not a high understanding among agents/educators about what the producer was asking them it could also be that agents/educators did not have enough information to find concerns. Credibility was identified as a minor theme when agents/educators said they would refer to a specialist, referred to research, or mentioned other producers who had the same problem. Grammar errors were also identified as a minor theme. Agents/educators provided email replies with spelling errors and symbols and abbreviations in place of complete words. Double words, improper capitalization of proper nouns, symbols (@), and fragmented sentences

are all good examples of errors in the email replies to the producer. It was discovered earlier in this study that the mean for agents/educators using email was 21.27% (SD = 16.43) and was only preferred after telephone calls and office visits. Agents/educators could be uncomfortable using email as a form of communication or lack proper training using it. This could account for the 15 instances of grammatical errors. Limited/reluctant accommodation was identified as agents/educators who provided short, hasty answers, passed the email off to the local specialist, or asked the producer to call them on the telephone. These agents/educators may not have had the time to provide an adequate answer to this scenario, they may be lacking communication skills that are essential to their job, or they may not be comfortable with using email, as indicated earlier. It could also be that agents/educators answered improperly to meet the producer at his comfort level. Agents/educators were, knowingly or unknowingly, converging their communication to be accommodating for the producer.

Kansas agents provided more emails with instances of friendly, passionate tones than they did of emails with dismissive tones. Agents who had a friendly tone thanked the producer for their email, informed the producer they would be happy to help answer their question, and thanked them for attaching a picture. Agents/educators who had a dismissive tone disregarded the producer's questions telling them there was no need for worry or concern. These results indicate that Kansas agents were friendlier and more passionate about their work than Oklahoma agents. The researcher did not find an abundance of dismissive tone instances in Oklahoma's email replies but also did not find responses that fit the friendly, passionate tone theme.

Convergence was identified as instances where the agent/educator made every effort to meet the

producer at their knowledge level, thanked the producer for their concern, and offered to follow-up later. Divergence was identified as instances where the agent/educator used jargon, did not explain scientific resources, and created a knowledge gap. There were more instances of convergence than divergence in agents/educators email replies to producers. This indicates that some agents do have some communication training. However, another theme was terminology which indicated agents/educators are using terms such as vernalization, lodging, tillering, prostrate, and thresholds. Producers who do not have a formal education or only occasionally seek information from Extension (both were identified in the description of the producer before the scenario) may not be familiar with these terms.

Kansas agents established a group identity in their email replies to producers. In their email reply to the producer they included the names K-State Research and Extension, K-State, KSRE, and named Extension districts. It is an interesting find that Kansas agents identified their organization and Oklahoma agents did not. This could be because Kansas agents provided longer, more proper emails than Oklahoma did. There is also the possibility that Kansas receives more brand training than Oklahoma.

***Email Scenario Two Emergent Themes.*** The second email scenario a producer who held a four year degree, frequently sought information from his local Extension office, and actively sought information on changing practices. In an email addressing the local Extension agent/educator the producer presented a problem concerning his winter wheat. Asking for assistance the producer attached a picture of his wheat and provided a phone number as a point of contact. This producer used correct email format, proper grammar, and proper sentence



structure.

There were no themes that appeared in the majority of replies to email two. Offering to make a site visit was the minor theme with the highest number of instances (14). Agents/educators indicated this theme by offering to stop by the field, offering to meet the producer at the field, or arranging a time to meet to discuss the scenario. There were some agents/educators who never offered to make a site visit with the producer. One of these agents/educators was the same agent who indicated they make zero on-farm visits. The Oklahoma educator who indicated they make zero on-farms visits did not reply to the email scenarios. The data shows these two participants were outliers in not making on-farm visits and not offering to make site visits. Agents/educators who indicated they only make one on-farm visit ( $n = 3$ ) a month still offered to make a site visit in their reply to the email scenarios. These are the same agents/educators that were identified in response to email one. This finding suggested these agents/educators are not taking the preference of the producer into consideration and instead are doing what is easiest for themselves.

Agents/educators referred to a specialist in their email replies to the producer. Responses that indicated this theme was offering to invite out the entomologist for a site visit, checking with the state climatologist, and consulting the local specialist. As identified in email one, Kansas agents and Oklahoma educators were found to have little to no capacity to address climate issues with producers so this is not a surprising find (Becerra et al., 2015) . Agents/educators did offer to check the source of the study identified by the producer in his email. Agents/educators indicated they would look at the sources and determine if it was a valid source of information. This

suggests that agents/education understand how to tell a scholarly source from an unscholarly source and determine if information is valid. For Kansas agents this was an interesting find since the majority, (n = 15, 68.2%) held a bachelor's degree and their research experience might have been limited. The majority of Oklahoma agents (n = 10, 66.7%) indicated they hold a master's degree which leads the researcher to assume they had stronger research experiences.

Weather forecasts were identified as predictions. Agents/educators indicated weather is hard to predict, that the weather forecasts usually change daily, and predications are not a guarantee.

This indicated agents/educators understand the differences between weather and climate.

Weather is the behavior of the atmosphere at any given moment and climate is major variations of wind, precipitation, temperature, etc. that occurs over several decades (Tomlinson et al., 2015). Their knowledge of weather and climate could have helped agents/educators identify the rest of the minor themes. Kansas agents highlighted the differences between weather and climate in their email replies. They mentioned the year-to-year changes in weather differences, the long term and short term effects of climate, and that the producer will not see the effects of climate change in his or her lifetime. Once again this indicated agents have an understanding of the differences between weather and climate. Agents/educators also referred to weather sources of information in their email replies. They referred to the Mesonet, the KSU weather lab, NOAA forecasts, and the state climatologist. This indicated agents/educators are utilizing trusted resources that are readily available to them. It also indicated agents/educators were exposed to climate information through these sources. Agents/educators did not list these sources when asked where they have received climate information from. This probably was because the question was framed more towards training scenarios. It should also be noted that the Southern

Plains Regional Climate Hub, the United States Department of Agriculture, U.S. National Climate Assessment, or the IPCC reports were not provided as sources agents/educators have received climate –change information from. Agents/educators indicated that they have several local resources available to them and provided adequate knowledge to answer the producer’s question. Becerra et al.'s (2015) study indicated Kansas agents and Oklahoma educators perceived themselves to not be capable knowledgeably handling climate conversations. This study found that agents/educators do have the background knowledge needed to address climate change issues but are unwilling to do so because of their comfort level on the topic.

Agents/educators identified that the warmer temperatures are affecting the winter wheat development. They suggested that producers look at southern states to learn how to adapt to these temperatures. Agents/educators provided adaptation options for producers instead of addressing the causes of temperature changes. This was consistent with Morris et al.'s (2014) recommendation to provide local adaption solutions to those who are willing to have climate conversations.

