

EQUIPPING YOUTH WITH AGRIPRENEURSHIP  
AND OTHER VALUABLE LIFE SKILLS BY LINKING  
SECONDARY AGRICULTURAL EDUCATION TO  
COMMUNITIES FOR IMPROVED LIVELIHOODS: A  
COMPARATIVE ANALYSIS OF PROJECT-BASED  
LEARNING IN UGANDA

By

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Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
DOCTOR OF PHILOSOPHY  
July, 2017

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## ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my committee chair and advisor Dr. M. Craig Edwards for the mentorship, resources, and professional development that he has provided me for the past six years of graduate school. Dr. Edwards has taught me the value of scholarship and has tirelessly guided me to improve on my writing and growth in academia. He has provided me opportunities to attend and become a member of professional development associations such as the Association for International Agricultural and Extension Education (AIAEE) that have inspired my academic journey. A special thank you to my committee members Dr. Craig E. Watters, Dr. Shane Robinson, and Dr. Jon W. Ramsey for the guidance, valuable feedback and support that you provided me during the time I was writing my dissertation. Without your input I don't think this would have been possible. Thank you all for believing in me.

In addition, I would like to thank my department head Dr. Rob Terry, Jr. for investing in me financially and making sure I had the resources to conduct my research. To my fellow graduate students in the Department of Agricultural Education, Communications, and Leadership at Oklahoma State University thank you for your support, especially my officemate José M. Uscanga. José you have been a true brother to me and we started this journey together. Thank you for being part of my academic journey.

To my research assistants in Uganda and facilitators, Mr. James Isooba, Andrew Gawuse, Rebecca Mukembo, Victor Ogwal, David Kyappa, among many others. You did a great job and I highly appreciate. To the students who participated in the study, thank you for your time and willingness to provide us valuable feedback. To the head teachers, especially Mrs. Idah Balina Nseko, thank you for giving us permission and allowing your students to participate in this study.

To my dad and mom (RIP) thank you for the firm foundation you provided for me, you loved and cared for me though you never lived long enough to witness this achievement. You planted a tree whose fruits you never lived to enjoy. However, I believe you have always watched over me and walked this journey with me. Thank you my guardian angels for helping me keep this candle burning. To my American family Jim, Lynn, and P.J. thanks for the unconditional love. Mom (Lynn) you made sure I start and complete this Ph.D. thank you and I am proud we made it together.

And finally to my wife Kevin and children Charles, Rebecca, and Stephen. Thank you for the support and endurance as I walked this journey. I know it has taken part of your time and resources by I did it for you. Charles, we now have enough time to play as you have always wished. This work is dedicated to you all and may you work hard to surpass what your dad has achieved. I dedicate this dissertation to you. Glory be to God for the gift of life and favor he has bestowed upon us. Surely his goodness and mercy shall follow me all the days of my life. Amen!!!

Name: STEPHEN CHARLES MUKEMBO

Date of Degree: JULY, 2017

Title of Study: EQUIPPING YOUTH WITH AGRIPRENEURSHIP AND OTHER VALUABLE LIFE SKILLS BY LINKING SECONDARY AGRICULTURAL EDUCATION TO COMMUNITIES FOR IMPROVED LIVELIHOODS: A COMPARATIVE ANALYSIS OF PROJECT-BASED LEARNING IN UGANDA

Major Field: AGRICULTURAL EDUCATION

Abstract: This study sought to assess how a project-based learning (PBL) approach involving agriprenurship enhanced students' understanding and application of poultry science knowledge and concepts and related entrepreneurial competencies learned at school to real-world settings. Further, the participants' experiences were described regarding school-based, agriprenurial projects (SAPs) and their potential for improving agricultural practices and livelihood opportunities. This study employed an embedded mixed methods design (Creswell & Plano Clark, 2011). Quantitative data from 280 participants were analyzed and reported. Further, an ANCOVA was conducted (Cook & Campbell, 1979) to determine if statistically significant interactions or differences existed between the treatment and counterfactual groups, including differences between sexes. Seven of the study's 10 null hypotheses were rejected. A statistically significant ( $p < .01$ ) interaction with a medium effect size was found between students' group and sex for posttest scores of poultry science knowledge depending on the instructional approach used. A statistically significant ( $p < .01$ ) main effect existed between groups for perceived agriprenurship competencies depending on instructional approach. Statistically significant ( $p < .01$ ) main effects with a small effect size existed between the groups and sexes regarding the students' likelihood to become agriprenurs in the future. A significant ( $p < .05$ ) association with a small effect size was found between the treated students' sexes and their intent to become agriprenurs in the future, among other significant relationships. More females than males in the treatment group indicated being either *likely* or *highly likely* to become agriprenurs. Regarding the qualitative data, the themes emanating from the students' and adult facilitators' experiences with the treatment also indicated improvements in students' poultry science knowledge as well as their understanding of agriprenurial concepts. Further, qualitative findings indicated the treated students acquired a variety of technical and life skills. A need exists to integrate PBL approaches in the curriculum to increase the likelihood of students' better understanding agricultural and entrepreneurial concepts and apply such to solve challenges in their communities. Due to contradictory results, additional research should examine the impact of using various teaching approaches on students' performance by sex regarding their acquisition of poultry science knowledge.

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## CHAPTER I

Alfred North Whitehead (1927), in his book *The Aims of Education and Other Essays*, affirmed that “[a] merely well-informed man is the most useless bore on God’s earth. What we should aim at producing is men [and women] who possess both culture and expert knowledge in some special direction” (p. 1).

## INTRODUCTION

How do we ensure food security for a global population approaching 10 billion people by 2050? This is one of numerous concerns for leaders around the world. The phenomenon is worsened by the declining number of youth engaged in or who aspire to pursue agriculturally-related professions or careers (Mukembo, Edwards, Ramsey, & Henneberry, 2014, 2015). In developed countries, such as the United States in 2012, the average age of a farmer was about 58.3 years (Census of Agriculture, 2014), compared to 54 years for an average farmer in a developing country, including Uganda (Lunghabo, 2016). Other sources, however, indicate the average age of a farmer in both the United States and Africa to be 60 years (Food and Agriculture Organization, 2014). Uganda, however, has one of the highest fertility rates, and the second youngest population in the world after Niger; more than 70% of Ugandans are below the age of 30



(Natukunda, 2013; The State of Uganda population report, 2013). In addition, the current population, which is estimated at 39 million (The World Bank, 2016a), was projected to reach 104 million by 2050 (The State of Uganda Population Report, 2014). This rapid increase in population coupled with a high influx of refugees from neighboring countries has put enormous pressure on Uganda's agriculture sector to ensure its food security. Moreover, as of April 2017, Uganda was home to more than one million refugees (ReliefWeb, 2017; United Nations High Commissioner for Refugees [UNHCR], 2017), a number expected to increase due to the ongoing civil wars in South Sudan, and recurrent political instability in other countries in its region, such as Burundi, the Democratic Republic of Congo, Eritrea, and Somalia, which has left numerous people stateless (UNHCR, 2015; 2017).

Ensuring the availability of enough safe and nutritious foods for all of its inhabitants – citizens and refugees – remains a big challenge for Uganda. The country's education system, which is very theoretical in many respects and examination-oriented (Basaza, Milman, & Wright, 2010; Lugemwa, 2014; Tashobya, 2014), has been criticized for producing graduates without the necessary skills to solve the challenges experienced in their communities. For example, most graduates are *job seekers* rather than *job creators*. Further, secondary school education in Uganda is highly selective and competitive in regard to the caliber of students chosen to advance to the next level, and the curriculum is overwhelmingly teacher-/subject-centered (Liang, 2002; Namukasa, Kaahwa, Quinn, & Ddungu, 2012; National Curriculum Development Centre [NCDC], 2014).

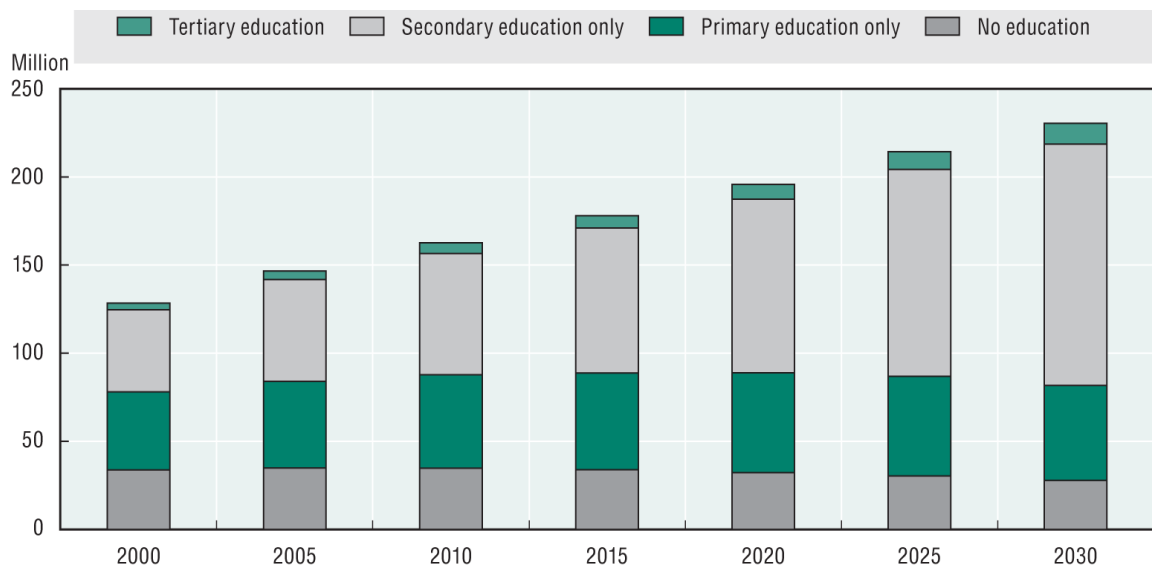
According to the NCDC (2013), an organization mandated to develop Uganda's

educational curriculum, the current school curriculum is outdated and does not meet contemporary needs. It was designed initially to address the labor demands of the public service sector when Uganda gained its independence from the British in 1962 (NCDC, 2013). Most of the teaching in Uganda's secondary schools is influenced by two national examinations: The Uganda Certificate of Education (UCE), administered after the first four years of secondary school or *Ordinary Level*, and the Uganda Advanced Certificate of Education (UACE), taken by students after two years of *Advanced Level* study and following their after completion of the UCE (Liang, 2002).

In Uganda, the possibility of students advancing to the next educational level is determined mainly by their performance on these two tests. To that end, a majority of schools, teachers, and parents emphasize students getting good grades on the final national examination to advance to the next level rather than equipping students with practical knowledge and skills that would likely increase their prospects of being self-sustaining after leaving school (Basaza et al., 2010; Lugemwa, 2014). This emphasis involves coaching students toward passing the examinations and, thus, the system encourages lower-order thinking through rote memorization of subject matter, with much less emphasis placed on the applicability of such learning to real-world situations and problems (Basaza et al., 2010; Lugemwa, 2014) or livelihood opportunities. Most students who fail to acquire the necessary grades to advance to the next level dropout of the school system and are not well-prepared to succeed in the real-world.

Liang (2002), however, posited that secondary education is vital in ensuring future economic prosperity of any country by preparing students for various future career trajectories pursued after graduation. Secondary schooling, at its best, is a *bridge* between

elementary school and tertiary-level learning (Liang, 2002). In Uganda, unfortunately, as may be the case for various developing countries in Sub-Saharan Africa, and elsewhere, even though many youth are becoming better educated (see Figure 1; Africa Economic Outlook, 2012), a mismatch exists between the knowledge and skills acquired by students and the demands of the labor market (Lugemwa, 2014; Namuli-Tamale, 2014; NCDC, 2013; Semboja, 2007; The Economic Intelligence Unit, 2014). This incongruence has contributed enormously to the high unemployment and underemployment experienced by many school graduates in Africa in general, and Uganda in particular (Gough, Langevang, & Owusu, 2013; Gyimah-Brempong & Kimenyi, 2013; Montpellier, 2014).



*Figure 1.* Africa is experiencing rapid growth in educated young people (20 to 24 year-old cohorts by education, 2000-2030) [Africa Economic Outlook, 2012, p. 24].

A study conducted in 2012 by three Non-Governmental Organizations (NGOs), *Lost Opportunity? Gaps in Youth Policy and Programming in Uganda*, reported that 61.6% of the youth in Uganda were unemployed (ActionAid International Uganda [AAU], Development Research and Training [DRT], & Uganda National NGO Forum

[UNNGOF], 2012). A majority of the participants in that study perceived they did not receive the necessary skills in school to prepare them for the *real-world* (AAU, DRT, & UNNGOF, 2012). The report stated:

The majority of out of school youth do not consider the education they received applicable to improving their livelihoods. Many felt that they would be better off if at school they had learned *agricultural education* [emphasis added], technical skills, *entrepreneurship* [emphasis added] and the creative arts. Outside of school, there is a complete lack of the career guidance necessary to help youth pursue additional training and income generating opportunities. (AAU, DRT, & UNNGOF, 2012, p. 36)

Moreover, a study by the African Development Bank Group about youth unemployment in Africa reported the poverty level among youth in Uganda was 80% and unemployment could be as high as 83% (Lugemwa, 2014; NCDC, 2014; Soucat, Nzau, Elaheebocus, & Cunha-Duarte, 2013). The 83% unemployment rate was even higher than the 61.6% reported by the three NGOs, i.e., AAU, DRT, and UNNGOF. Namuli-Tamale (2014) and Semboja (2007) asserted the lack of vocational and entrepreneurial skills among the youth to survive in the real-world contributed to the high unemployment rate.

To combat the high unemployment rate among secondary school as well as college graduates, the Government of Uganda embarked on a 10-year strategic plan to equip youth with skills, i.e., *Skilling Uganda* (Ministry of Education and Sports [MoES], 2011; Namuli-Tamale, 2014). The objective of this approach was to prepare graduates with “employable skills and competencies relevant in the [labor] market instead of educational certificates” (MoES, 2011, p. vii). Also, in 2013, the National Planning

Authority (NPA) released an ambitious plan – Uganda Vision 2040 – that aims to transform Uganda into a middle income economy by the year 2040 with a per capita income of \$9,500 compared to the \$504 average reported in 2010 (NPA, 2013; Ogwanga, 2013). Uganda’s Vision 2040 aims to ensure students will acquire employability skills, such as communication, teamwork, and problem solving abilities relevant to the current national and global trends, as well as vocational skills enabling them to be self-employed and create jobs for others (NPA, 2013). This objective would be achieved by reforming the school curriculum to match the existing market requirements as well as to accommodate the individual interests and capabilities of the students (NPA, 2013).