Extended growing periods were also identified as a minor theme. Agents/educators acknowledged that planting dates, seed variety, and the time to maturity are a factor for extended growing periods. They also identified environmental conditions as a theme. Agents/educators mentioned things such as growing conditions, environmental conditions, and the weather’s effect on crop growth. Oklahoma educators indicated that the producer should look to manage the upcoming climate changes. They indicated this by telling the producer to anticipate the increased average number of days over 100 degrees, look to the southern states as examples, and

act on personal results they were getting in their fields. These environmental conditions are similar to the projections of Barros et al. (2014) and the U.S. National Climate Assessment (2014) as highlighted in the literature review.

Agents/educators were willing to provide additional information to the producer about his concerns. They enclosed fact sheets, offered to forward him additional materials, and voiced similar concerns other producers are having. This information was about adapting to the changes in their production such as new planting dates, varieties, and fact sheets to determine economic thresholds. Nobody offered to provide materials on climate change. This suggested agents/educators do not have these fact sheets readily available to them or they are not confident using them.

Similar to email one, some agents/educators indicated to the producer that there is no need for concern. These agent/educators told the producer that his crops look healthy with excellent yield potential and that he should not be concerned based on the article's information. One agent and one educator expressed there was no need for concern in both emails one and two. The agent and educator indicated they did not want other conversations like the email scenarios, are dissatisfied with these conversations, and think nothing is accomplished in these conversations. The background of these agents varied too much to draw any conclusions about how their background played a role in their reply, but it should be noted that two of the agents/educators did specialize in crops and livestock. It could be speculated these agents/educator do not believe in climate change based on their nonaccommodating email reply.

Agents/educators also indicated that climate change is a debated topic. Very few agents/educators provided their opinion that climate change is a debated subject to the producer. This indicates not all agent/educators have the proper training needed to discuss climate change with agricultural producers or the ability to provide unbiased information. However, since K-State Research and Extension had not taken a public stance on climate change these agents were not wrong in providing knowledge to the best of their ability. There were agents/educators who indicated climate change has been happening to the producer. They explained the climate is now warmer than it once was. Based on literature which indicated scientists have reached a consensus that the climate is changing (Barros et al., 2014; Dasgupta et al., 2014; Edenhofer et al., 2014; Field et al., 2014; Intergovernmental Panel on Climate Change, 1990; Parry et al., 2007; Stocker et al., 2013), the majority of agents/educators would not appear to be providing biased information despite some popular opinions.

Oklahoma educators also indicated producers have the option to dual purpose their wheat by bailing it or grazing cattle. In email one, Kansas agents also indicated this theme, but they did not in email two. However, this is not a surprising to find since the difference between planted and harvested acres in Kansas is 600,000 and the difference in Oklahoma is 1,700,000 (United States Department of Agriculture National Statistics Service, 2015). This indicated that Oklahoma may not be taking all their wheat to grain and instead utilizing the wheat as forage.

***Email Scenario Two Accommodation Scale.*** A four variable accommodation scale followed email scenario one. While there was a significant difference ( $p < .05$ ) in the way Kansas and Oklahoma answered the variable realistic for email scenario two. There were no

mean differences between Kansas and Oklahoma for the rest of the variables of comfortable, respectful, and understanding. For the variable realistic, Kansas had a mean of 4.26 (SD = 1.89), 4 = neither realistic or unrealistic and Oklahoma had a mean of 5.53 (SD = 1.06), 5 = somewhat unrealistic. For the variable comfortable, Kansas had a mean of 4.22 (SD = 1.73) and Oklahoma had a mean of 4.73 (SD = 1.22), 4 = neither comfortable or uncomfortable. For the variable respectful, Kansas had a mean of 5.56 (SD = .94) and Oklahoma had a mean of 5.60 (SD = .91), 5 = somewhat disagree. For the variable understand, Kansas had a mean of 5.26 (SD = .96) and Oklahoma had a mean of 5.33 (SD = .98), 5 = understand a little.

Educators thought this scenario was slightly unrealistic. Agents/educators did not feel comfortable or uncomfortable answering the email scenario. They thought the producer was slightly disrespectful but indicated they did somewhat understand what the producer was asking them. These results are similar to email one. Once again, some of these results could be explained because of the use of email as a communication channel, which agents/educators are not frequently using to speak with producers according to other answers they provided in this study.

***Email Scenario Two Tenets of Accommodation.*** Email two was re-analyzed for tenets of Communication Accommodation Theory. A major theme was “Accommodation” which appeared in 30 instances. Agents/educators thanked producers for their email, used proper email format, and explained materials and terminology in their replies to the This major theme indicated agents/educators were mostly accommodating in the email responses to the producer and adequately answered the producers’ question.

There were eleven minor themes in email two. Hospitality was indicated when agents/educators offered to make a site visit or offered further assistance to the producer. Grammar errors in email two consisted of improper spelling, punctuation, sentence structure, and use of quotations. The amount of grammar errors in email two may be due to Extension agent/educators being tired of participating in the study, although the scenarios were early in the study. It should also be noted that grammar errors in reply to email could be considered accommodation since the producer used improper grammar when writing the email. However, in email two the producer used proper email format when writing his email, therefore, the agents/educators use of improper grammar should be considered nonaccommodation. Similar to email one, this could be because agents/educators only preferred email after telephone calls and office visits. Agents/educators could be uncomfortable using email as a form of communication or lack proper training. Nonaccommodation consisted of agents/educators who did not use proper email format and did not answer the producer's questions. Credibility was identified as consulting a specialist, enclosing fact sheets to support answers, or referring to trusted information sources such as the Mesonet or KSU weather lab. This indicated that agents/educators have access to reliable information about climate change. It also indicates they are providing factual information to producers.

Limited/reluctant accommodation was identified as short answers, no offers to follow-up, and offering to get back to the producer next week. While agents/educators did address the producer's question in some fashion, they lacked certain communication skills that would make the email more accommodating and friendly. Agents/educators are not expected to know all the

answers, but they are expected to adequately communicate that they will find the information and get back to the constituent as quickly as possible (Rasmussen, 1989).

Agents/educators used terminology that might need to be explained. Examples of terminology used in their email replies were Necrosis, vernalize, global warming, El Nino, and La Nina. This producer was educated with a four-year degree and more accepting of change, which could be why agents/educators included more terminology than in email one. However, it would seem agents/educators would need to explain their use of these terms in their replies.

Kansas agents established a group identity in their email replies. They used the names K-State Research and Extension, KSU Weather Lab, and K-State climatologist. This sense of identity is good for K-State Research and Extensions branding. Kansas agents also had a friendly, passionate tone in their email replies. They thanked the producer for his email, told him he had a good question, and offered to call him to talk over some options. While Oklahoma educators did not have a hostile tone, they did not make an effort to make the producer feel comfortable in their email replies. Oklahoma educators also did not provide any university branding in their email replies. These results may indicate a difference in Kansas and Oklahoma communication and branding trainings. It could also indicate a difference in the type of education each agent/educator received before working for Extension.

Convergence was identified when agents/educators made an effort to meet the producer at his knowledge level, explained in simple terms, and thanked the producer for his concern. These strategies are similar to climate-change communication literature which suggests only providing



information the producer is ready to accept (Morris et al., 2014). Divergence was identified when agents/educators did not meet the producer at their knowledge level creating a knowledge gap. This gap has the potential to make the producer feel uncomfortable and less likely to ask for assistance from Extension again. The agent/educator may have felt the producer, who had a high knowledge level, was testing their knowledge and created some divergence in this scenario.

Some agents/educators had a dismissive tone in their email replies. They told the producer he cannot prevent what is happening and that they would get back to him next week. This tone could discourage the producer from seeking further advice from Extension and indicates agents/educators need to work on their communication skills.

*Comparing States Accommodation for Combined Emails One and Two.* When comparing Kansas's and Oklahoma's combined email one to their combined email two accommodation scales, there were mean differences and significant differences. The variables "Understand", "Comfortable", and "Realistic" were significantly different at the  $p < .01$  level between emails one and two. The variable "Respectful" was significantly different at the  $p < .001$  level between emails one and two. Agents/educators somewhat disagreed that the producer was respectful, felt somewhat comfortable answering the email scenarios, that the scenarios were somewhat realistic, and understood at least a little of what the producer was asking them. It is unknown why agents/educators thought the producer was not respectful. The agents/educators lack of comfort in answering these questions could be based on their knowledge or based on the beliefs of the local producers. Once again, agents/educators may have felt these email scenarios were more realistic if they had been a telephone call or an office visit.

## Recommendations

*Recommendations for Practice.* Recommendations for future practice include providing communication and climate-change training to all agents/educators. Agents/educators indicated they have the knowledge to answer climate-change questions but did not exhibit proper communication skills for the complex topic. This recommendation is supported by Lakai et al.'s (2014) study of Extension agents which found agents were highly proficient in subject matter expertise. Extension administration should re-evaluate training and training strategies. Extension should move away from subject area expertise and shift towards training in areas such as communication.

Communication is a vital part of agents/educators daily tasks. Agents/educators need training on how to properly format an email and training on the importance of grammar for effective communication. The basic concepts of communication accommodation should be taught to agents/educators in an effort to make them understand how the producer feels. Training for both climate-change material and email communication should be offered in person and through the use of interactive webinars. Conducting these trainings could reduce the amount of misunderstandings between agents/educators and producers by improving communication skills and knowledge level. Agents/educators should be answering climate-change questions with confidence. They have the background and subject matter knowledge to provide producers with adequate adaptation methods and techniques. This study shows that proper training in Communication Accommodation Theory can help agents/educators communicate effectively with agricultural producers who are doubtful about climate change.

Agents/educators should continue to conduct on-farm visits. On-farm visits are vital to

interpersonal communication and are a valuable way to connect with agricultural producers. The average age of producers in Kansas and Oklahoma is nearing 60 (United States Department of Agriculture, 2014). These producers indicate they prefer to communicate in more personal ways than through email usage. As producers age, Extension should take steps to reach a younger audience and help more young people become involved in agriculture.

It is recommended that the Southern Plains Regional Climate Hub or any new climate organization work through an already established source of climate information.

Agents/educators in this study indicated a handful of sources they are getting information from, the majority was local sources or within Extension.

All agents/educators who participated in this study indicated they hold a degree in agriculture. This study recommends that climate information be taught in every major at the college level. This way agents/educators and producers have a greater understanding of climate before entering their profession. Climate-change education is currently lacking in the United States (Leiserowitz et al., 2011) but growing in K-12 education as states adopt new science standards (Next Generation Science Standards, n.d.). Next Generation Science Standards are currently being adopted across the United States and introduces weather and climate concepts in the third grade. When Extension implements climate-change programming, requiring advanced education for agents/educators in the programming will be essential to a successful program and agent development. While the majority of agent/educators showed they have the ability to address climate-change issues, this programming will be essential for those that indicated they did not have the ability to address climate-change issues in this study. This study also recommends that

all majors at the college level increase communication and email education so students are prepared for real world situations.

Branding guidelines should be discussed with agents/educators, especially in Oklahoma where no mention of university branding was provided in the email scenarios. Oklahoma should also work on addressing hospitality and establishing a friendly tone in their conversations with constituents. Doing so may bring about a higher comfort level when speaking with agricultural producers about scientific topics. Agents/educators should be willing to accept change. A study of Kansas and Oklahoma agents indicated that the majority (n = 226, 55%) would not easily change their beliefs on climate change. Extension agents/educators must be willing to adapt to current and pertinent topics. Extension administration should be devising a climate-change policy, which clearly states the organization's position on the topic. This information should be distributed to every agent/educator. Extension administrators must realize the information being demanded of agents/educators and provide resources, training, and mentors.

***Recommendations for Research.*** Future research in Extension should determine if agents/educators are receiving any training on email and how email use is recommended at the state level. This study determined that agents/educators are not currently receiving any formal type of climate-change training. Future research should look at the best methods for climate training for agents/educators. This will be an important step in educating agents/educators on the proper way to communicate about complex, scientific topics, like climate change.

Future research should also look at why agents/educators perceived the producer as disrespectful.

There are several factors that could have played a role in this decision such as communication channel and the subject climate change. Research should also look at ways to improve all of the scales utilized in this study, especially the background scale. In order to improve clarity, future research should look at ways to improve the understanding factor in the scenario. The background of agents/educators should be studied in more detail to understand why the majority are no longer directly involved in production agriculture. It should also be determined if the lack of participation in production agriculture is affecting their decisions as an agent/educator.

Future research should also conduct a similar study in the form of a telephone interview or a personal interview in the agents'/educators' office to see if different results are achieved. This study found that agents/educators are communicating with agricultural producers through telephone and personal visits more than through email. A larger study should also be conducted, including different states, to determine if similar results are found across the United States.

***Recommendations for Theory.*** This study was adapted from research not relating to agriculture. Previous studies have looked at how an authoritative figure interacts with the public. This study took a reverse look, studying how the public, agricultural producers, interact with authoritative figures, agents/educators. Future research should look at ways to apply this research to new audiences. The scales utilized in this study worked on the major variables but the scales can be improved for future research.

There are many elements of Communication Accommodation Theory that were not able to be tested in this email scenario. A personal interview would allow researchers to study the body

language of agents/educators and how producers might perceive these actions. Future research should look for ways to improve the qualitative analysis of written work for tenets of Communication Accommodation Theory.

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## Appendix A - Survey

A Changing Climate: A Review of the Communication and Training of County Extension in Kansas and Oklahoma

### Consent Form

An exploration of the accommodation and communication methods of agricultural Extension agents/educators in Kansas and Oklahoma related to complex scientific topics.