Further, Uganda’s Government has put increasing emphasis on and directed additional resources toward the promotion of science and mathematics by recruiting and training additional science teachers (Komakech & Osuu, 2014; Namukasa et al., 2012). Science teachers’ salaries were increased above those of other teachers to help boost their morale and to ensure they remain committed to teaching (Namukasa et al., 2012). In addition, more Government-sponsored scholarships, including 75% at the university level, were allotted to students taking science-related courses, and only 25% to those in the liberal arts (Uganda National Council for Science and Technology, 2012). Through the promotion of science and technology, the Government of Uganda presumes the skills acquired by the beneficiaries will foster creativity and innovations leading to self-employment, as well as create jobs to improve the country’s economy and mitigate the challenges of youth unemployment (NPA, 2013).

The NCDC (2013) recognized the shortcomings of the current education system and embarked on reforms to transform the existing curriculum at the lower secondary

level to provide “a holistic education for personal and national development” (p. 12) for Uganda’s students. The new proposed curriculum aims to focus on the needs of the learner, i.e., student-centered/-centric instruction with opportunities for experiential learning (NCDC, 2013). In the proposed reforms, the current number of 18 subjects taught in secondary schools at the Ordinary Level will be reduced to eight *learning areas*, including the creative arts, languages, life education, mathematics, religious education, science, social studies, and technology and enterprise (Musoke, 2014; NCDC, 2013).

Although efforts are being undertaken to reform Uganda’s secondary education curriculum to make it more learner-centered/-centric and prepare students to meet today’s challenges as well as in the future, teaching and the assessment of learning to date remains largely subject-centered/-centric (NCDC, 2013, 2014). Little meaningful coherence exists among the various subjects, i.e., a lack of curriculum integration; rather, teaching and assessment are oriented toward students getting good grades on the final examinations which determine their prospects for future educational opportunities (NCDC, 2014). The impact of reform remains far from achieving its intended objectives. Therefore, the need exists for teachers to integrate crosscutting concepts in their instruction to go beyond subject-based boundaries to achieve meaningful curricular coherence and increase students’ understanding. This approach is especially important in the *vocational or practical subjects* such as entrepreneurship and agriculture. Such integration stands to promote the transfer of knowledge and skills across subjects to solve challenges encountered in real-world situations (Mukembo & Edwards, 2015a). For example, students could incorporate knowledge and skills acquired in entrepreneurship courses to identify opportunities in agriculture leading to the development of viable

business ventures for self-employment. Good (as cited in Shoemaker, 1989) postulated curriculum integration “cuts across subject matter lines to focus upon comprehensive life problems or broad areas of study that bring together the various segments of the curriculum into meaningful association” (p. 5). To that aim, Alfred North Whitehead (1927) posited:

Let the main ideas which are introduced into a child’s education be few and important, and let them be thrown into every combination possible. The child should make them his own, and should understand their application here and now in the circumstances of his actual life. (p. 3)

Unlike agricultural education, which has been part of Uganda’s education system for a long time, entrepreneurship education, as a subject offered in secondary schools, is relatively new; it was included in the curriculum in 2000 (Luyima, 2010; NCDC, 2014, 2015). Entrepreneurship education was introduced to equip students with practical skills for job creation to mitigate the challenges associated with youth unemployment, as well as to meet the needs of employers who saw it as relevant to the labor force and country for economic growth (Luyima, 2010; NCDC, 2014, 2015). Therefore, in the curriculum reforms proposed by the NCDC, some existing vocational subjects taught at the secondary Ordinary Level, including agricultural and entrepreneurship education, will be merged into one learning area called *Technology and Enterprise* (NCDC, 2013). The themes/strands to be taught in this learning area include crop production and animal husbandry, food production and food security, self-employment, as well as water, sanitation, and hygiene among others to address a wide range of challenges in Uganda’s communities (NCDC, 2013). The anticipated outcomes are graduates capable of

developing and managing viable enterprises, including value addition, and creating innovative products and services, which would meet the needs of communities for improved livelihood opportunities, especially in regard to youth (NCDC, 2013).

Unfortunately, to date, little effort has been devoted to the development of *agripreneurship skills*, i.e., the teaching of agricultural entrepreneurship, by Uganda's secondary school youth. Agriculture is considered the backbone of Uganda's economy, employing more than 72% of the population and contributing 20.9% to the country's Gross Domestic Product [GDP] (Uganda Bureau of Statistics [UBOS], 2014). The NCDC (2013) posited that "[i]f Uganda is to transform its subsistence economy into modern agriculture, industrial, service, and public sectors, most of the population will eventually need competencies with broad application" (p. 25). Equipping students and farmers with entrepreneurial skills relevant to agriculture could be one way to transform the agricultural sector from predominantly subsistence to primarily commercial farming (Khayri, Yaghoubi, & Yazdanpanah, 2011; Onyebinama & Onyebinama, 2010). To achieve this aim, Mugisha and Owens (2008) urged Uganda's MoES to redesign the secondary school curriculum to make it more learner-centered/-centric, such that young people would be equipped with skills enabling them to develop agricultural income-generating projects to improve their livelihoods while lifting their communities (International Youth Foundation, 2014; Montpellier, 2014).

### **Problem Statement**

The Government of Uganda is interested in transforming its agricultural sector from subsistence to commercial agriculture to ensure food security and empower its populace for self-reliance and job creation, as outlined in Uganda's Vision 2040 (NPA,



2013). A number of approaches and resources have been dedicated toward this aim. Such includes the Entadikwa scheme (i.e., startup capital), National Agricultural Advisory Services (NAADS), Plan for Modernization of Agriculture (PMA), Poverty Eradication Action Plan (PEAP), Prosperity for All, and Uganda Vision 2040 (International Monetary Fund, 2003; Joughin & Kjaer, 2010; Ministry of Finance, Planning & Economic Development, 2004; NPA, 2013; The World Bank, 2001).

None of these interventions, unfortunately, have achieved their intended objectives due to mismanagement, corruption, and politics (Joughin & Kjaer, 2010; Mukembo & Edwards, 2015a). Moreover, in Uganda, as may be the case in other countries, agriculture, especially gardening, was used customarily to punish misbehavior by students (Food and Agriculture Organization, Technical Centre for Agricultural and Rural Cooperation, & International Fund for Agricultural Development, 2014; Mukembo, 2013; Waithera, 2013). This practice among other factors may have created negative perceptions about agriculture and related careers among Uganda's youth. Therefore, building human capital to ensure food security for improved livelihoods remains a big challenge, especially with rapid population growth. Further, a discrepancy exists between Uganda's population growth and its agricultural sector. Whereas the country's population is growing at a rate of 3.03% per annum (Uganda Bureau of Statistics, 2014), its agricultural sector is increasing at a slower rate of 2.6% to 2.9% per annum (Feed the Future, n.d.; Ministry of Agriculture, Animal Industry, & Fisheries, 2010).

In Uganda, more than one-half of the population is below the age of 15 (The State of Uganda Population Report, 2013) and dependent on proportionally fewer working adults for their survival. Uganda is among the countries with the highest youth-to-adult

dependence ratio in the world (Central Intelligence Agency [CIA], 2016; The World Bank, 2016b). A majority of the nation's youth, 62% to 83% depending on the report, between the ages of 16 to 35 years, are unemployed or underemployed (AAU, DRT, & UNNGOF, 2012; Mwesigwa, 2014; Soucat et al., 2013; The World Bank, 2013).

In addition, more than 75% of all college graduates produced annually in Uganda remain unemployed (Arinaitwe, 2014; NCDC, 2014). The World Bank (2013) estimates that by 2020 more than 10 million Ugandans will be in search of employment if strategies are not developed and implemented to address the jobs challenge. This phenomenon is partly attributed to the school curriculum being too theoretical or *subject-centered/centric* and out of touch with current employer and enterprise development needs (Liang, 2002; Lugemwa, 2014; Namuli-Tamale, 2014; NCDC, 2013; Semboja, 2007; The Economic Intelligence Unit, 2014). According to the NCDC (2013), the current curriculum used in Uganda's secondary schools was "initially designed for an elite minority of learners bound for positions within the public service [sectors]" (p. 24).

According to Booker T. Washington, education needs to equip individuals with knowledge and skills to solve challenges encountered in real-world situations (as cited in Gordon, 2008), including self-employment and job creation. Therefore, with an increasing population and few job opportunities in Uganda's public service sector, the need exists to find alternative ways to equip students with practical skills for self-employment and job creation. Studies should determine how students can transfer the knowledge and skills acquired in the classroom to solve challenges they encounter in their daily lives, including reliable and sustained employment. To that end, this study sought to assess how a project-based learning approach could be used to enhance

students' understanding and application of concepts learned in school to real-world situations with implications for economic development and empowerment, especially in regard to agripreneurship.

### **Purpose of the Study**

The primary purpose of this study was to assess how a project-based learning (PBL) approach involving agripreneurship could be used to enhance students' understanding and application of selected agricultural knowledge and concepts (i.e., poultry science and related entrepreneurial competencies) learned in school to real-world settings. In addition, the study sought to describe participants' experiences in regard to school-based, agripreneurial projects (SAPs) and their potential for improving agricultural practices and related livelihood opportunities in local communities.

### **Objectives of the Study**

Six objectives and 10 null hypotheses guided this study:

- 1) describe selected personal and professional characteristics of the participants (students and adults);
- 2) compare students' poultry science knowledge based on the instructional approach used, i.e., project-based learning featuring agripreneurship versus traditional classroom instruction;
  - Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for poultry science knowledge based on the instructional approach used.

- Ho: No statistically significant differences ( $p < .05$ ) existed between groups for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for poultry science knowledge based on the instructional approach used.
- 3) compare students' perceived agripreneurship competencies (skills) based on the instructional approach used;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceived agripreneurship competencies based on the instructional approach used.
- 4) compare students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.

- Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
- 5) describe relationships between students' characteristics and other selected variables;
- Ho: No statistically significant relationships ( $p < .05$ ) existed between students' characteristics and other selected variables.
- 6) describe participants' (students' and adults') experiences in regard to school-based, agripreneurial projects, including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills.

### **Significance of the Study**

The Government of Uganda is interested in ensuring graduates of secondary schools, both at the Ordinary and Advanced Levels, acquire knowledge and skills through *hands-on, minds-on* learning experiences enabling them to be *self-reliant* and empowered to *create jobs* for the economy (MoES, 2011, NCDC, 2013, 2014; NPA, 2013). This is evidenced in the Government's efforts to reform the existing school curriculum to make it more learner-centered/-centric, and also by reducing the number of subjects at the

Ordinary Level from 18 subjects to eight learning areas (Musoke, 2014, NCDC, 2013). To achieve this, existing subjects such as agriculture and entrepreneurship are being merged/integrated into one learning area, i.e., Technology and Enterprise (NCDC, 2013). The findings of this study, therefore, will provide stakeholders, including teachers, as well as Uganda's Government and its development partners, with policy recommendations for the proposed curriculum reforms being undertaken by the NCDC, especially in regard to the integration of agricultural and entrepreneurship education.

Further, Uganda's Government is concerned with developing and transforming its agricultural sector from subsistence to commercial farming for improved livelihoods and community development as outlined in its Vision 2040 initiative (NCDC, 2013; NPA, 2013). Unfortunately, the decline of youth engagement in agriculture amidst an aging population of farmers is of great concern to Uganda's Government officials, as it is for many world leaders. More than 70% of Uganda's population is below 30 years of age, and yet the average age of a Ugandan farmer exceeds 50 years (Lunghabo, 2016; Natukunda, 2013; The State of Uganda Population Report, 2013), which has created a high youth-to-adult dependence ratio (CIA, 2016; The World Bank, 2016b). Therefore, using a project-based learning approach to integrate agricultural and entrepreneurship education in schools may be a way for students to learn that agriculture is a viable business enterprise with multiple employment opportunities at the farm level and in the value addition stream (Mukembo et al., 2014, 2015). This approach may help attract more young people to the agricultural sector, thus contributing to its human capital and reducing the sector's youth-to-adult dependency ratio in Uganda.

In addition, the results of this study may provide valuable feedback to stakeholders in Uganda and elsewhere interested in developing their agricultural sectors, including the promotion of such to youth as a viable livelihood alternative, while improving food security and food sovereignty for the respective populations. The findings also may provide insights on how to improve students' experiences and perceptions with regard to learning about agriculture, including its career opportunities. Such a change in students' views could lead to increased enrollment in agricultural programs of study and to more agriculturists in the future.

### **Assumptions of the Study**

Six assumptions were made by the researcher regarding this study:

1. Students in the treatment group, in addition to receiving the usual instruction on poultry, as stipulated in the Ordinary Level agricultural teaching syllabus by the NCDC (2008), would also apply the knowledge and skills learned about poultry in their classrooms to real-world settings by implementing poultry projects, i.e., raising broilers.
2. Students in the counterfactual group would receive their usual classroom instruction about poultry, as stipulated in the Ordinary Level agricultural syllabus by the NCDC (2008).
3. Students in the treatment group, regardless of school setting, received the same learning content and skills training in regard to implementing their poultry projects, including training on agricultural entrepreneurship from teachers and extension educators.

4. The students in the treatment group would be truthful while journaling their experiences with regard to their poultry projects and the agripreneurship training received.
5. The student participants in both the treatment and counterfactual groups would be honest in their answers and respond to the study's survey instruments to the best of their ability.
6. During the study's follow up interviews, the interviewees would be truthful about sharing their experiences with the researcher.

### **Limitations of the Study**

This study had five limitations:

1. The participants in this study were limited to only four boarding schools, including one school in the Iganga district and three in the Jinja district of eastern Uganda.
2. It is possible some of the participants may not have completed both survey instruments, i.e., the pretest and posttest administrations.
3. The survey instruments were administered by a research assistant who had been trained by the researcher because he was not present for data collection in Uganda.
4. Follow-up interviews with participants were done using Skype conferencing tools and by telephone rather than face-to-face, so some limitations to the researcher understanding their responses may have occurred.



5. All students in the treatment group were expected to journal their project-based learning experiences. Unfortunately, not all students made regular entries. In addition, some students did not turn in their journals at the end of the study.

### **Definition of Terms**

**Advanced or A-level** in Uganda’s secondary education system refers to the two years of secondary education post the Ordinary Level, which learners are required to attend before they sit for the Uganda Advanced Certificate of Education Examinations [UACE] (Liang, 2002; Namukasa et al., 2012). Students who pass the examinations are awarded the Uganda Advanced Certificate of Education which is a requirement to join any tertiary institution offering associate’s and/or bachelor’s degree programs.