Hello,

I am a graduate student at Kansas State University working towards my master's degree in Agricultural Education and Communications. I am conducting research to identify agricultural and natural resource agents'/educators' accommodation process for communication with agricultural producers when discussing complex scientific topics, like climate science information.

There are no expected risks to participate in this study. If you decide to take part in this study, you will be asked to reply in email format to two producers who have questions about winter wheat growth along with some follow-up questions.

It is estimated this survey will take 25 minutes. Your answers will be anonymous and no personally identifiable information will be asked. You may withdraw from the survey at any time without penalty.

I know your time is valuable and appreciate your assistance with this research. The results of this research will be used to build on future training and communication tactics for Extension agents/educators as you work with agricultural producers.

The principle investigator for this study is Dr. Lauri Baker. Her contact information is 785-532-1140 or [lbaker@ksu.edu](mailto:lbaker@ksu.edu). The contact for the institution review board is Rick Scheidt. His contact information is 785-532-3224 or [rscheidt@ksu.edu](mailto:rscheidt@ksu.edu).

If you have any questions about this study please contact me, Katie Rohling, at 620-778-4616 or katie26@ksu.edu.

Do you agree to continue with this study? By selecting yes, you are giving your consent to participate in the study and will proceed to the survey questions.

- Yes
- No

If No Is Selected, Then Skip To End of Survey

**Q1:**

The following email scenario is about an issue a local producer is having with his winter wheat. Following this scenario, you will be asked to respond to the producer's email as you actually would along with other follow-up questions.

A local agricultural producer in your county, who occasionally seeks information about farming practices at your Extension office, has emailed you seeking information. This producer is leery of change and rarely seeks information outside of other farmers and yourself. This producer received little to no formal education after high school because he started working full-time on the family farm.

---

Mr. Smith,

I own an 80 that is beside my neighbor's. Both fields are planted with wheat. The wheat seems large for this time of year. Aphids are eating on my wheat every time I check on it. No matter what time of day it is. The weather this year seems unseasonably warm. Should I be concerned about how big the wheat is growing before the winter? I talked to my neighbor. He doesn't know anything either. Said he used XXX variety of wheat too this year and planted around the same time. I tried to attach a picture of my wheat stand in this email. Give me a call if you think of something 555-789-4561. John Doe





**Q1:**

Please write your email reply to the producer, in Scenario 1, in the space below.

**Q2:** How realistic do you think this situation is?

1 Not very realistic	2	3	4	5	6	7 Very Realistic
----------------------	---	---	---	---	---	------------------

**Q3:** After reading the producer's email, how comfortable are you with having this conversation?

1 Not very comfortable	2	3	4	5	6	7 Very comfortable
------------------------	---	---	---	---	---	--------------------

After reading the producer's email, how much do you agree or disagree with the following statement.  
The producer was respectful.

**Q4:**

1 Strongly agree	2	3	4	5	6	7 Strongly disagree
------------------	---	---	---	---	---	---------------------

**Q5:** After reading the producer's email, did you understand what the producer was asking you?

1 Understood completely	2	3	4	5	6	7 Didn't understand at all
-------------------------	---	---	---	---	---	----------------------------

**Q6:**

The following email scenario is about an issue a local producer is having with his winter wheat. Following this scenario, you will be asked to respond to the producer's email as you actually would along with other follow-up questions.

A local agricultural producer in your county, who frequently seeks information about farming practices at your Extension office, has emailed you seeking information. This producer, being open to change, actively seeks information from national weather sites, land-grant universities, and government programs. This producer received a four year degree from a land-grant university.

---

Mr. Smith,

I read an article in XXX agriculture publication I get weekly about how the number of days over 100 degrees is supposed to double (14 days) in the northern region and triple (21 days) in the southern region of the Great Plains. Is this true? The article stated that winter temperatures will also be increasing, which could affect my wheat development and its end yield. I took a quick picture of my current wheat stand. How do I tell if these temperatures are affecting my wheat? And how do I prevent it?

Billy Jones

788-951-9632



**Q6:**

Please write your email reply to the producer, in Scenario 2, in the space below.

**Q7:** How realistic do you think this situation is?

1 Not very realistic	2	3	4	5	6	7 Very Realistic
----------------------	---	---	---	---	---	------------------

**Q8:** After reading the producer's email, how comfortable are you with having this conversation?

1 Not very comfortable	2	3	4	5	6	7 Very comfortable
------------------------	---	---	---	---	---	--------------------

**Q9:** After reading the producer's email, how much do you agree or disagree with the following statement.  
The producer was respectful.

1 Strongly agree	2	3	4	5	6	7 Strongly disagree
------------------	---	---	---	---	---	---------------------

**Q10:** After reading the producer's email, did you understand what the producer was asking you?

1 Understood completely	2	3	4	5	6	7 Didn't understand at all
-------------------------	---	---	---	---	---	----------------------------

**Q11:**

Reflecting on general conversations with wheat producers that involve climate change adaptation and impacts, tell us how much the following statements describe your feelings.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Nothing is accomplished	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like other conversations like these	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very dissatisfied with the conversations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not enjoy the conversations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I could talk about anything	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We each get to say what we want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The conversation flows smoothly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We talk about things I was not interested in	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q12:**

Is there anything else you would like to share about conversations with producers over climate change adaption and impacts?

**Q13:**

Use the sliding bars below to indicate the percentage of how producers contact you with questions. Your answer must total 100.

	0	10	20	30	40	50	60	70	80	90	100	
Telephone	<input type="text"/>										0	
Email	<input type="text"/>										0	
Office Visits	<input type="text"/>										0	
<b>Total:</b>											<b>0</b>	

**Q14:**

How many times a month do you generally conduct on-farm visits?

**Q15:**

What are your areas of specialty?

	Please indicate if you specialize in these areas by selecting yes or no for each option.	
	Yes	No
4-H Youth Development	<input type="radio"/>	<input type="radio"/>
Community / Rural Development	<input type="radio"/>	<input type="radio"/>
Crops	<input type="radio"/>	<input type="radio"/>
Livestock	<input type="radio"/>	<input type="radio"/>
Nutrition / Food Safety / Health	<input type="radio"/>	<input type="radio"/>
Family / Family Development / Consumer Sciences	<input type="radio"/>	<input type="radio"/>
Lawn & Garden / Horticulture / Pest Management	<input type="radio"/>	<input type="radio"/>
Natural Resources / Environment / Ecology	<input type="radio"/>	<input type="radio"/>
Weather	<input type="radio"/>	<input type="radio"/>
Farm Management	<input type="radio"/>	<input type="radio"/>
Adult Development & Aging	<input type="radio"/>	<input type="radio"/>
Biological & Agricultural Engineering	<input type="radio"/>	<input type="radio"/>

**Q16:**

What is your preferred method of attending training sessions?