**Agricultural education** refers to a “program of instruction in and about agriculture and related subjects” (Talbert, Vaughn, Croom, & Lee, 2007, p. 4).

**Agricultural Entrepreneurship or Agripreneurship:** The concept of agripreneurship has myriad definitions. According to Macher (1999), agripreneurship is a “profitable marriage of agriculture and entrepreneurship – more plainly, turning your farm into a business” (p. xi), while Nagalakshmi and Sudhakar (2013) described agripreneurship as “generally, sustainable, community-oriented, directly-marketed agriculture” (p. 208). In addition, Mukembo and Edwards (2015a) defined agripreneurship “as the application of entrepreneurial principles to identify, develop, and manage viable agricultural enterprises/projects optimally and sustainably for profit and [/or] improved livelihoods” (p. 5). To that end, the definition espoused by Mukembo and Edwards (2015a) broadened the concept of agripreneurship beyond just turning a farm into a business to include other entrepreneurial endeavors in the agricultural sector. These endeavors also may include

developing projects, programs, or other social agripreneurship ventures such as the One Acre Fund, which is aimed at improving people's wellbeing and the agricultural sector as a whole. Agripreneurship encompasses "many characteristics of 'generic' entrepreneurship, [the concept] also has its distinct features due to the specific context of the agricultural sector" (Lans, Seuneke, & Klerkx, 2013, p. 45).

**Agriculture** is "[t]he science, art, business, and technology of the plants, animals, and natural resources systems" (Talbert et al., 2007, p. 509).

**Agripreneur** is an individual "who runs an agricultural business – farming in particular – at his or her own risk" (Macher, 1999, p. 9). Alternatively, an agripreneur can be defined as "a business owner who is self[-]employed and seeks to create wealth within the agricultural industry" (Aleke, Ojiako, & Wainwright, 2011, p. 70). Agripreneurs recognize business opportunities in the agricultural industry and transform them into viable ventures (Aleke et al., 2011; Macher, 1999; Nagalakshmi & Sudhakar, 2013; Tripathi & Agarwal, 2015).

**Commercial farmer** refers to an individual engaged in the production of crops and/or livestock for the purposes of gaining profit on the investment made in farming (Dixon, Tanyeri-Abur, & Wattenbach, 2004; Leavy & Poulton, 2007; Smalley, 2013).

Commercial farmers are profit oriented and, compared to smallholder farmers, invest numerous resources, including advanced technologies, and rely on hired labor in their farming enterprises to ensure increased output and return on investment (Dixon et al., 2004; Leavy & Poulton, 2007; Smalley, 2013). The amount of land used in commercial farming varies from tens to thousands of hectares (Smalley, 2013).

**Community** refers to “a group of people with diverse characteristics who are linked by social ties, share common perspectives, and engage in joint action in geographical locations or settings” (MacQueen et al., 2001, p. 1929).

**Curriculum:** The concept of curriculum has evolved and changed overtime (Wiles, 2005). Numerous definitions exist (Oliva, 1982; Tanner & Tanner, 1980; Wiles, 2005) reflecting “so many conflicting schools of thought that it is highly unlikely that any universally accepted definition can be reached” (Tanner & Tanner, 1980, pp. 37-38). According to Oliva (1982), to many educators the term *curriculum* “seems at times analogous to the blind men’s elephant” (p. 4), with a number of different interpretations based on a person’s philosophical orientation. To that end, Oliva (1982) indicated the definition of curriculum is associated with the “settings within which it takes shape” (p. 8). Tanner and Tanner (1980) defined curriculum as “*that reconstruction of knowledge and experience, systematically developed under the auspices of the school (or university), to enable the learner to increase his or her control of knowledge and experience* [emphasis in original]” (p. 43). According to Wiles (2005), the term curriculum refers to “[a] structured series of intended learning experiences” (p. 195). Moreover, Taba (1962) defined a curriculum as simply “a plan for learning” (p. 11), and she added:

A curriculum usually contains a statement of aims and of specific objectives; it indicates some selection and organization of content; it either implies or manifests certain patterns of learning and teaching, whether because the objectives demand them or because the content organization requires them. Finally, it includes a program or evaluation of the outcomes. (p. 10)

**Curriculum integration** refers to a “curriculum design that is concerned with enhancing the possibilities for personal and social integration through the organization of curriculum [ , i.e., learning content,] around significant problems and issues, collaboratively identified by educators and young people, without regard for subject-area boundaries” (Beane, 1997, pp. x-xi). Oliva (1982) posited that “[b]y integration [of the curriculum], we mean the blending, fusion, or unification of disciplines” (p. 466). Curriculum integration focuses on the common themes among various subjects to enable students to comprehend the relationships between various concepts, and determine how the knowledge and skills learned can be applied to real-life situations to solve challenges likely to be encountered in their lives (Beane, 1995, 1996, 1997; Loepp, 1999; Shoemaker, 1989; Vars, 1991, 2001).

**Entrepreneur:** Although numerous descriptions exist of who is an entrepreneur, it is important to note that no universally accepted definition is dominant (Brockhuas & Horwitz, 1985; Carland, Hoy, & Carland, 1988; Gartner, 1989; Venkataraman, 1997). Further, whereas some definitions focus on the personality characteristics of the individual entrepreneurs, others stress the behaviors of such persons (Carland et al., 1988; Gartner, 1989, 1990; Shane & Venkataraman, 2000). Stevenson and Sahlman (1990) defined an entrepreneur as “a person who perceives opportunity, finds the pursuit of opportunity desirable in the context of his or her life situation, and believes that success is possible” (p. 48), and such views differentiate entrepreneurs from the rest of the general populace. In addition, entrepreneurs recognize opportunities and devise ways to exploit them (Baumol, 1968; Bygrave, 2011).

**Entrepreneurial competencies** refer to the “underlying characteristics such as generic and specific knowledge, motives, traits, self-images, social roles, and skills which result in venture birth, survival, and/or growth” (Bird, 1995, p. 51). Competencies related to entrepreneurship are critical in the birth and successful establishment of business ventures (Bird, 1995; Mitchelmore & Rowley, 2010).

**Entrepreneurial process** involves a series of activities that include recognizing, screening, evaluating, exploiting and/or pursuing opportunities to create products or services of value (Bygrave, 2011; Davidsson, 2005; Shane & Venkataraman, 2000; Volkmann et al., 2010). Bygrave (2011) added: “The *entrepreneurial* [emphasis in original] process involves all the functions, activities, and actions associated with perceiving opportunities” (p. 3).

**Entrepreneurship:** In spite of the numerous definitions of entrepreneurship advanced by various authors, i.e., “entrepreneurship is polysemous” (Fayolle & Gailly, 2008, p. 572), still no universally accepted definition of entrepreneurship exists (Baumol, 1968; Brockhaus, 1980; Brockhuas & Horwitz, 1985; Bull & Willard, 1993; Carland et al., 1988; Gartner, 1988, 1990; Shaver & Scott, 1991; Venkataraman, 1997). For example, Stevenson and Jarillo (1990) defined entrepreneurship as “a process by which individuals – either on their own or within organizations – pursue opportunities without regard to the resources they currently control” (p. 23). Kuratko (2016) added: “Entrepreneurship is a dynamic process of vision, change, and creation that requires an application of energy and passion toward the creation and implementation of new ideas and creative solutions” (p. 20). Bruyat and Julien (2001) indicated that entrepreneurship is about creating value. However, Schumpeter’s description of entrepreneurship associated it with inventions and

innovations and concluded that such grounds most of the definitions for entrepreneurship (Brockhaus, 1980; Bull & Willard, 1993; Lans, Seuneke, & Klerkx, 2013; Volkmann, Tokarski, & Grünhagen, 2010).

**Entrepreneurship education** refers to “the transfer of knowledge about how, by whom and with what effects opportunities to create future goods and services are discovered, evaluated and exploited” (Hindle, 2007, p. 107). Further, according to Jones and English (2004), entrepreneurship education involves training individuals to recognize, evaluate, and exploit opportunities while mitigating risks and uncertainties associated with their pursuit.

**Experiential learning** is defined as “the process of making meaning from direct experience, namely learning through reflection on doing” (Pappa et al., 2011, p. 1003).

**Extension** involves the “conscious communication of information to help people form sound opinions and make good decisions” (Van den Ban & Hawkins, 1996, p. 278). The aim of providing extension education is to ensure the beneficiaries are able to make informed decisions regarding change in a way desired by the change agent or to find solutions to the challenges encountered in their communities (Rogers, 2003; Van den Ban & Hawkins, 1996).

**Extension agent (educator)** is a “change agent [who] intervenes to bring about change in order to help improve the lives of the farmers and [their] families” (Oakley & Garforth, 1985, p. 92). Extension agents work with various formal organizations, both in the public and private sectors, to bring about positive change in ways desired by the change agency or organization they represent (Oakley & Garforth, 1985; Rogers, 2003; Van den Ban & Hawkins, 1996).

**Food security:** According to the World Food Programme (2016), food security occurs when people have “availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life style” (para. 1). Food security is undergirded by three elements, i.e., food availability, food access, and food utilization (World Food Programme, 2016).

**Learner-centered teaching** which is used interchangeably with *learner-centric* teaching (Bhakare, 2014; Raina, 2015) refers to one of the *best practices* for instruction which places the learner’s needs at the forefront of the teaching–learning process with the teacher playing a facilitation role (Bain, 2004; Brown, 2008; Smart, Witt, & Scott, 2012; Weimer, 2002; Wohlfarth et al., 2008). According to McCombs and Whisler (1997), a learner-centered/-centric approach encompasses “a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) with a focus on learning” (p. 9). If using this method, teachers usually adopt a constructivist approach in their teaching, and learners play an active role in formulating new knowledge based on their experiences (Brown, 2008; Callison, 2001; Doolittle & Camp, 1999; Gray, 1997; Grier-Reed, Skaar, & Conkel-Ziebell, 2009). Although the focus is put on the learner, the relationship between the teacher and learner is *mutualistic* with both learning from one another in the process (Brown, 2008; McCombs & Whisler, 1997). Wohlfarth et al. (2008) posited: “Learner-centered teaching involves connecting with knowledge and students at the same time” (p. 68).

**Learning** is “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience” (Kolb, 1984, p. 41).

**Life skills:** According to the United Nations Children’s Emergency Fund [UNICEF] (2003), life skills are “psychosocial abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life” (para. 3). UNICEF classifies life skills into three categories: cognitive skills, personal skills, and interpersonal skills.

**Livelihood** refers to the “capabilities, assets (stores, resources, claims and access) and activities required for a means of living” (Chambers & Conway, 1991, p. 6). Sustainable livelihoods are resilient and able to meet the optimal needs of both current and future generations (Chambers & Conway, 1991).

**Opportunities:** Stevenson and Jarillo (1990) defined opportunities as “future situation[s] which [are] *deemed desirable* and *feasible* [emphasis added]” (p. 23).

**Opportunity exploitation** involves “building efficient, full-scale operations for products or services created by, or derived from, a business opportunity” (Choi, Lévesque, & Shepherd, 2008, p. 355). Before embarking on exploiting an opportunity, entrepreneurs try to gain insight about the resources and procedures required to exploit a given entrepreneurial endeavor to minimize possible risks that may arise when undertaking the venture (Choi et al., 2008; Choi & Shepherd, 2004)

**Opportunity recognition** is “the process of perceiving the possibility of a profitable new business or a new product or service” (Barringer & Ireland, 2010, p. 53). According to Jones and English (2004), “[o]ppportunity recognition involves the identification of unfulfilled needs in the marketplace and the creation of ideas for services or products that meet them” (p. 418). Chea (2008) stressed that opportunity recognition involves cogitating to identify viable ventures.



**Ordinary Level** or *O-Level* in Uganda's secondary education system refers to the first four years of secondary school post-primary education students are required to complete before taking national examinations to obtain the Uganda Certificate of Education (Liang, 2002; Namukasa et al., 2012). The Uganda Certificate of Education (UCE) is required for a student to further his or her education either at the Advanced level or to join institutions offering certificate programs in vocational or career training (Namukasa et al., 2012).

**Poultry:** According to the American Poultry Association (1974), the term poultry is used to imply all domesticated birds, which may include chicken, ducks, geese, guinea fowl, and turkeys. These birds may be raised for eggs, meat, feathers, and manure production, or for exhibition (American Poultry Association, 1974; Hilmi, Dolberg, Alders, 2011; Sonaiya & Swan, 2004).

**Poultry keeping (farming)** involves the raising of domesticated fowl for home consumption or commercial purposes (Hilmi et al., 2011; Sonaiya & Swan, 2004). This may involve keeping birds under intensive or extensive farming systems. Intensive poultry farming systems involve raising a large number of birds in a small area and requires high levels of capital investment and management (Hilmi et al., 2011; Sonaiya & Swan, 2004). Examples of intensive poultry farming systems include battery cage and deep litter systems. On the other hand, extensive poultry farming systems are characterized by low levels of inputs, capital investment, and management, for example, a free range poultry operation (Hilmi et al., 2011; Sonaiya & Swan, 2004).

**Poultry sector (or industry)** refers to the vertical integration of all the segments related to poultry production, including poultry breeders, hatcheries, grow-out farms, the poultry

feed industry, processing plants, animal health, merchandisers, and transporters (Henry & Rothwell, 1995; USpoultry.org, n.d.).

**Project-based learning** is “a comprehensive approach to classroom teaching and learning that is designed to engage students in [the] investigation of authentic problems” (Blumenfeld et al., 1991, p. 369). Project-based learning involves students working, mostly in teams with others, on a venture or enterprise in real-world environments under the mentorship and guidance of their teachers or other adult facilitators (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000). The relationship between students and teachers in project-based learning is similar to that of a “master-apprentice relationship” (Blumenfeld et al., 1991, p. 371).

**Secondary education** in Uganda refers to the four to six years of formal education completed by learners post-primary before matriculating to a tertiary institution of higher learning (Liang, 2002; Namukasa et al., 2012). Sometimes learners complete only the first four years, take the Uganda Certificate of Education examination, and, thereafter, join a vocational or career training institution (Namukasa et al., 2012).

**Smallholder farmer:** The concept of smallholder farmer is used interchangeably with the terms small-scale, subsistence, or resource-poor farmers. (Bisht et al., 2014; Rowntree, Lewis, Price, & Wyckoff, 2014; Smalley, 2013). Smallholder or subsistence farmers are producers who grow crops and raise livestock for home consumption and may sell their extra output to generate income to pay for basic family needs and are usually characterized by small acreage and the use of family labor (Bisht et al., 2014; Rowntree et al., 2014; Smalley, 2013). The amount of land owned by smallholder farmers varies by country but usually ranges from less than one hectare to no more than

10 hectares (Dixon et al., 2004). Smallholder farming is often manifested by low productivity, little or no input utilization, and the family, especially women and children, providing most of the labor demands (Salami, Kamara, & Brixiova, 2010).

**Social Entrepreneurship** is a special form of entrepreneurship whose focus is to achieve a social mission (Dees, 2001). According to Alvord, Brown, and Letts (2004) “social entrepreneurship creates innovative solutions to immediate social problems and mobilizes the ideas, capacities, resources, and social arrangements required for sustainable social transformations” (p. 262).

**Teacher (or Instructor)**, for the purpose of this study, refers to an individual who has undergone formal training and received certification to guide, mentor, and provide learning experiences to students to achieve set objectives within a prescribed curriculum (Ball & Forzani, 2009; Harden & Crosby, 2009). Harden and Crosby (2009) outlined six roles of teachers, including provision of information to learners, role modeling, planning and sequencing learning content, facilitating the teaching-learning process, provision of related resources and materials to facilitate instruction, and assessing and evaluating students’ work.

**Teacher-centered (-centric) teaching or Subject-centered (-centric) teaching** is an institutional setting in which the teacher controls and manipulates the learning process to attain a desired outcome based on generalized characteristics of the learners (Schuh, 2004; Wagner & McCombs, 1995). Under such an approach to instruction, the learner is considered an empty vessel, i.e., *tabula rasa*, whose brain is to be filled with knowledge transmitted by the teacher (Rodriguez, 2012; Schuh, 2004). The teacher organizes all the

learning experiences he or she perceives are necessary for the learners to achieve the prescribed instructional outcomes (Schuh, 2004; Wagner & McCombs, 1995).

**Uganda** is a landlocked country in Sub-Saharan, East Africa located along the Equator (Government of Uganda, 2017; The State House of Uganda, 2017). Uganda is bordered by five countries, i.e., the Democratic Republic of the Congo to the west, Kenya to the east, Rwanda to the southwest, Tanzania to the south, and South Sudan to the north (Government of Uganda, 2017; The State House of Uganda, 2017).

**Venture creation** involves transforming an idea or notion into a business to provide products or services capable of filling a market gap (Bhave, 1994). Venture creation plays a critical role in entrepreneurship and is central to all entrepreneurial endeavors (Chea, 2008; Shook, Priem, & McGee, 2003).

**Vocational education**, which is also referred to as career and technical education in the United States, usually includes “[o]rganized educational programs offering a sequence of courses directly related to the preparation of individuals in paid or unpaid employment and in current or emerging occupations requiring other than a baccalaureate or advanced degree” (Gordon, 2008, p. 363).

**Vocational subjects** are domains of study that equip students with hands-on, minds-on practical skills, knowledge, and experiences necessary to succeed in a specified field, industry, or trade (Edward, Weedon, & Riddell, 2008; Lauglo, 2004). Vocational subjects may include agricultural education, business studies, computer science, entrepreneurship, home economics, trades and industry, among others.

**Youth-Adult Partnerships (Y-APs)** are social interactions and collaborations between youth and adults in a community to develop ideas, programs, and policies that advance

the progress and enhancement of their communities while leading to improved livelihoods and positive youth development (Akiva & Petrokubi, 2016; Camino, 2000; Krauss et al., 2014; Zeldin, Camino, & Mook, 2005; Zeldin, Christens, & Powers, 2013; Zeldin & Petrokubi, 2008). Zeldin et al. (2013) added: “Y-AP involves citizens across generations working together to address common concerns” (p. 385).

## CHAPTER II

### REVIEW OF LITERATURE

Chapter II provides a review of literature that undergirds this study and is divided into four sections. The first section provides an overview about entrepreneurship, entrepreneurial competencies, and entrepreneurship education. The second section explores the background of agricultural entrepreneurship, i.e., *agripreneurship*, extension or advisory services, and farmer entrepreneurship. In the third section, several related topics such as agricultural education, curriculum integration, lecture/traditional classroom instruction, project-based learning, project-based learning in agricultural and extension education, and youth-adult partnerships are discussed. The final section of this chapter describes the study's overarching conceptual framework, i.e., Kolb's model of experiential learning (Kolb, 1981, 1984) and the theoretical framework on which the investigation was grounded, the theory of planned behavior (Ajzen, 1991), including its relevance to entrepreneurial intentions (Bird, 1995; Boyd & Vozikis, 1994; Krueger, Reilly, & Carsrud, 2000), and a summary of the literature reviewed.

## Section I

### Entrepreneurship

Entrepreneurial endeavors have existed since time immemorial (Neergaard & Ulhøi, 2007). For example, in the middle ages, clerics dealt “with [the] building of large projects such as churches and castles without, however, taking personal risks” (Volkman et al., 2010, p. 2). According to Wingham (2004), entrepreneurship is partly rooted in the socio-economic and entrepreneurial works of Phoenicians (1100 BC-500 BC) who engaged in trade with and colonization of “modern-day Spain, Syria, Cyprus, Libya, Tunisia, Italy, Malta, Algeria, and Morocco” (p. 27) before being taken over by the Persian Empire in 539 BC. The Phoenician entrepreneurs undertook risks and uncertainties to explore different parts of the unknown world in search of economic opportunities, and traded in a variety of general merchandise, including ivory, garments, precious stones, and perfumes, among other commodities (Wingham, 2004). “The impact of the Phoenician trading and entrepreneurial culture outlasted their empire, largely because of the trade-based non-aggressive philosophy of communication and shared elements of language throughout their colonies” (Wingham, 2004, p. 28).

An explanation of entrepreneurship is ingrained in our understanding the related behaviors of early entrepreneurs (Baron & Tang, 2011; Baumol, 1968; Shane & Venkataraman, 2000), such as those of the Phoenicians. These early entrepreneurs gave rise to the *concept of entrepreneurship* (Gartner, 1988) and are regarded as *thought leaders* in the business literature (Neck & Greene, 2011; Schumpeter & Swedberg, 2003). Some of the earliest sources of entrepreneurial literature came from the works of Richard Cantillon (1680-1734), especially his often cited book *Essai sur la Nature du Commerce*

*en Général, or the Essay on the Nature of Trade in General* (Bull & Willard, 1993; Carland, Hoy, Boulton, & Carland, 1984; Higgs, Cantillon, & Jevons, 1959; Volkmann et al., 2010). According to Bruyat and Julien (2001), entrepreneurship is entwined in the works of “Cantillon, Turgot, Say, and Schumpeter” (p. 166).

However, entrepreneurship as a scholarly discipline is grounded deeply in the works of two Austrian-American Economists, Joseph A. Schumpeter and Israel M. Kirzner. Both Schumpeter and Kirzner provide distinct perspectives about entrepreneurship and related economic opportunities, i.e., Schumpeterian versus Kirznerian entrepreneurship (Dutta & Crossan, 2005; Knudson, Wysocki, Champagne, & Peterson, 2004; Oner & Kunday, 2016; Post, 2014; Roininen & Ylinenpaa, 2009; Shaver & Scott, 1991; Sundqvist, Kylaheiko, Kuivalainen, & Cadogan, 2012).

According to Schumpeter, entrepreneurial opportunities are created by individuals who desire to challenge the status quo in the economy through what he called *creative destruction*, i.e., coming up with something new that renders the existing paradigm or approach obsolete (Bull & Willard, 1993; Foss & Klein, 2008; Schumpeter & Swedberg, 2003). This can occur with the help of technological advancements in the economy through inventions and innovations (Oner & Kunday, 2016; Post, 2014; Roininen & Ylinenpaa, 2009). Dutta and Crossan (2005) concluded “Schumpeter believe[d] that the entrepreneur is high in terms of intuition, creativity, and the power to overcome skepticism and hostility-intrinsic personal qualities that are difficult to imitate” (p. 430). On the other hand, Kirzner argued that through environmental alertness and possession of market information, entrepreneurs are able to discover market gaps and opportunities in the economy ripe for exploitation (Oner & Kunday, 2016; Roininen & Ylinenpaa, 2009).



The Schumpeterian view of entrepreneurship posits that opportunities are created with the help of technology rather than discovered, as asserted by the Kirznerian perspective.

Entrepreneurship contributes to economic development (Baumol, 1968) and is among the four factors of production also including land, labor, and capital. It is associated with business start-ups, invention or innovation of new ideas, and improvement of existing products or services through value addition (Hattab, 2014; Roberts, Stevenson, Sahlman, Marshall, & Hamermesh, 2007).

A difference exists between entrepreneurship and small business ownership (Garavan & O’Cinneide, 1994; Ulhøi, 2005), however, with the former “characterized by innovative behavior[s] and employ[ing] strategic management practices, the main goal being profit and growth” (Garavan & O’Cinneide, 1994, p. 4). On the other hand, “[s]mall business owners are people whose businesses consume most of their time and resources and provide most of their income. Unlike the entrepreneur, the small business owner is seldom engaged in innovative practices” (Garavan & O’Cinneide, 1994, p. 4).

Though entrepreneurship involves establishment of new businesses, it can also take place in established enterprises and organizations (Bruyat & Julien, 2001; Rasmussen & Sørheim, 2006; Roberts et al., 2007). When entrepreneurship occurs within an organization, it is referred to as *intrapreneurship* (Gartner, 1990; Kuratko, 2005; Volkmann et al., 2010) and essential for proper functioning, survival, and effectiveness of organizations (Baumol, 1968). Moreover, Stevenson and Jarillo (1990) asserted: “Innovation and entrepreneurship are key to renewal, [and e]very company’s initial success is dependent upon the identification and pursuit of a sound opportunity” (p. 49). Entrepreneurship focuses on opportunity recognition, evaluation, and the pursuit of

identified opportunities amidst taking risks and accepting uncertainties regardless of the resources available or controlled, through what is referred to as the *entrepreneurial process* (Corbett, 2007; Davidsson, 2005; Jones & English, 2004; Krueger & Dickson, 1994; Krueger et al., 2000; Venkataraman, 1997).

Scholars have posed a multitude of definitions for entrepreneurship based on their unique perspectives and schools of thought (Amo, 2014; Brockhaus, 1980; Cuervo, Ribeiro, & Roig, 2007; Henry, Hill, & Leitch, 2005; Valerio, Parton, & Robb, 2014; Vallierre, Gedeon, & Wise, 2014; Volkmann et al., 2010). These definitions, however, belong to three broad categories: “those that identify the word [entrepreneurship] with an economic function, those that identify entrepreneurship with an individual and those that view entrepreneurship in behavioral terms” (Stevenson & Sahlman, 1987, p. 14).

Whereas some definitions have centered on the description of entrepreneurs and the activities in which they engage (Baron & Tang, 2011; Bruyat & Julien, 2001; Mwasalwiba, 2010; Shane & Venkataraman, 2000; Venkataraman, 1997), others have defined entrepreneurship based on the behaviors of entrepreneurs (Corbett, 2007; Erikson, 2003; Krackhardt, 1995). These perspectives notwithstanding, a universally accepted definition of an entrepreneur remains elusive (Baumol, 1968; Brockhaus & Horwitz, 1986; Crant, 1996; Gartner, 1988, 1990; Hattab, 2014; Pacalo, 2014; Shaver & Scott, 1991). Stevenson and Jarillo (1990), for example, defined entrepreneurship as “a process by which individuals – either on their own or within organizations – pursue opportunities without regard to the resources they currently control” (p. 23). Other definitions of entrepreneurship are listed in Table 1.

Table 1

*Definitions of Entrepreneurship as Espoused by Various Scholars*

Sources	Definitions of Entrepreneurship
Cantillon (1755)	Self-employment with an uncertain return
Knight (1921)	Entrepreneurship means generating profits from bearing uncertainty and risks
Schumpeter (1934)	The realization of new factor combinations – new products, new services, new raw material sources, new production methods, new markets, new forms of organization
Casson (1982)	Entrepreneurship involves taking judgmental decisions about the coordination of scarce resources
Hisrich/Brush (1985) [original version] [modified version in Hisrich/Peters (2002)]	Entrepreneurship is the process of creating something of value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence
Hart, Stevenson, and Dial (1995)	Entrepreneurship entails the pursuit of opportunity without regard to resources currently controlled, but constrained by the founders' previous choices and industry-related experience

Sources	Definitions of Entrepreneurship
Timmons (1999)	Entrepreneurship is a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced

*Note.* Adapted from “Entrepreneurship in a European perspective: Concepts for the creation and growth of new ventures” by Volkmann et al., 2010, p. 4.

Entrepreneurship embodies both the individual and his or her society, whereby the individual identifies the opportunity and looks to the community for resources to pursue it (Stevenson, 2004). However, opportunities are not perpetual (Stevenson, 2004), and change with time depending on a number of factors, which can be both internal and/or external to the entrepreneur. Stevenson (2004) hypothesized four premises about entrepreneurial successes in communities:

1. [E]ntrepreneurship flourishes in communities where resources are mobile.
2. [E]ntrepreneurship is greater when successful members of a community reinvest excess capital in the projects of other community members.
3. [E]ntrepreneurship flourishes in communities in which the success of other community members is celebrated rather than derided.
4. [E]ntrepreneurship is greater in communities that see change as positive rather than negative. (p. 4)

Unfortunately, because of the narrow focus of most entrepreneurship definitions posed by scholars they may miss the *big picture* of entrepreneurship as a *discipline* or body of academic study and real-world practice. It is important to understand that

entrepreneurship as a *discipline* is not limited to the business literature but rather crosses and incorporates a multitude of scholarly traditions (Bell & Bell, 2016; Chigunta, Schnurr, James-Wilson, & Torres, 2005; Jones, Matlay, & Maritz, 2012; Mars & Hoskinson, 2009; Morris, Kuratko, & Cornwall, 2013a; Oparaocha, Pokidko, Adagbon, & Sutinen, 2014), including agriculture (Alsos, Carter, Ljunggren, & Welter, 2011; Katz, 2003; Redford & Fayolle, 2014; Roberts, Mukembo, & Edwards, 2016). To that end, Shapero and Sokol (1982) posited:

Standing back from the profusion of literatures and references, it becomes apparent that 'entrepreneurship' is a label for a profound and pervasive human activity that is of interest to many disciplines but not encompassed by any one of them. Academic disciplines are accidents of history; each is bounded and consequently procrustean. Discipline-centered approaches to the subject of entrepreneurship almost always define away parts of the subject or oversimplify it to fit existing theoretical structures. (p. 74)

Further, Low and Macmillan (1988) affirmed:

The phenomenon of entrepreneurship is intertwined with a complex set of contiguous and overlapping constructs such as management of change, innovation, technological and environmental turbulence, new product development, small business management, individualism and industry evolution. Furthermore, the phenomenon can be productively investigated from disciplines as varied as economics, sociology, finance, history, psychology, and anthropology, each of which uses its own concepts and operates within its own terms of reference. (p. 141)

Therefore, an interdisciplinary approach is warranted to understand better the concept of entrepreneurship (Blenker, Elmholdt, Frederiksen, Korsgaard, & Wagner, 2014; Honig, 2004; Low & Macmillan, 1988; Shapero & Sokol, 1982). Ronstadt (1985) posited “[t]here is much that economists, historians, sociologists, anthropologists, philosophers, technologists, etc. have to offer to a field that is interdisciplinary to its core” (p. 8), i.e., entrepreneurship and its endeavors.