- Face to face at land-grant university
- Webinar - presentation on Internet, allowing participants in different locations to see and hear the presenter and other classmates, ask questions, and answer polls
- Online Class - course delivered electronically using the Internet. Little to no face communication. Student questions are asked through email/inbox format
- Face to face at location other than the land-grant university
- Other \_\_\_\_\_

**Q17:**

Have you received any form of climate-change information since becoming an Extension agent/educator?

- Yes
- No

If, Have you received any form of climate-change training since becoming an Extension agent?,  
Yes is selected:

**Q18:**

Please tell the year(s) you received this information, where or how you received the information,  
and the organization that shared it.



**Q19:**

What is your highest level of completed education

- Bachelor's Degree
- Master's Degree
- Doctorate Degree
- Other \_\_\_\_\_

**Q20:**

Do you have any plans to further your education?

- Yes, Online
- Yes, On-Campus
- No

**Q21:**

Do you have a background in agriculture? Select all that apply.

	1 Agree	2	3	4	5	6	7 Disagree
Raised on farming/ranching operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participated in 4-H	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participated in FFA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agriculture major in college	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sold 1,000 dollars or more in agricultural products in the 2015 fiscal year	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q22:**

How many years have you held a position as an Extension agent/educator?

- 0-3 years
- 4-8 years
- 9-14 years
- 15-20 years
- 21-30 years
- 31 + years

**Q23:**

What state do you work in?

- Kansas
- Oklahoma

**Q24:**

What is your age

**Q25:**

Please indicate your gender.

- Male
- Female

## **Debriefing Statement**

Thank you for completing this survey! Your replies are valuable and completely confidential. Information you provided will be used to determine if agricultural and natural resource agents/educators adjust their language and/or actions when speaking about complex scientific issues, such as climate change with agricultural producers. Results of this study will be used to make recommendations for future training and communication tactics of Extension agents.

Thank you for your time,

Katie

Katie Rohling

Graduate Student

Kansas State University

katie26@ksu.edu

620-778-4616


## Appendix B - Institutional Review Board Approval

**KANSAS STATE**  
**UNIVERSITY**

University Research Compliance Office

TO: Lauri Baker  
Communication & Ag. Ed.  
Umberger Hall

Proposal Number: 8081

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 1/22/2016

RE: Proposal Entitled, "A Changing Climate: A Review of the Accommodation and Communication Methods of Agricultural Extension Agents/Educators in Kansas, Oklahoma, and Texas"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR §46.101, paragraph b, category: 2, subsection: II.

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

**ADMINISTRATIVE INFORMATION:**

Title of Project/Course:

Type of Application:  New / Renewal  Revision (to a pending new application)  
 (check one box)  Modification to an existing approved application #:

Principal Investigator Details: (must be a KSU faculty member):

Name:  Degree/Title:

Department:  Campus Phone:

Campus Address:

E-mail:  Fax #:

Responsible Graduate Student: (Person to contact for questions/problems with the form):

Name:  Campus Phone:

E-mail:

Does this project involve any collaborators not part of the faculty/staff at KSU? (projects with non-KSU collaborators may require additional coordination and approvals):

No  Yes

Project Classification (Is this project part of one of the following?):

Thesis  Dissertation  Faculty Research  
 Other:

*Note: Class Projects should use the short form application for class projects.*

Copy of the Consent Form:  Copy will be submitted to [comply@ksu.edu](mailto:comply@ksu.edu) with this application  Consent form not used

Funding Source:  Internal  External (Identify source. You will also need to provide a copy of the sponsor's grant application or contract as submitted to the funding agency. This should be submitted to [comply@ksu.edu](mailto:comply@ksu.edu) with your application.)

Based upon criteria found in 45 CFR 46 – and the overview of projects that may qualify for exemption explained at <http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html>, I believe that my project using human subjects should be determined by the IRB to be exempt from IRB review:

No  Yes (If yes, please provide the category of "Exemption" in the space below)

**Exempt Projects:** 45 CFR 46 identifies six categories of research involving human subjects that may be exempt from IRB review. The categories for exemption are listed here: <http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html#fc2>. If you believe that your project qualifies for exemption, please indicate which exemption category applies (1-6). Please remember that only the IRB can make the final determination whether a project is exempt from IRB review, or not.

Exemption Category:

**MODIFICATION:**

Is this a modification of an approved protocol?  No  Yes. If yes, please comply with the following:

If you are requesting a modification or a change to an IRB approved protocol, please provide a concise description of all of the changes that you are proposing in the following block. Additionally, please highlight or bold the proposed changes in the body of the protocol where appropriate, so that it is clearly discernible to the IRB reviewers what and where the proposed changes are. This will greatly help the committee and facilitate the review.

**I. NON-TECHNICAL SYNOPSIS** (Please provide a brief narrative description of proposal. This should typically be less than 75 words and be easily understood by nonscientists):

This study will utilize an online survey that will be emailed to all potential participants. Potential participants are agricultural and natural resource Extension agents/educators in Kansas, Oklahoma, and Texas. Participants will be asked to complete two scenarios with follow-up questions. Questions are related to how agents/educators accommodate their communication patterns when speaking with agricultural producers related to climate change and climate science. Questions will also be related to agents'/educators' preferred methods of communicating about climate change and climate science.

**II. BACKGROUND** (concise narrative review of the literature and basis for the study):

The significance of a changing climate on production agriculture affects producers', "tools and techniques to protect their bottom line and ensure the future food security of our nation" (United States Department of Agriculture, 2015, p. 1). The most significant impacts of a changing climate on the agricultural industry will be rising temperatures leading to drought, variability in rainfall events, and changes in seasonality (Field et al., 2014). If agriculture is to be largely impacted by the changing climate, as predicted in all of the Intergovernmental Panel on Climate Change's reports since 1990, there is concern for global food security (Edenhofer et al., 2014; Intergovernmental Panel on Climate Change, 1990). The Cooperative Extension Service has been identified as the correct vehicle to deliver climate-change information to Extension constituents (Hibbs et al., 2014; Morris, Megalos, Vuola, Adams, & Monroe, 2014). Extension has been identified as a trusted information source by both small and large agricultural producers during focus groups on climate in Kansas (Hibbs et al., 2014). Agricultural producers often turn to Extension agents/educators for information on how to adapt to adverse situations. Producers' willingness to recognize and implement adaptation and mitigation strategies depend upon their beliefs regarding climate change and their perceptions of climate change related risks (Arbuckle Jr. et al., 2014). It is important that agents/educators are prepared to discuss climate change and climate-science information with agricultural producers and do so in a way that producers understand. When Kansas and Oklahoma agents/educators were asked to assess their ability to address climate change with constituents, 64% reported low to no capacity. This suggests Extension agents/educators need formal training before addressing climate change with their constituents (Becerra et al., 2015). Extension agents'/educators' personal beliefs are a potential limitation to their providing climate-change information in their programs (Monroe, Plate, Adams, & Wojcik, 2014).