Although entrepreneurs have been classified differently by various scholars, they generally belong to one of three main categories: nascent entrepreneurs, novice entrepreneurs, and habitual entrepreneurs (Alsos & Kolvereid, 1998; Erikson, 2003; Forsyth & Gelderen, 2005; McGee, Peterson, Mueller, & Sequeira, 2009; Ucbasaran, Alsos, Westhead, & Wright, 2008; Westhead, Ucbasaran, Wright, & Binks, 2005). Nascent entrepreneurs are individuals who have not yet undertaken any entrepreneurial venture but intend to start one; therefore, they commit time and resources to evaluate the possibilities of exploiting identified opportunities (Aldrich & Martinez, 2001; McGee et al., 2009; Post, 2014; Taplin, 2004). Novice entrepreneurs are first time entrepreneurs with minimal experience and are learning-on-the-job how to establish successful ventures (Alsos & Kolvereid, 1998; Taplin, 2004; Westhead & Wright, 1998).

Habitual entrepreneurs can be subdivided further into two groups, i.e., portfolio entrepreneurs and serial entrepreneurs (Taplin, 2004; Westhead & Wright, 1998). Habitual entrepreneurs start or acquire multiple ventures “at one time (portfolio) or sequentially (serial)” (Taplin, 2004, p. 240). Westhead et al. (2005) described serial entrepreneurs “as individuals who have sold/closed a business in which they had a minority or majority ownership stake, and they currently have a minority or majority

ownership stake in a single independent business that is either new, purchased or inherited” (p. 111). Portfolio entrepreneurs are “individuals who currently have minority or majority ownership stakes in two or more independent businesses that are either new, purchased and/or inherited” (Westhead et al., 2005, p. 111). However, akin to the definition of entrepreneurship, different researchers have posited varying descriptions for each of the aforementioned entrepreneurial typologies (Alsos & Kolvereid, 1998; Taplin, 2004).

Entrepreneurs recognize opportunities and develop mental and conceptual models to exploit those opportunities amidst taking on risks and uncertainties (De Carolis & Saporito, 2006; Hills & Singh, 2004; Krackhardt, 1995; Krueger et al., 2000; Neck & Greene, 2011). They pursue opportunities to bring about change in the social system (Bruyat & Julien, 2001; Henry et al., 2005; Venkataraman, 1997; Volkmann et al., 2010). Drucker (1985) stated, “[e]ntrepreneurs see change as the norm and as healthy . . . *the entrepreneur always searches for change, responds to it, and exploits it as an opportunity* [emphasis in original]” (pp. 27-28).

The ability to recognize opportunities is innate to a given individual, and varies from one person to the next even when part of a team (Allinson, Chell, & Hayes, 2000; Corbett, 2005; De Carolis & Saporito, 2006; Hills & Singh, 2004; Rasmussen & Sørheim, 2006). This may be due to inherent personal characteristics, such as “training, and the competitive environment” (Stevenson & Jarillo, 1990, p. 23), and unique insights enabling them to see challenges and setbacks as opportunities worthy of pursuit (Krueger & Dickson, 1994; Ulhøi, 2005).

Entrepreneurs' abilities to recognize opportunities may come from their interaction with the environment, social networks, or their mental cognition, personal interests, and the context in which they are situated (De Carolis & Saporito, 2006; Krueger et al., 2000; McGee et al., 2009). Further, entrepreneurial opportunities may arise from changes in market structure, personal experiences, peers and family, social and cultural factors, changes in government policies, as well as analysis of trends in the economy or population among other forces (Aldrich & Martinez, 2001; Bird, 1988; Shapero & Sokol, 1982; Volkmann et al., 2010). Hills and Singh (2004) posited:

A confluence of factors, including both uncontrolled factors (cultural, social, economic and job forces, and personality) and controlled factors (alertness, job selection, study, moonlight venturing, and lifestyle), affect the ability of a potential entrepreneur to recognize the opportunity, and the evaluation and elaboration phase (strategic planning) occurs after the recognition of the opportunity. (p. 261)

When entrepreneurs recognize opportunities, they evaluate their feasibility and transform such into business ideas by writing a business plan as a part of the *entrepreneurial process* (Davidsson, 2005; Volkmann et al., 2010). This process involves mental cognition and is reflected in the behaviors exhibited by individuals as they move to exploit the opportunities (Davidsson, 2005). This process can occur through four successive stages (see Figure 2).



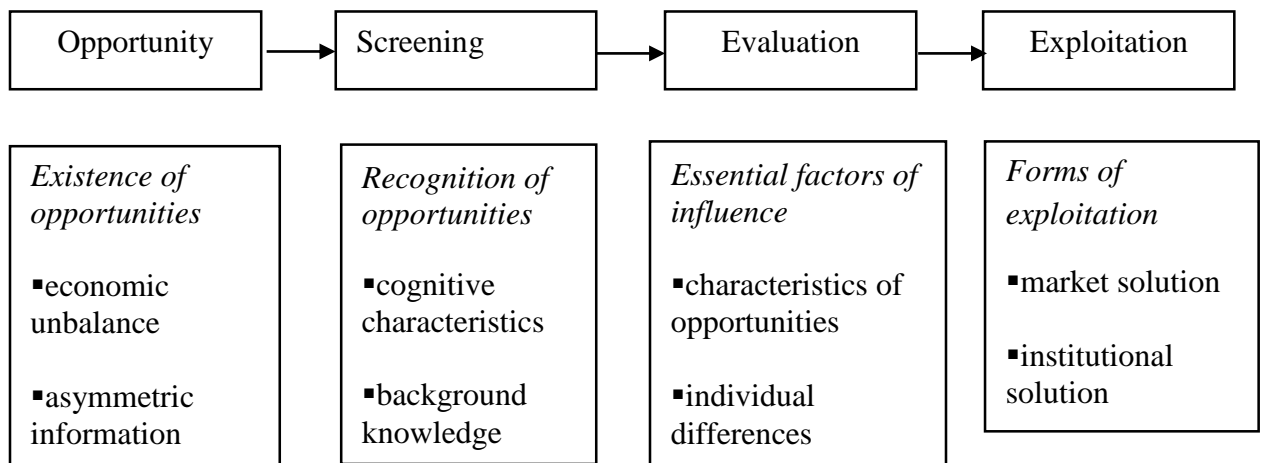


Figure 2. The process of entrepreneurial recognition. Source: Adapted from “Entrepreneurship in a European perspective: Concepts for the creation and growth of new ventures” by Volkmann et al., 2010, p. 79.

A multitude of factors drive individuals into entrepreneurship but belong to two distinct categories, i.e., *push* and *pull factors* (Alsos et al., 2011; Stevenson & Jarillo, 1990; Vyavahare & Bendal, 2012). The *push factors* mainly arise from the environment, such as extrinsic forces, and *pull factors* emerge from an individual’s intrinsic desires and motivations. However, it is purely an intentional act to recognize entrepreneurial opportunities.

*We don’t start a business as a reflex, do we? We may respond to the conditions around us, such as an intriguing market niche, by starting a new venture. Yet, we think about it first; we process the cues from the environment around us and set about constructing the perceived opportunity into a viable business proposition [emphasis in original]. (Krueger et al., 2000, p. 411)*

Entrepreneurship is a driver of economic development in communities and nations through the creation of employment opportunities and revenue sources for the

economy (Akola & Heinonen, 2006; Oosterbeek, Van Praag, & Ijsselstein, 2010). It is thought to be a potential solution for various economic challenges impacting the world today such as unemployment and widening economic disparities within communities and between nations (Marques, Ferreira, Gomes, & Rodrigues, 2012; Valerio et al., 2014). This aim may be achieved by equipping aspiring entrepreneurs with knowledge, skills, and entrepreneurial competencies enabling them to launch and sustain successful ventures.

### **Entrepreneurial Competencies**

Bird (1995) described entrepreneurial competencies as the “underlying characteristics such as generic and specific knowledge, motives, traits, self-images, social roles, and skills which result in venture birth, survival, and/or growth” (p. 51). Such competence involves special skills, personality traits, attitudes, as well as behaviors exhibited by entrepreneurs to successfully accomplish specific tasks (Mitchelmore & Rowley, 2010; Morris, Webb, Fu, & Singhal, 2013b).

Lackéus (2013) classified entrepreneurial competencies to include knowledge, skills, and attitudes related to entrepreneurship. Entrepreneurship knowledge leads to the development of cognitive-models making individuals more innovative, creative, and able to recognize and evaluate entrepreneurial opportunities (Lackéus, 2013). The skills domain includes competencies in marketing, opportunity recognition, communication, and interpersonal relations (Lackéus, 2013). And the attitude domain involves the entrepreneur developing competencies featuring perseverance, self-efficacy, as well as tolerance for risks and uncertainties, among perspectives (Lackéus, 2013).

To evaluate the competencies of entrepreneurs, some scholars have focused on their personal characteristics, i.e., *traits theory* (Boyd & Vozikis, 1994; Gurol & Atsan, 2006; Low & Macmillan, 1988). Unfortunately, no single set of personality traits have accurately predicted which individuals emerge as entrepreneurs; rather, a combination of factors such as attitudes, intentions, knowledge, skills, and behaviors exhibited by individuals are recognized (Autio, Keeley, Klofsten, Parker, & Hay, 2001; Mitchelmore & Rowley, 2010; Neck & Greene, 2011; Sherman, Sebor, & Digman, 2008). Moreover, Volkmann et al. (2010) posited that “for studying entrepreneurship at the level of the individual business the behavioral approach may hold more future potential than the traits approach” (p. 140). Entrepreneurial competencies are reflected in entrepreneurs’ behaviors (Autio et al., 2001; Gartner, 1988). Some entrepreneurial competencies are, however, related to managerial competencies, even though the two are conceptually different (Boyatzis, 1982; Man & Chan, 2002). In addition, being entrepreneurially competent does not necessarily imply an individual has intentions to become an entrepreneur, “although it is likely that [some persons may] attempt to develop a business venture in the future” (Erikson, 2003, p. 107).

Entrepreneurial competence leads to improved self-efficacy, which, in turn, is likely to lead to individuals’ developing an entrepreneurial mindset, and this influences the establishment of entrepreneurial ventures (Baron, Mueller, & Wolfe, 2016; Chen, Greene, & Crick, 1998; Kickul, Wilson, Marlino, & Barbosa, 2008; Post, 2014; Wilson, Kickul, & Marlino, 2007). Competence in any area, including entrepreneurship, can be achieved through modification of four different types of experiences that promote self-efficacy, i.e., mastery experiences, vicarious experiences, social persuasion, and

physiological state (Bandura, 1977, 1986, 1988; Wood & Bandura, 1989). Further, Morris et al. (2013a) argued entrepreneurial competencies similar to other skills can be honed through practice and education.

*Mastery experiences* involve direct or hands-on encounters and are the most effective way to promote personal self-efficacy, endurance, and resilience (Bandura, 1977, 1986; Boyd & Vozikis, 1994; Lent, Brown, & Hackett, 1994; Wood & Bandura, 1989). Successful launching and management of ventures improves self-efficacy, but inhibits such if individuals experience setbacks that cause self-doubt (Bandura, 1988; Wood & Bandura, 1989). “People with high self-efficacy have more intrinsic interest in the tasks, are more willing to expend their effort, and show more persistence in the face of obstacles and setbacks” (Chen et al., 1998, p. 298).

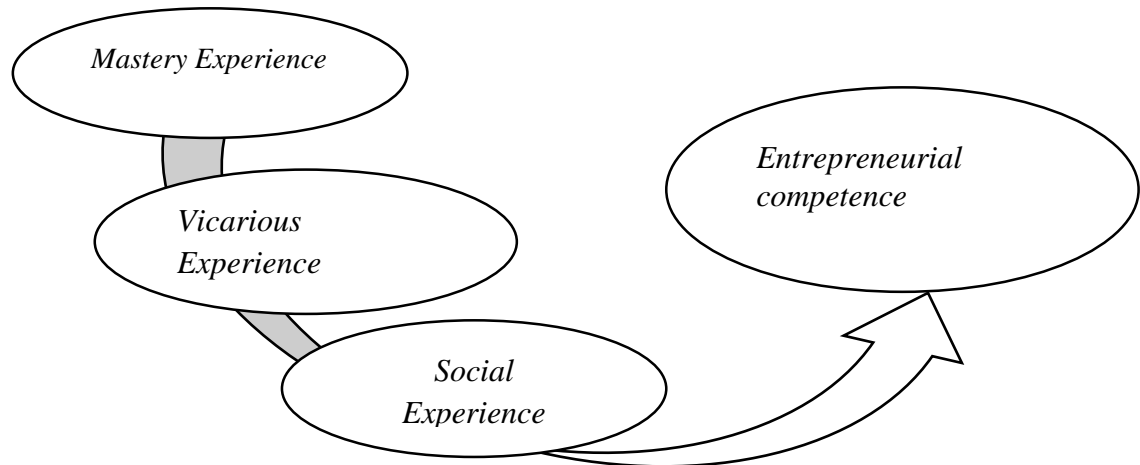
*Vicarious experiences* emerge from indirect experiences such as observing role models which provides a yardstick for self-evaluation (Bandura, 1977, 1986, 1988; Erikson, 2003; Lent et al., 1994; Wood & Bandura, 1989). When individuals see their peers or role models succeed, it boosts their own self-efficacy and uplifts their self-drive for success, but the same may be inhibited if their peers or role models experience setbacks, which are likely to result in negative feedback causing self-doubts (Bandura, 1988; Wood & Bandura, 1989).

*Social persuasion* arises from societal expectations and beliefs from the community that an individual has what it takes to succeed in achieving a desired goal, and, as a result, promote a person’s perceived self-efficacy (Bandura, 1977, 1986, 1988; Lent et al., 1994; Wilson et al., 2007; Wood & Bandura, 1989). Individuals with high perceived personal efficacy tend to feel more competent about trying new ventures and

take more risks in pursuit of entrepreneurial ventures, which is a key attribute of entrepreneurs (Krueger & Dickson, 1994). To this point, Bandura (1988) asserted: “To ensure progress in personal development, success is measured in terms of self-improvement rather than by triumphs over others” (p. 285).