**III. PROJECT/STUDY DESCRIPTION**

(Please provide a concise narrative description of the proposed activity in terms that will allow the IRB or other interested parties to clearly understand what it is that you propose to do that involves human subjects. This description must be in enough detail so that IRB members can make an informed decision about the proposal).

By contacting the directors of agriculture and natural resource agents in Kansas, Oklahoma, and Texas researchers will compile a list of all agents'/educators' email addresses with job duties in this area. Participants will receive a link to the survey in an email asking them to participate. The first question of the survey will be a consent statement. After agreeing to the consent statement, participants will be asked to complete the survey questions. After completion of the survey, participants will be thanked for their time and provided a debriefing statement.

**IV. OBJECTIVE**

(Briefly state the objective of the research – what you hope to learn from the study).

To determine the accommodation and preferred communication methods of agriculture and natural resource Extension agents when discussing climate change and climate science with agricultural producers.

**V. DESIGN AND PROCEDURES** (succinctly outline formal plan for study)

A. List all sites where this research will be conducted:

Kansas State University Manhattan, Kansas and online across Kansas, Oklahoma, and Texas

- B. Variables to be studied: Agents'/educators' language accommodation  
Agents'/educators' preferred methods of communicating
- C. Data collection methods: (surveys, instruments, etc - copies must submitted to [comply@k-state.edu](mailto:comply@k-state.edu)).  
The survey to be used for this study is attached.
- D. List any factors that might lead to a subject dropping out or withdrawing from a study. These might include, but are not limited to emotional or physical stress, pain, inconvenience, etc.  
Time to participate
- E. List all biological samples taken: (if any)  
N/A
- F. Debriefing procedures for participants:  
After completing the last question on the survey, participants will be thanked for their time and help. Researchers will explain how the information provided by the agents/educators will help future development of tools and methods to communicate climate-science information with agricultural producers in their area. Results will serve as background information and a starting point for researchers as they develop these tools and methods.

**VI. RESEARCH SUBJECTS:**

- A. Source:  
Agricultural and natural resources Extension agents/educators in Kansas, Oklahoma, and Texas
- B. Number: (provide a brief rationale for your sample size)  
1,000
- C. Inclusion criteria: (List any unique qualifiers desirable for research subject participation)  
Any Extension agent in Kansas, Oklahoma, or Texas holding any amount of job duties in the area of agricultural and natural resources
- D. Exclusion criteria: (list any unique disqualifiers for research subject participation)  
Any Extension agent/educator in Kansas, Oklahoma, or Texas that does not hold any amount of job duties in the area of agricultural and natural resources
- E. Recruitment procedures:  
How will subjects be identified?  
Subjects will be identified by contacting the director of agriculture and natural resource agents/educators in Kansas, Oklahoma, and Texas.  
How will subjects be recruited (advertisement, associates, etc.) ?  
Subjects will be asked for voluntary participation, with the knowledge that the information gathered will be used to provide them with better tools and methods for communicating climate-science information to agricultural producers  
How will subjects be enrolled?  
Subjects will be enrolled after providing their consent and participating in the survey.  
Describe any follow-up recruitment procedures: (reminder emails, mailings, etc.)



Subjects will be sent three reminder emails. Once they participate in the survey they will be removed from the reminder email list.

**VII. RISK - PROTECTION - BENEFITS:** The answers for the three questions below are central to human subjects research. You must demonstrate a reasonable balance between anticipated risks to research participants, protection strategies, and anticipated benefits to participants or others.

**A. Risk for Subjects:** (check all that apply)

- Exposure to infectious diseases
- Use of confidential records
- Exposure to radiation
- Manipulation of psychological or social variables such as sensory deprivation, social isolation, psychological stressors
- Examining for personal or sensitive information in surveys or interviews
- Presentation of materials which subjects might consider sensitive, offensive, threatening, or degrading
- Invasion of privacy of subject or family
- Social or economic risk
- Risk associated with exercise or physical exertion
- Legal risk
- Review of medical records
- Review of criminal records
- HIV/AIDS or other STD's
- Employment/occupational risk
- Others – Please explain below (Indirect risks, risk to individuals who are not the primary subjects):

**B. Minimizing Risk:** (Describe specific measures used to minimize or protect subjects from anticipated risks.)

The survey is confidential and no personal information will be obtained.

**C. Benefits:** (Describe any reasonably expected benefits for research participants, a class of participants, or to society as a whole.)

The purpose of this survey is to gather information which will be used to provide Extension agents/educators with better tools and methods for communicating climate science information to agricultural producers.

**D. More than Minimal Risk?** In your opinion, does the research involve more than minimal risk to subjects? ("Minimal risk" means that "the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.")

- Yes             No

**VIII. CONFIDENTIALITY:** Confidentiality is the formal treatment of information that an individual has disclosed to you in a relationship of trust and with the expectation that it will not be divulged to others without permission in ways that are inconsistent with the understanding of the original disclosure. Consequently, it is your responsibility to protect information that you gather from human research subjects in a way that is consistent with your agreement with the volunteer and with their expectations.

Explain how you are going to protect confidentiality of research subjects and/or data or records. Include plans for maintaining records after completion.

All survey results will be kept confidential. All efforts will be made to ensure confidentiality of all participants. No personally identifiable information is asked in the survey. Records will be maintained on campus in the Department of Communications and Education for three years.

**IX. INFORMED CONSENT:** Informed consent is a critical component of human subjects research - it is your responsibility to make sure that any potential subject knows exactly what the project that you are planning is about, and what his/her potential role is. (There may be projects where some forms of "deception" of the subject is necessary for the execution of the study, but it must be carefully justified to and approved by the IRB). A schematic for determining when a waiver or alteration of informed consent may be considered by the IRB is found at <http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html#c10>

Even if your proposed activity does qualify for a waiver of informed consent, you must still provide potential participants with basic information that informs them of their rights as subjects, i.e. explanation that the project is research and the purpose of the research, length of study, study procedures, debriefing issues to include anticipated benefits, study and administrative contact information, confidentiality strategy, and the fact that participation is entirely voluntary and can be terminated at any time without penalty, etc. Even if your potential subjects are completely anonymous, you are obliged to provide them (and the IRB) with basic information about your project. See informed consent example on the URCO website. It is a federal requirement to maintain informed consent forms for 3 years after the study completion.

Answer the following questions about the informed consent procedures.

Yes  No A. Are you using a written informed consent form? If "yes," include a copy with this application. If "no" see B.

Yes  No B. In accordance with guidance in 45 CFR 46, I am requesting a waiver or alteration of informed consent elements (see section VIII above). If "yes," provide a basis and/or justification for your request.

This study will be conducted through an online survey. Researchers request permission to add a consent statement as the first question of the survey. If participants agree to the consent statement they will move on to finish the survey. If participants do not agree to the consent statement they will be thanked for their time and the survey will close.