The physiological state of an individual is the fourth variable involved in modifying perceived self-efficacy (Bandura, 1988; Wood & Bandura, 1989). Individuals, including potential entrepreneurs, evaluate personal capabilities and potential for success based on their overall wellbeing; signs of ill health or personal discomfort can impact an individual’s assessment of his or her perceived self-efficacy (Bandura, 1988; Wood & Bandura, 1989). Boyd and Vozikis (1994) explained empirical evidence exists supporting the notion of “a negative relationship between anxiety level and self-efficacy expectations” (p. 68). Therefore, improving peoples’ perceived wellbeing, and management of stress and anxieties, could lead to the improvement of their perceived self-efficacy and entrepreneurial competence, and thereby contribute to success of the individuals’ business ventures.

According to Erikson (2003), when an individual’s mastery experiences, vicarious experiences, and social experiences about entrepreneurship are good, such leads to increased entrepreneurial self-efficacy, which is reflected in a person’s positively perceived entrepreneurial competence, as illustrated in Figure 3.



*Figure 3.* Main determinants of entrepreneurial competence (Erikson, 2003, p. 108).

Schumpeter concluded that being innovative and creative are some of the major underlying characteristics of successful entrepreneurs (Brockhaus, 1980; Bruyat & Julien, 2001; Carland et al., 1984). A number of skills, traits, and attributes possessed by certain individuals are presage variables for entrepreneurial competencies but such differs across the entrepreneurship literature (Boyatziz, 1982; Gurol & Atsan, 2006; Morris et al., 2013a; Neck & Greene, 2011). These attributes include autonomy/independence, creativity, desire to achieve, endurance, flexibility, goal setting, high internal locus of control, leadership, market awareness, opportunity recognition, persistence, power or control, risk taking propensity, self-efficacy and confidence, social networks/connections, among others (Gurol & Atsan, 2006; Liberal, 2007; Oosterbeek et al., 2010; Valerio et al., 2014; Vesala, Peura, & McElwee, 2007). Man, Lau, and Chan (2002) added six entrepreneurial competencies, including “opportunity, relationship, conceptual, organizing, strategic, and commitment” (p. 124). However, possession of said competencies does not imply an entrepreneur is competent to start a venture unless such

is reflected in the individual's knowledge, skills, attitudes, decisions, behaviors, and actions (Man et al., 2002; Morris et al., 2013a, b).

In addition, other entrepreneurial skills include cognitive, functional, and behavioral competencies, all of which can be acquired through formal and informal learning experiences (Lans, Hulsink, Baerk, & Mulder, 2008). Morris et al. (2013b) conducted a Delphi study in which they identified 13 entrepreneurial competencies (see Table 2).

Table 2

*Entrepreneurial Competencies Identified by Morris et al. (2013b)*

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- 1 Opportunity Recognition: [T]he capacity to perceive changed conditions or overlooked possibilities in the environment that represent potential sources of profit or return to a venture
  - 2 Opportunity Assessment: [A]bility to evaluate the content structure of opportunities to accurately determine their relative attractiveness
  - 3 Risk Management/Mitigation: [T]he taking of actions that reduce the probability of a risk occurring or reduce the potential impact if the risk were to occur
  - 4 Conveying a Compelling Vision: [T]he ability to conceive an image of a future organizational state and to articulate that image in a manner that empowers followers to enact it
  - 5 Tenacity/Perseverance: [A]bility to sustain goal-directed action and energy when confronting difficulties and obstacles that impede goal achievement
-

- 6 Creative Problem Solving/Imaginativeness: [T]he ability to relate previously unrelated objects or variables to produce novel and appropriate or useful outcomes
  - 7 Resource Leveraging: [S]kills at accessing resources one does not necessarily own or control to accomplish personal ends
  - 8 Guerrilla Skills: [T]he capacity to take advantage of one's surroundings, employ unconventional, low-cost tactics not recognized by others, and do more with less
  - 9 Value Creation: [C]apabilities of developing new products, services, and/or business models that generate revenues exceeding their costs and produce sufficient user benefits to bring about a fair return
  - 10 Maintain Focus yet Adapt: [A]bility to balance an emphasis on goal achievement and the strategic direction of the organization while addressing the need to identify and pursue actions to improve the fit between an organization and developments in the external environment
  - 11 Resilience: [A]bility to cope with stresses and disturbances such that one remains well, recovers, or even thrives in the face of adversity
  - 12 Self-Efficacy: [A]bility to maintain a sense of self-confidence regarding one's ability to accomplish a particular task or attain a level of performance
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- 13            Building and Using Networks: [S]ocial interaction skills that enable an individual to establish, develop, and maintain sets of relationships with others who assist them in advancing their work or career

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*Note.* Adapted from “A competency-based perspective on entrepreneurship education: Conceptual and empirical insights” by Morris et al., 2013b, p. 358.

Conceptual and empirical insights” by Morris et al., 2013b, p. 358.

Although the aforementioned entrepreneurial competencies are possessed by successful entrepreneurs, these skills are not consistently found in all such individuals (Fiet, 2001a; Garavan & O’Cinneide, 1994; Izquierdo, Deschoolmeester, & Salazar, 2005). Moreover, research on what actual characteristics or competencies constitute competent entrepreneurs is inconclusive (Chen & He, 2011; Gurol & Atsan, 2006; Neck & Greene, 2011), but includes some personality traits that enhance a person’s enablement of entrepreneurial behaviors (Boyatziz, 1982).

Akin to the debate on theories explaining successful entrepreneurship, that is to say trait-based versus behavioral (Daft, 2015), the discussion of which leadership skills, traits, or behaviors make up competent entrepreneurs is ongoing (Bull & Willard, 1993; Carland et al., 1988; Gartner, 1988, 1990). Whereas some scholars focus on the personality traits of entrepreneurs (Gurol & Atsan, 2006), many have studied their behaviors, and still others have relied on both to develop a list of the key attributes that constitute the competencies exhibited by *successful entrepreneurs* (Autio et al., 2001; Carland et al., 1988; Gartner, 1988, 1990; Pyysiäinen, McElwsee, Anderson, & Vesala, 2006). On that note, Fiet (2001a) concluded: “There is no general recipe for successful entrepreneuring” (p. 8). And Low and Macmillan (1988) added:

[B]eing innovators and idiosyncratic, entrepreneurs tend to defy aggregation.

They tend to reside at the tails of population distributions, and though they may be expected to differ from the mean, the nature of these differences are not predictable. It seems that any attempt to profile the typical entrepreneur is inherently futile. (p. 148)

Although describing the determinants of successful entrepreneurs defies reduction (Fiet, 2001a; Low & Macmillan, 1988), entrepreneurial competencies may arise from the interaction of both personality traits and cognitive styles but transcend each while being reflected in their behaviors, attitudes, knowledge, and values (Morris et al., 2013b). Therefore, entrepreneurial competencies may be evaluated through observation of behaviors, changes in attitudes, entrepreneurial intentions and knowledge differences, all of which are subject to acquisition and modification through entrepreneurship education (Blok, Lubberink, Lans, & Omta, 2014; Lackéus, 2013; Lans et al., 2008; Morris et al., 2013). Moreover, entrepreneurial competencies also can be assessed through direct observation; analyzing diaries, records, and journal entries; interviewing; and field placements experiences; among other sources of data and information (Bird, 1995; Lackéus, 2013; Pavlovich, 2007; Scott et al., 2015, 2016).

### **Entrepreneurship Education**

Though some scholars assert *entrepreneurs are born* (Gibb, 1987; Henry et al., 2005; Kuratko, 2005; Valerio et al., 2014; Volkmann et al., 2010), a majority argue that through formal and non-formal education, such as business incubation using a hands-on, minds-on approach, individuals can be equipped with entrepreneurial skills for successful venture creation (Cheng, Chan, & Mahmood, 2009; Mohamad, Lim, Yusof, &

Soon, 2015; Rezai, Mohamed, & Shamsudin, 2011; Ronstadt, 1985; Scott, Penaluna, & Thompson, 2016). Drucker (1985) posited “everyone who can face up to decision making can learn to be an entrepreneur and to behave entrepreneurially. Entrepreneurship, then, is behavior rather than a personality trait. And its foundation lies in concept and theory rather than in intuition” (p. 26). However, some individuals may naturally exhibit “more entrepreneurial attributes than others” (Garavan & O’Cinneide, 1994, p. 4).

In addition, entrepreneurial skills such as business planning, accounting, management, creativity, and innovativeness can be learned in formal educational settings through active experimentation (Akola & Heinonen, 2006; Haase & Lautenschläger, 2011; Neck & Greene, 2011; Valerio et al., 2014). Alsos et al. (2011) posited: “Although some individuals may appear to have strong innate skills, the majority acquire entrepreneurial skills through practice” (p. 15). Application of the theoretical content acquired in a classroom to real-world environments in contextualized ways helps aspiring entrepreneurs to gain practical experiences (Dhliwayo, 2008; Hynes & Richardson, 2007; Lackéus, 2013; Marsick & Watkins, 1990; Pittaway & Cope, 2007; Rasmussen & Sørheim, 2006), including the acquisition and exercise of tacit knowledge and understanding.

Smith (2001) described tacit knowledge as that which is “practical, action-oriented knowledge or ‘know-how’ based on practice, acquired by personal experience, seldom expressed openly, [and] often resembles intuition” (p. 314). Tacit knowledge promotes creativity, innovation, and is useful in problem solving (Leonard & Sensiper, 1998; Smith, 2001). For this reason, scholars have advocated for educational institutions to immerse entrepreneurship students in real-world hands-on, minds-on learning

experiences regarding venture creation and business start-ups to acquire practical skills for future business development (Dhliwayo, 2008; Garavan & O’Cinneide, 1994; Gibb, 1987; Haase & Lautenschläger, 2011; Young, 2007). Real-world experiences provide learners with direct entrepreneurial learning opportunities, i.e., learning through entrepreneurship (Lackéus, 2013; O’Connor, 2013).

Gibb (1987) opined that “in the education system, it should be possible, without abandoning some of the basic cultural values, to move more flexibly towards encouraging students to cope in new ways with the real world” (p. 19). Engaging students with entrepreneurial role models in real-world environments helps them to network; gain practical experience; acquire leadership, report writing, problem solving, crisis management, and decision making skills; and also stands to improve relationships between schools and communities (Bell & Bell, 2016; Hynes & Richardson, 2007).

Entrepreneurship education is synonymous with enterprise education, and the two terms are used interchangeably depending on geographical location (Gurol & Atsan, 2006; Jones et al., 2012; Mwasalwiba, 2010). Although the United Kingdom uses *enterprise education* as its descriptor, the United States and a majority of the world refers to such as *entrepreneurship education* (Gibb, 1993; Haase & Lautenschläger, 2011; Lackéus, 2013). Other researchers, however, argue that the two terms are conceptually different (Garavan & O’Cinneide, 1994; Gorman, Hanlon, & King, 1997; Pittaway & Cope, 2007). For example, Jones and Iredale (2010) stated: “Entrepreneurship education focuses primarily on the needs of the entrepreneur, whereas enterprise education addresses the requirements of a wider range of stakeholders, including consumers and community” (p. 11). Moreover, enterprise education takes on a much broader approach to

learning compared to entrepreneurship education which tends to focus on business start-ups (Jones & Iredale, 2010). Mwasalwiba (2010) argued entrepreneurship education aims to create “an attitude of self-reliance” (p. 25) and enterprise education “is for creating opportunity-seeking individuals” (p. 25).

One issue vexing many scholars is whether entrepreneurship education increases the intent of students to become entrepreneurs (Graevenitz, Harhoff, & Weber, 2010; Joensuu-Salo, Varamäki, & Viljamaa, 2015); research findings diverge in this regard. Some investigators have reported a positive influence of entrepreneurship education on learners’ perceptions and intent to become entrepreneurs (Clouse, 1990; Fayolle & Gailly, 2008; Fayolle, Gailly, & Lassas-Clerc, 2006; Hamidi, Wennberg, & Berglund, 2008; Hattab, 2014; Kolvereid & Moen, 1997; Morris et al., 2013a; Peterman & Kennedy, 2003). Others, however, reported a negative impact of entrepreneurship education on participants’ entrepreneurial intentions (Cheng et al., 2009; Gurel, Altinay, & Daniele; 2010). A majority of the significant findings reported by authors were based on descriptive and exploratory research, or results from non-experimental pretest-posttest designs which, without counterfactual groups to compare findings, limits the possibility to predict the cause-effect relationships between variables with confidence (Fiet, 2001a, b; Graevenitz et al., 2010).

Entrepreneurship education also can be understood in two ways, i.e., “learning about entrepreneurship as a phenomenon, or learning useful skills in order to become an entrepreneur” (Rasmussen & Sørheim, 2006, p. 186). Entrepreneurship education helps learners to develop an entrepreneurial mindset with the ability to recognize, evaluate, and exploit opportunities (Haase & Lautenschläger, 2011; Hynes & Richardson, 2007).

Valerio et al. (2014) described *entrepreneurial mindset* as “the socio-emotional skills and overall awareness of entrepreneurship associated with entrepreneurial motivation and future success as an entrepreneur” (p. 36).

Although the entrepreneurship curriculum varies across institutions of higher education and even regions (Fayolle et al., 2006; Fiet, 2001a; Garavan & O’Cinneide, 1994; Mwasalwiba, 2010; Rasmussen & Sørheim, 2006), one crosscutting feature in the curricula is the development of a business plan (Gartner & Vesper, 1994; Gurol, Aydinlik, & Atsan, 2008; Hamidi et al., 2008; Hills, 1988; Kuratko, 2005; Morris et al., 2013a; Sherman et al., 2008). Unfortunately, in real-world environments business ventures are often organic and evolve based on a number of factors removed from the proposed business plans (Bell & Bell, 2016; Dhliwayo, 2008; Honig, 2004; Neck & Greene, 2011; Ronstadt, 1985). On that note, Sullivan (2000) contended that “too much emphasis on the business plan may lead to an environment where entrepreneurs fear change and are unable or unwilling to be flexible in the face of a dynamic environment” (p. 171).

On the other hand, when individuals receive proper training and mentorship in entrepreneurship, it increases the likelihood of them starting and successfully managing entrepreneurial ventures (Bell & Bell, 2016; Haase & Lautenschläger, 2011; Morris et al., 2013a). Mentors are agents of change who can help aspiring entrepreneurs hone entrepreneurial competence through modeling, practice, reflection, and their provision of constructive feedback (Sullivan, 2000). Stevenson (2004) urged entrepreneurship educators to “be more than cheerleaders” (p. 11), and, instead, *be part of the change process* in partnership with aspiring entrepreneurs. To that end, entrepreneurship

education may be vital in promoting entrepreneurship among students and positive change in communities (Stevenson, 2004). In regard to entrepreneurs as learners, Smilor (1997) asserted:

[E]ffective entrepreneurs are exceptional learners. They learn from everything. They learn from customers, suppliers, and especially competitors. They learn from employees and associates. They learn from other entrepreneurs. They learn from experience. They learn by doing. They learn from what works, and more importantly, from what doesn't work. (p. 344)

Adolescence is the most potent age to cultivate and nurture a favorable attitude toward entrepreneurship among students (Peterman & Kennedy, 2003). In the United States, although non-formal education in entrepreneurship dates back to the 1800s (Katz, 2003; Kuratko, 2005), it was not until beginning in the early 1970s and during the 1980s that a concentration on entrepreneurship education gained momentum at universities (Clouse, 1990; Fiet, 2001b; Katz, 2003; McMullan & Long, 1987; Sherman et al., 2008). In recent times, entrepreneurship education has expanded to include other faculties and students outside of the schools of business (Blenker et al., 2014; Morris et al., 2013a).

Experiential learning involving hands-on, minds-on approaches is the usual method employed to teach entrepreneurship (Fitzgerald & Stokes, 2009; Hynes & Richardson, 2007; Kuratko, 2005; Scott et al., 2016). This may include writing business plans, engaging in business incubation/start-ups, experiencing apprenticeships, and taking field trips and site visits to equip students with entrepreneurship knowledge and skills (Kuratko, 2005; Morris et al., 2013a). Entrepreneurship students acquire skills in communication, gain self-confidence and good work ethics, as well as leadership,

marketing, and problem solving, record keeping, risk management, and teamwork, among other competencies (Bell & Bell, 2016; Honig, 2004; Hynes & Richardson, 2007; Oosterbeek et al., 2010). This is especially true if learners implement entrepreneurial activities with the mentorship of experienced role models in their communities (Belbin, 2010; Bell & Bell, 2016; Sullivan, 2000).

Hoover and Whitehead (1975) contended: “Experiential learning exists when a personally responsible participant cognitively, affectively, and behaviorally processes knowledge, skills and/or attitudes in a learning situation characterized by a high level of active involvement” (p. 25). Experiential learning in entrepreneurship education helps learners to hone their personal and entrepreneurial skills, which increases the likelihood of successful entrepreneurial endeavors (Pittz, 2014). Entrepreneurship teachers need to be encouraging and proactive in helping students to identify their entrepreneurial talents, including an education that is holistic but also tailored to meet the needs of individual learners (Pittz, 2014) and the community as a whole. Pittz (2014) added: “We must be more than naysayers. We must endeavor to recognize the unique characteristics of our students and tailor our pedagogy to meet individual needs” (p. 182).

Further, entrepreneurship teachers ought to relate their teaching with the environments in which the students are likely to operate, so they are able to recognize opportunities and mitigate real-world risks (Cheng et al., 2009; Cole & Ulrich, 1987; Fayolle & Gailly, 2008; Gartner & Vesper, 1994; Heinonen & Poikkijoki, 2006; Morris et al., 2013a). Pittz (2014) outlined five stages useful in ensuring experiential learning in entrepreneurship is effective: (a) “[e]nhancing self-awareness and developing intellectual



capital”; (b) “[n]etworking”; (c) “[d]etermining the target industry”; (d) “[b]usiness selection”; and (e) “[d]eveloping a marketing system” (p. 184).

The ability of students to realize their “capabilities, desires, weaknesses, and talents” (Pittz, 2014, p. 184) is crucial in entrepreneurship education because it helps them to develop entrepreneurial ideas/innovations consistent with their own abilities and interests. Individuals are likely to be creative, devoted, and successful when working on innovations/projects in which they are interested (Pittz, 2014). Pittz (2014) added that “through internships, apprenticeships, part-time jobs, or volunteer opportunities [where they are able to connect with potential partners,] customers, competitors, and stakeholders” (p. 185), students are able to grow their networks and also gain experience in real-world environments. Further, through self-awareness and networking, student entrepreneurs are equipped to identify entrepreneurial opportunities, such as developing a marketing strategy, to reach potential customers (Pittz, 2014).

Teaching entrepreneurship requires pedagogical techniques that provide learners with opportunities to have hands-on, minds-on learning experiences and experiment with concepts in real-world environments (Corbett, 2005; Honig, 2004; McMullan & Long, 1987; Morris et al., 2013a), i.e., concrete experiences leading to self-reflection and abstraction, as postulated by Kolb (1984). According to Jones and English (2004), such techniques would include “a teaching style that is action-oriented, encourages experiential learning, problem solving, project-based learning, creativity, and is supportive of peer evaluation” (p. 416).

Prior to exploiting an entrepreneurial endeavor, entrepreneurs need to first recognize the opportunity for which they intend to develop or apply an innovation (Cole

& Ulrich, 1987). This is followed by formulating strategies to exploit the opportunity, and, thereafter, evaluation and selection of the best approach to employ (Cole & Ulrich, 1987). However, “to be effective, the entrepreneur, like any other learner, needs to employ the four different learning abilities: concrete experience, reflective observation, abstract conceptualization, and active experimentation” (Cole & Ulrich, 1987, p. 35). These constructs comprise Kolb’s model of experiential learning (Kolb, 1981, 1984; Morris et al., 2013a).

Experiential learning approaches, as emphasized in Kolb’s model (1984), are the cornerstone of entrepreneurship education, and address some of the shortcomings associated with other traditional teaching methods such as the lecture method (Bell & Bell, 2016; Kuratko, 2005; Piercy, 2013). Heinonen and Poikkijoki (2006) asserted: “The traditional lecture format with all its predictability may not be the most effective method as it ignores the essence of the phenomenon, i.e.[,] the entrepreneurial process” (p. 84). Teaching entrepreneurship requires that students have hands-on, minds-on experiences in real-world settings and not doing such limits their learning. To put it in perspective, teaching entrepreneurship without incorporating practical and realistic learning opportunities is akin to “teaching someone to swim without a pool” (Sherman et al., 2008, p. 29). Through active experimentation and experiences in real-world environments, learners tend to remember more of what transpired (Knapp & Benton, 2006). Such was the rationale for John Dewey’s approach to teaching in which he advocated for *learning by doing* (Dewey, 1951), which grounds Kolb’s (1984) model of experiential learning.

## Section II

### **Background of Agricultural Entrepreneurship (*Agripreneurship*)**

Agricultural entrepreneurship is synonymous with *agripreneurship* (Bairwa, Lakra, Kushaha, Meena, & Kumar, 2014). It emanates from the discipline of entrepreneurship (Lans, Seuneke, & Klerkx, 2013; Uneze, 2013). Moreover, entrepreneurship, as espoused by the French in the 1700s, evolved in the context of agriculture, though now it is usually associated with technology and manufacturing and less with agriculture (Singh & Krishna, 1994). Various definitions of *agripreneurship* have been put forth by scholars (Macher, 1999; Mukembo & Edwards, 2015a; Nagalakshmi & Sudhakar, 2013). But the common theme among these definitions is that *agripreneurship* involves creating a product or providing services of value related to agriculture to bring about returns on investment and/or improve livelihoods. On that note, it is not limited to making a farming enterprise profitable, but may involve a wide range of agriculturally related initiatives with a positive and transformative impact on communities. For example, social agricultural ventures such as Heifer International and One Acre Fund aim to improve people's livelihoods while promoting food security in their communities.

Agripreneurs are interested in agriculturally related businesses with a motive for profit and self-employment (Aleke et al., 2011; Nagalakshmi & Sudhakar, 2013; Singh & Sharma, 2012; Tripathi & Agarwal, 2015). Agripreneurs require entrepreneurial competencies to be successful in their ventures. Competencies include being visionary, innovativeness, opportunity recognition and evaluation, resilience, risk tolerance, and self-efficacy, among others. But, most important, sustainability and profitability are the

underlying principles of any agripreneurship venture (Macher, 1999; Vyavahare & Bendal, 2012).

A number of factors drive adults into entrepreneurship and are also likely to motivate youth to pursue agripreneurship; these include push *and* pull factors (Alsos et al., 2011; Vyavahare & Bendal, 2012). Agripreneurs, whether adults or youth, should consider their personal goals and the potential for returns on investment before embarking on agricultural ventures (Macher, 1999). Some personal attributes associated with agripreneurs include being market- and achievement-oriented, creativity, empathy, flexibility, initiative, inspiration, leadership, perseverance, and self-criticism (Singh, 2012; Singh & Sharma, 2012).

### **Extension Agents and Farmers' Entrepreneurial Endeavors**

In the past, extension agents were tasked with the *dissemination of research-based innovations to farmers* in what has been called a “*one-size-fits all approach* [emphasis added]” (Lans et al., 2013, p. 46). Little consideration was given to the aptitudinal diversity, individual interests, and entrepreneurial abilities found among farmers (Lans et al., 2013; Rajaei et al., 2011). This may have been due to limited research-based evidence about the entrepreneurial abilities of agricultural producers (Carter, 1998; McElwee, 2008), especially in developing countries.

Though not all farmers are entrepreneurs, most, if not all, have undertaken entrepreneurial ventures, as reflected in their ability to adapt and overcome challenges associated with the agricultural sector worldwide (Alsos et al., 2011; Carter, 1998). These challenges include climate change, disease outbreaks, natural disasters, pests, price fluctuations, and so forth. Overcoming these obstacles has been achieved through a

number of ways, including portfolio entrepreneurship, or sometimes referred to as diversification or pluriactivity in agriculture (Carter, 1998; Vesala et al., 2007). This involves the establishment of several enterprises to spread the risks encountered in practicing agriculture.

In addition, globalization has opened up local as well as world markets and resulted in rural-economic changes; local farmers have to compete with imports for market share, therefore, necessitating them to be entrepreneurial in their undertakings to survive (McElwee, 2005; Pyysiäinen et al., 2006). Farmers are under pressure “to become more all-round entrepreneurs, diversifying away from the production of crops and livestock as raw commodities for transformation further up the supply chain” (Warren, 2004, p. 371) to survive in the global market. This requires skills to select the right enterprises for diversification, including their choosing to produce specialty crops to meet the demands of emerging markets (Warren, 2004). Entrepreneurship skills and competencies increase productivity and farmers’ profits, and, ultimately improve their livelihoods (Richards & Bulkley, 2007).

Agripreneurial farmers are creative, innovative, self-driven, and have the ability to optimally take advantage of available opportunities (Kahan, 2013). However, transforming an individual from the status of a “farmer as a farmer” to a “farmer as [an] entrepreneur” (Díaz-Pichardo, Cantú-González, López-Hernández, & McElwee, 2012, p. 97) requires empowering him or her with the requisite entrepreneurial competencies (Kahan, 2013; Rudmann, 2008; Tripathi & Agarwal, 2015). Extension service providers, therefore, should support and promote the development of entrepreneurship skills among

farmers, including the mentoring of aspiring farmers and would be agripreneurs through education and outreach initiatives (Kahan, 2013; Rudmann, Vesala, & Jäckel, 2008).

Extension educators (or agents) should endeavor to help farmers to recognize, evaluate, and exploit the agripreneurship opportunities available within and beyond their communities (Kahan, 2013). Moreover, training farmers in value-addition increases efficiency and profitability of agricultural ventures; networking with other agripreneurs within and outside their communities as well as researchers leads to better market access and potential sources of credit (Kahan, 2013). When extension educators facilitate networking between agripreneurial farmers in a community with individuals outside their locale, including scientists, it fosters teamwork, co-creation of knowledge, and builds stronger networks which facilitate the flow of knowledge about innovations (Navarro, 2008). This, in turn, may foment improved agricultural production and community development in the long-run. Moreover, farmers possessing entrepreneurial attributes, such as innovativeness, opportunity recognition, and appropriate risk-taking behaviors, facilitates the change process which culminates in them adopting new technologies, as assisted by the work of extension agents (Singh & Krishna, 1994). Further, extension agents should play a supportive role beyond the trainings they provide, if farmers are to become successful agripreneurs (Kahan, 2013). However, because most extension personnel are specialists in one particular field or technical specialty, they may require professional development in agricultural entrepreneurship to be effective at mentoring aspiring agripreneurs (Kahan, 2013).

Agripreneurship is important “for the survival of small-scale farming in an ever-changing and increasingly complex global economy” (Kahan, 2013, p. 2). But in spite of

its importance in agriculture, limited research exists about agripreneurship and related innovations (Alsos et al., 2011; Knudson et al., 2004; McElwee, 2005). A research project funded by the European Union to explore entrepreneurial skills needed by farmers identified five categories of skills or competencies required to be successful agripreneurs. These categories were (a) cooperation/networking skills which include soft skills to help the farmer interact with others effectively, such as communication, cooperation, flexibility, leadership, and teamwork; (b) management skills, including human and financial management, project planning, and customer care skills; (c) opportunity recognition skills, which encompasses the ability to identify business opportunities, conduct risk assessment and management, and innovativeness; (d) professional skills involving technical and production knowledge for the area/project the farmer would like to implement; and (e) strategic skills to develop and evaluate the feasibility of a business idea, thinking conceptually, and setting goals (De Wolf, Schoorlemmer, & Rudmann, 2007; McElwee, 2008b; Rudmann, 2008; Vesala & Pyysiäinen, 2008). Three of these five skills, i.e., cooperation, opportunity recognition, and being strategic, are what make a farmer an entrepreneur (De Wolf & Schoorlemmer, 2008; De Wolf et al., 2007). However, farmers also need managerial and entrepreneurial skills to be successful agripreneurs (Pyysiäinen et al., 2006). The farmers' technical knowledge about the proposed entrepreneurial ventures is also essential to ensuring successful implementation and can be achieved through education.

### **Section III**

#### **Agricultural Education**

Agricultural education is a scholarly discipline which conflates the agricultural sciences and education (Barrick, 1989; Phipps, Osborne, Dyer, & Ball, 2008). In addition, it “serves as the bridge between agricultural science and other disciplines” (Barrick, 1989, p. 27). School-based, agricultural education (SBAE) involves teaching learners about agriculture, environment, and related natural resources (Phipps et al., 2008). In general, agricultural education “focuses on educational processes as they are applied to the diverse field of agriculture” (Phipps et al., 2008, p. xxvii), and aims to develop human capital for the agricultural sector and related industries (Gordon, 2008; Love, 1978; Phipps et al., 2008). Moreover, Love (1978) stated: “Programs in agricultural education are student – and occupation – centered” (p. 9).