Yes  No C. Are you using the online Consent Form Template provided by the URCO? If "no," does your Informed Consent document have all the minimum required elements of informed consent found in the Consent Form Template? (Please explain)

The online Consent Form Template was used to draft our consent statement. Please see the attached consent statement for verification.

Yes  No D. Are your research subjects anonymous? If they are anonymous, you will not have access to any information that will allow you to determine the identity of the research subjects in your study, or to link research data to a specific individual in any way. Anonymity is a powerful protection for potential research subjects. (An anonymous subject is one whose identity is unknown even to the researcher, or the data or information collected cannot be linked in any way to a specific person).

Yes     No

E. Are subjects debriefed about the purposes, consequences, and benefits of the research? Debriefing refers to a mechanism for informing the research subjects of the results or conclusions, after the data is collected and analyzed, and the study is over. (If "no" explain why.) Copy of debriefing statement to be utilized should be submitted to [comply@k-state.edu](mailto:comply@k-state.edu) with your application.

F. Describe the Informed Consent Process:

Who is obtaining the consent? (i.e. Principle Investigator, Graduate Student, etc.)

Graduate student. The first page of the survey indicates that by participating in the survey participants are giving their consent to participate in the study.

When and where will consent be obtained?

Before beginning the survey, the first page indicates that by participating in the survey participants are giving their consent to participate in the study.

If assent (for minors) is required, please describe who will obtain the assent? (Assent means a child's affirmative agreement to participate in research)

N/A

If assent (for minors) is required, when and where will assent be obtained?

N/A

How will consent be obtained from non-English speaking participants? (a translated written form, orally, identify the name and qualifications of the individual providing the translation)

N/A

**Informed Consent Checklist**

Items	YES	NO	N/A
Does the title appear at the top of the consent/assent form?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the consent/assent form written toward the subject?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a statement that explains that the study is <i>research</i> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a statement that explains the <i>purpose</i> of the research?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the procedures to be followed explained clearly and adequately?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the consent document describe <i>risks or discomforts</i> to subjects as a result of participating in the research?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the consent/assent form written in the <i>native language</i> of the potential subject?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are participants compensated?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
If the subjects' identity is known to the PI, does the form detail how confidentiality of records will be maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is contact information for both the PI and the URCO/IRB office included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the consent document indicate to the participant that he/she can withdraw at any time from the project without penalty or loss of benefit?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are there probable circumstances which would require the PI to terminate a subject's participation regardless of his or her consent?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is the consent document written in lay language (Recommended 8th grade level)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**X. PROJECT INFORMATION:** (If you answer Yes to any of the questions below, you should explain them in one of the paragraphs above)

- Yes  No A. Deception of subjects? If "YES" explain why this is necessary.
- 
- Yes  No B. Shock or other forms of punishment
- Yes  No C. Sexually explicit materials or questions about sexual orientation, sexual experience or sexual abuse
- Yes  No D. Handling of money or other valuable commodities
- Yes  No E. Extraction or use of blood, other bodily fluids, or tissues (if 'yes', you must comply with facility and handling protections detailed in the 5th Edition of the Biosafety in Biomedical Laboratories (BMBL))
- Yes  No F. Questions about any kind of illegal or illicit activity
- Yes  No G. Questions about protected health information as defined by HIPPA
- Yes  No H. Purposeful creation of anxiety
- Yes  No I. Any procedure that might be viewed as invasion of privacy
- Yes  No J. Physical exercise or stress
- Yes  No K. Administration of substances (food, drugs, etc.) to subjects
- Yes  No L. Any procedure that might place subjects at risk
- Yes  No M. Will there be any use of Radioactive materials and/or use of Radioactive producing machines
- Yes  No N. Any form of potential abuse; i.e., psychological, physical, sexual
- Yes  No O. Is there potential for the data from this project to be published in a journal, presented at a conference, etc?
- Yes  No P. Use of surveys or questionnaires for data collection. Copies should be submitted to [comply@k-state.edu](mailto:comply@k-state.edu) with your application.

**XI. SUBJECT INFORMATION:** (If you answer yes to any of the questions below, you should explain them in one of the paragraphs above)

- Yes  No a. Under 18 years of age (these subjects require parental or guardian consent)
- Yes  No b. Over 65 years of age
- Yes  No c. Minorities
- Yes  No d. Physically or mentally disabled
- Yes  No e. Economically or educationally disadvantaged
- Yes  No f. Unable to provide their own legal informed consent
- Yes  No g. Pregnant females as target population
- Yes  No h. Victims
- Yes  No i. Subjects in institutions (e.g., prisons, nursing homes, halfway houses)
- Yes  No j. Are subjects likely to be vulnerable to coercion or undue influence
- Yes  No k. Is this international research? If yes, provide details as to if OHRP regulations apply in or near the area you intend to conduct research or if you have contacted individuals for applicable regulations to human subject research.
- Yes  No l. Are research subjects in this activity students recruited from university classes or volunteer pools? If so, do you have a reasonable alternative(s) to participation as a research subject in your project, i.e., another activity such as writing or reading that would serve to protect students from unfair pressure or coercion to participate in this project? If you answered this question "Yes," explain any alternatives options for class credit for potential human subject volunteers in your study. (It is also important to remember that: Students must be free to choose not to participate in research that they have signed up for at any time without penalty. Communication of their decision can be conveyed in any manner, to include simply not showing up for the research.)

Yes  No m. Is audio from the subjects recorded? If yes, how do you plan to protect the recorded information and mitigate any additional risks?

Yes  No n. Are research subjects' images being recorded (video taped, digitally recorded, photographed)? If yes, how do you plan to protect the recorded information and mitigate any additional risks?

**XII. FDA ACTIVITIES:** Answer the following questions about potential FDA regulated activities:

- Yes  No a. Is this a Clinical Trial?
- Yes  No b. Are you using an FDA approved drug/device/diagnostic test?
- Yes  No c. Does this activity involve the use of FDA-Regulated products? (biological products, color additives, food additives, human drugs, etc.)
- Yes  No d. Has the protocol been submitted to the FDA, or are there plans to submit it to the FDA?
- Yes  No e. Have you submitted an FDA form 3454 or 3455 (conflict of interest)?

**XIII. CONFLICT OF INTEREST:** Concerns have been growing that financial interests in research may threaten the safety and rights of human research subjects. Financial interests are not in them selves prohibited and may well be appropriate and legitimate. Not all financial interests cause Conflict of Interest (COI) or harm to human subjects. However, to the extent that financial interests may affect the welfare of human subjects in research, IRB's, institutions, and investigators must consider what actions regarding financial interests may be necessary to protect human subjects. Please answer the following questions:

- Yes  No a. Do you or the institution have any proprietary interest in a potential product of this research, including patents, trademarks, copyrights, or licensing agreements?
- Yes  No b. Do you have an equity interest in the research sponsor (publicly held or a non-publicly held company)?
- Yes  No c. Do you receive significant payments of other sorts, eg., grants, equipment, retainers for consultation and/or honoraria from the sponsor of this research?
- Yes  No d. Do you receive payment per participant or incentive payments?
- e. If you answered yes to any of the above questions, please provide adequate explanatory information so the IRB can assess any potential COI indicated above.

The sponsor of this research, the United States Department of Agriculture, is funding this project and another in our department. The grant supports an assistant and associate professor and two graduate students, including the graduate student whose thesis work is this research. The grant is attached to this application.

**XIV. PROJECT COLLABORATORS:**

A. KSU Collaborators: List anyone affiliated with KSU who is collecting or analyzing data: (list all collaborators on the project, including co-principal investigators, undergraduate and graduate students).

Name:	Department:	Campus Phone:	Campus E-mail:
Dr. Lauri Baker	Department of Communications and Education	785-532-1140	lbaker@ksu.edu
Dr. Peter Tomlinson	Department of Agronomy	785-532-3198	ptomlin@ksu.edu
Dr. Gregg Hadley	K-State Research and Extension Agriculture and Natural Resources	785-532-5838	ghadley@ksu.edu
Katie Rohling	Department of Communications and Education	785-532-1138	katie26@ksu.edu
Cassie Wandersee	Department of Communications and Education	785-532-1138	wands@ksu.edu

Brooke Harshaw	Department of Communications and Education	785-532-1138	bharshaw2911@ksu.edu
Lana Berkman	Department of Agronomy	785-532-3354	lanasunn@ksu.edu
Add Row		Delete Row	

B. **Non-KSU Collaborators:** List all collaborators on your human subjects research project not affiliated with KSU in the spaces below. KSU has negotiated an Assurance with the Office for Human Research Protections (OHRP), the federal office responsible for oversight of research involving human subjects.

Name:	Organization:	Phone:	Institutional E-mail:
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Add Row		Delete Row	

C. **Does your non-KSU collaborator's organization have an Assurance with OHRP?** (for Federawide Assurance listings of other institutions, please reference the OHRP website under Assurance Information at: <http://ohrp.cit.nih.gov/search>).

Yes  No If yes, Collaborator's FWA #

Is your non-KSU collaborator's IRB reviewing this proposal?

Yes  No If yes, IRB approval #

**XV. IRB Training:**

A. **The URCO must have a copy of the Unaffiliated Investigator Agreement on file for each non-KSU collaborator who is not covered by their own IRB and assurance with OHRP. When research involving human subjects includes collaborators who are not employees or agents of KSU the activities of those unaffiliated individuals may be covered under the KSU Assurance only in accordance with a formal, written agreement of commitment to relevant human subject protection policies and IRB oversight. The Unaffiliated Investigators Agreement can be found and downloaded at <http://www.k-state.edu/research/comply/irb/forms>**

Online Training**\*TRAINING REQUIREMENTS HAVE RECENTLY CHANGED\***

The IRB has mandatory training requirements prior to protocol approval. Training is now offered through the Collaborative Institutional Training Initiative (CITI) Program. Instructions for registration and access to training are on the URCO website <http://www.k-state.edu/research/comply/>.

Use the check boxes below to select the training courses that apply to this application. If you have any questions about training, contact URCO at [comply@ksu.edu](mailto:comply@ksu.edu), or (785) 532-3224.

Mandatory Training**Required for all Principal Investigators, research staff and students**

- Responsible Conduct of Research  
 IRB core modules

**Required (Provost-mandated) for all full-time K-State employees**

- Export Compliance

**Required procedure-specific training (check all that apply to this protocol):**

- Students in Research (check if students are listed as personnel on this protocol)  International Research  
 Research in Public Elementary and Secondary Schools  Research with Children  Research with Prisoners  
 Internet Research  Vulnerable Subjects - Research Involving Workers/Employees  
 Research with Subjects with Physical Disabilities and Impairments  Illegal Activities or Undocument Status in Human Research  
 Gender and Sexuality Diversity in Human Research  Research with human blood, body fluids, or tissues  
 Research with Older Adults

All new personnel or personnel with expired training are required to register for CITI and take the new training requirements. If you previously completed online IRB modules, your training status will remain current until it expires. URCO will verify training from the previous system as well as the new system prior to approval of any protocol.

## INVESTIGATOR ASSURANCE FOR RESEARCH INVOLVING HUMAN SUBJECTS

(Print this page separately because it requires a signature by the PI)

P.I. Name: Dr. Lauri Baker

Title of Project: A Changing Climate: A Review of the Accommodation and Communication Methods of Agricultural Extension Agents/Educators in Kansas, Oklahoma, and Texas

**XVI. ASSURANCES:** As the Principal Investigator on this protocol, I provide assurances for the following:

- A. **Research Involving Human Subjects:** This project will be performed in the manner described in this proposal, and in accordance with the Federalwide Assurance FWA00000865 approved for Kansas State University available at <http://www.hhs.gov/ohrp/assurances/forms/filasurt.html>, applicable laws, regulations, and guidelines. Any proposed deviation or modification from the procedures detailed herein must be submitted to the IRB, and be approved by the Committee for Research Involving Human Subjects (IRB) prior to implementation.
- B. **Training:** I assure that all personnel working with human subjects described in this protocol are technically competent for the role described for them, and have completed the required IRB training accessed via the URCO website at: <http://www.k-state.edu/research/comply/irb/training>. I understand that no proposals will receive final IRB approval until the URCO has documentation of completion of training by all appropriate personnel.
- C. **Extramural Funding:** If funded by an extramural source, I assure that this application accurately reflects all procedures involving human subjects as described in the grant/contract proposal to the funding agency. I also assure that I will notify the IRB/URCO, the KSU PreAward Services, and the funding/contract entity if there are modifications or changes made to the protocol after the initial submission to the funding agency.
- D. **Study Duration:** I understand that it is the responsibility of the Committee for Research Involving Human Subjects (IRB) to perform continuing reviews of human subjects research as necessary. I also understand that as continuing reviews are conducted, it is my responsibility to provide timely and accurate review or update information when requested, to include notification of the IRB/URCO when my study is changed or completed.
- E. **Conflict of Interest:** I assure that I have accurately described (in this application) any potential Conflict of Interest that my collaborators, the University, or I may have in association with this proposed research activity.
- F. **Adverse Event Reporting:** I assure that I will promptly report to the IRB / URCO any unanticipated problems involving risks to subjects or others that involve the protocol as approved. Unanticipated or Adverse Event Form is located on the URCO website at: <http://www.k-state.edu/research/comply/irh/forms>. In the case of a serious event, the Unanticipated or Adverse Events Form may follow a phone call or email contact with the URCO.
- G. **Accuracy:** I assure that the information herein provided to the Committee for Human Subjects Research is to the best of my knowledge complete and accurate.

 1/12/15  
(Principal Investigator Signature) (Date)