Historically, agricultural education also has been conducted around the world in informal learning environments by extension/advisory services (Foor & Connors, 2010; Jones & Garforth, 1997; Mukembo & Edwards, 2015a; Swanson & Claar, 1984; True, 1929). However, formal agricultural education took root at different times in various countries. For example, in England and other places in Europe, agricultural education is thought to have existed as early as the 17th century when Samuel Hartlib (1600 – 1670) wrote books about animal husbandry and learners were taken for apprenticeships (Brook, 2011; True, 1929). In the United States, formal agricultural education can be traced back to the 18th century with a focus on equipping youth with knowledge and skills to improve agricultural and food production (Gordon, 2008; Hamlin, 1956; National Research Council [NRC], 1988; True, 1929).



Although it is difficult to determine with certainty when public support for agricultural education started, most formal agricultural education programs are thought to have started during the late 19th century and early 20th century in the United States (Herren, 1985; Hillison, 2010; NRC, 1988). The national program for vocational agricultural education in the United States was established in 1917 with enactment of the Smith-Hughes Act (Foor & Connors, 2010; Hamlin, 1956; Herren, 1985; NRC, 1988). However, earlier in 1916, as many as 3,181 public high schools taught agricultural education in their curriculum (Hamlin, 1956; Herren, 1985; Herren & Hillison, 1996). For most of the 20th century, formal agricultural education in the United States was shaped by funding from the Smith-Hughes Act of 1917 and successive legislation with a focus on vocational education to increase farm output and develop youth for the agriculture sector (Foor & Connors, 2010; Gordon, 2008; Hamlin, 1956; Herren, 1985; Herren & Hillison, 1996; Hillison, 2010; NRC, 1988; Phipps et al., 2008).

Beginning in the 1980s, agricultural education in U.S. public schools underwent a series of transformations to meet the needs of contemporary times, including the incorporation of agriscience, agribusiness, entrepreneurship education, and international agricultural experiences, among other modifications and reorientations (Gordon, 2008; NRC, 1988; Scott & Sarkees-Wircenski, 1996). Other changes initiated in the late 1980s explored innovative approaches to teaching agricultural education, such as decreased emphasis on vocational training because less than 2% of the jobs in U.S. agriculture were production-related (Gordon, 2008; NRC, 1988; Phipps et al., 2008). Today, SBAE in U.S. high schools consists of three interrelated aspects: “classroom and laboratory

instruction, supervised agricultural experience programs, and the FFA student organization” (Phipps et al., 2008, p. 5).

In Uganda, informal agricultural education was initiated by Christian missionaries who established schools to teach converts how to read the Bible, and who were also taught how to grow crops and raise animals for improved livelihoods and food security (Jones & Garforth, 1997; Mukembo & Edwards, 2015b; Ndamira, 1982). However, formal agricultural education is thought to have started in 1911 when an agricultural department was established to promote the growing of cash crops, especially coffee and cotton (Staples, 1939). Later, in 1925, an education department was established, and an agricultural officer appointed to head the agricultural education component, and this was followed by the training of agricultural education instructors at Makerere College (Staples, 1939), which is now Makerere University (Goldthorpe, 1965; Makerere University, 2017). Other training centers were opened at Bukalasa and Serere to provide short-term training in agricultural courses to both primary and secondary level agricultural instructors (Staples, 1939). By 1933, the British colonial government started to provide agricultural training to local chiefs at Bukalasa and Serere, who, in turn, worked as agricultural instructors in their communities (Staples, 1939) and also provided extension services related to food and cash crop production (Mukembo & Edwards, 2015b).

From the 1940s through the 1960s, formal agricultural education was not given much regard in Uganda, and was often discouraged in elementary schools, though allowed in high schools as part of the curriculum (Ndamira, 1982). Moreover, many parents did not believe agricultural education would provide their children with upward

social mobility, especially considering that Uganda's education system was designed to develop human capital to fill the jobs left behind by expatriates at the time of her independence (NCDC, 2013). It was not until the 1970s, when preceding educational reforms highlighted the role of agriculture in Uganda's economy, that agricultural education in schools was given much attention (Ndamira, 1982). Agricultural education was introduced to all schools in Uganda as part of the national curriculum in elementary and secondary schools, and in colleges that trained future educators (Ndamira, 1982). For this reason, Ndamira (1982) contended that the increase in agriculture production and related economic improvements in the 1970s could be partly attributed to the importance given to agricultural education in Uganda's national school curriculum.

The NCDC embarked on a number of Ordinary Level curriculum reforms to make it more relevant to the contemporary needs of learners and Uganda's human capital requirements (Musoke, 2014; NCDC, 2013, 2014). In the new proposed reforms, agricultural education will be integrated with other vocational subjects such as foods and nutrition, entrepreneurship, and computing to comprise the Technology and Enterprise learning area (Musoke, 2014; NCDC, 2013, 2016). It is posited that students will undergo learning experiences supporting their ability to become job creators, including entrepreneurs, whose endeavors will generate revenue leading to improving Uganda's economy (NCDC, 2013, 2016).

### **Curriculum Integration**

Curriculum integration promotes unification of learning by merging related themes in the curriculum into a unitary relationship to help students understand connections between content areas, thereby, increasing the capacity to transfer and apply

their understanding to real-life situations (Beane, 1995, 1996; Shoemaker, 1989; Tanner & Tanner, 1980; Vars, 1991, 2001; Wiles, 2005). According to Ralph W. Tyler (1949), such integration focuses on the horizontal relationship among subjects stipulated in the school curriculum (as cited in Oliva, 1982 & Taba, 1962) and is more concerned with the type of activities or projects in which learners are engaged rather than the subjects studied (Beane, 1995). Curriculum integration may also involve vertical cohesion as learners progress from one educational level to the next (Pearson et al., 2010). The subject matter content from various disciplines is contextualized into themes relative to the activity or project being implemented by the students (Beane, 1995; Pearson et al., 2010). To this point, Taba (1962) affirmed that “learning is more effective when facts and principles from one field can be related to another, especially when applying this knowledge” (p. 298).

Curriculum integration improves students’ self-efficacy through holistic integration of subject matter (Beane, 1995). Students learn to transfer knowledge from one subject to another through integration to find solutions to challenges experienced (Beane, 1995). This, however, necessitates collaboration among teachers from different disciplines toward a common goal, which promotes teamwork and collaboration by educators (Banks & Stave, 1998; Mukembo & Edwards, 2015c; Pearson et al., 2010). Curriculum integration uses a student-centered (or centric) approach to teaching, and learners work with their teachers to develop the learning activities, which may be related to issues they have met or are likely to encounter in real-life (Vars, 2001).

Although curriculum integration has several benefits, some teachers fear that such an approach negatively impacts the integrity of their respective subjects (Barefield, 2005;

Beane, 1995; Taba, 1962). And yet, according to Beane (1995), “[c]urriculum integration, in theory and practice, transcends subject-area and disciplinary identifications; the goal is integrative activities that use knowledge without regard for subject or discipline lines” (p. 619).

### **Traditional Classroom Instruction: Lecture**

Traditionally, lecturing is the usual mode of instruction in many academic disciplines, especially at institutions of higher learning (Costin, 1972; Dunkin, 1983; Lake, 2001; Mills, 2012; Ramsden, 2003; Svinicki & Mckeachie, 2011). The historical conception associated with this instructional approach was that learners were *empty vessels* waiting to be filled with the teacher’s knowledge of the subject (Berry, 2008; Bligh, 2000), i.e., *tabula rasa*. When used effectively, the lecture method of instruction can be an effective way to transmit a large amount of information in a short period of time (Bligh, 2000; Nilson, 2010). Moreover, instructors tend to have significant control over the learning process when using lecture; they plan and deliver the learning content with limited input from the learner, which would be the case with more student-centered/-centric teaching approaches (Ramsden, 2003). Further, the lecture method remains convenient and useful, especially in situations where instructors have large classes, and where it is not feasible to use other methods given resource constraints, especially time, money, and human capital (Hansen & Stephens, 2000; Lake, 2001; Mills, 2012).

However, whereas lecturing may play an important role in creating awareness, in most cases, it does little to spur students’ interests in the subject (Bligh, 2000). Lecturing is ineffective in teaching behavioral skills as well as other life skills that may require

direct and active experiences, and does little to evoke emotions likely to trigger change in an individual compared to methods that involve simulations (Bligh, 2000), for example.

Further, in spite of its popularity, lecturing promotes lower-order thinking, including regurgitation of ideas provided by the instructor without critical thinking by the learners, and students tend to forget most of what has been taught in a short time (Bloom, 1953; Hansen & Stephens, 2000; Menges, 1988; Nilson, 2010). In a study comparing results of physical therapist students taught through active learning techniques, such as group discussion, to the lecture method, Lake (2001) reported students who learned about topics in a group discussion setting performed better in a physiology course than those taught using the lecture method, although the more active approach resulted in teaching less course material.

Unlike teaching methods that involve active inquiry and problem-based deduction, students taught entirely using the lecture method tend to forget content faster (Menges, 1988; Nilson, 2010). When students are taught using the lecture method, at the end of the presentation they are likely to remember only 62% of the content, 45% after three to four days, which drops to 24% in eight weeks (Menges, 1988). For this reason, one American scholar, educator, and Aristotelian philosopher – Mortimer J. Adler – described lecturing as “the transfer of information from the notes of the lecturer to the notes of the student without passing through the minds of either” (Nilson, 2010, p. 113).

Further, Menges (1988) stated: “If students took an immediate examination, however, they retained almost twice as much material after eight weeks, both for ‘thought questions’ and for ‘fact questions’” (p. 260). This argument was supported by Nilson (2010) who advocated for testing of students at the end of a session to increase the

likelihood of them reflecting and retaining more of what had been presented. Such tests could be graded to serve as formative assessment of learners' understanding or left ungraded (Nilson, 2010).

To make lecturing more effective in achieving the intended learning objectives, Nilson (2010) proposed that instructors should try their level best to focus on one major topic, while making a connection between the previous and forthcoming topics. The instructor should sub-divide the topics into 10 to 15 minute segments or *chunks*, and during delivery provide some active-breaks in between such (Nilson, 2010).

Rosenshine and Furst (1971) proposed five guidelines for instructors to make teaching more effective. These included “clarity, variability, enthusiasm, task-orientation and/or businesslike behavior, and student opportunity to learn” (p. 54). These ideas espoused by Rosenshine and Furst (1971) were also echoed by Svinicki and Mckeachie (2011) who recommended proper organization of the lecture content by sequencing it from known to unknown, i.e., from “specifics to generalizations” (p. 60), and ensure coherence and consistence in the learning process. Further, instructors need to be enthusiastic, show a positive attitude, vary their voices, and ask questions to ensure students understand the concepts, keep eye contact with the learners, and be expressive while lecturing (Dunkin, 1983; Svinicki & Mckeachie, 2011). These behaviors are likely to motivate learners and help them to be more attentive and focused, which may improve students' understanding of the concepts taught.

Though the lecture method is good for delivering a large amount of information in a short time to relatively large audiences and creating awareness (Bligh, 2000; Nilson, 2010), it has a number of shortcomings which limits its effectiveness. These

shortcomings include limited engagement of the students in the learning process, lack of high-order thinking, inability to equip learners with behavioral skills, and lack of direct and active learning experiences in real-world environments (Bligh, 2000; Nilson, 2010). Moreover, students tend to forget much of the content taught in a short time (Bloom, 1953; Hansen & Stephens, 2000; Menges, 1988; Nilson, 2010). These shortcomings limit the transfer of knowledge by learners to real-life situations to solve everyday challenges they encounter outside of the classroom, which, in essence, is the purpose of education (Whitehead, 1927). This was also supported by Booker T. Washington (as cited in Gordon, 2008). To this end, the use of active learning approaches that are learner-centered/-centric and permit direct as well as active experimentation by the learners in real-world environments, such as project-based learning, are useful in overcoming many of the lecture method's shortcomings (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000).

### **Project-based Learning**

Project-based learning involves students working, mostly in teams with others, on a venture or enterprise in real-world environments under the mentorship and guidance of their teachers or other adult facilitators (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000). In project-based learning, the students take charge of their learning with some degree of independence and responsibility while working on context-based problems or issues, and the teacher's role is that of a *facilitator* or a *coach* who assists in enabling students to reach their learning objectives (Thomas, 2000). The collaboration between students and teachers is akin to that of a "master-apprentice relationship" (Blumenfeld et al., 1991, p. 371) in which the teacher models for learners and equips them with



techniques to work and solve problems but the students take over the main role of executing the projects. The students are provided with opportunities to experiment and apply the content learned in class to real-life situations; it is essentially a *learning by doing* approach with “a goal-directed process that involves inquiry, knowledge building, and resolution” (Thomas, 2000, p. 3).

Though project-based learning requires a substantial amount of time and resources to implement, the benefits arising from it may be enormous (Blumenfeld et al., 1991; Nilson, 2010). The learning approach helps students to acquire problem solving skills in real-life situations, promotes the development of inter-personal communication skills, leadership skills, and also foments high-order thinking, reasoning skills, and teamwork (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000). These skills are likely to be retained and used by students later in life; this may not be the case with some traditional methods of teaching, such as lecturing, that encourage rote memorization (Thomas, 2000). Further, project-based learning promotes in-depth understanding of the subject matter and its applicability to real-world situations (Blumenfeld et al., 1991).

For project-based learning to achieve its intended objectives, teachers should design the projects in such a way that they motivate and arouse curiosity among the students to learn and to do more (Blumenfeld et al., 1991). This could be achieved by designing projects around problems that students face or are likely to encounter in their local communities (Blumenfeld et al., 1991). In addition, the projects’ foci should be on the learning outcomes to be attained by students rather than their grades (Blumenfeld et al., 1991).

## **Project-based Learning in Agricultural and Extension Education**

Historically, project-based learning has been the cornerstone of experiential learning in agricultural education with the aim of equipping students with vocational skills to succeed in the real-world, through a *hands-on, minds-on approach*, i.e., learning by doing (Barrick et al., 1992; Davis, 1911; Moore, 1988; Phipps et al., 2008; Swortzel, 1996). For example, Supervised Agricultural Experiences (SAEs), as reflected in the three-circle model of SBAE in the United States (see Figure 4), provides learners with opportunities to apply the content taught in their classrooms to situations in real-life (Barrick, Hughes, & Baker, 1991; Camp, Clarke, & Fallon, 2000; Dailey, Conroy, & Shelley-Tolbert, 2001; Hughes & Barrick, 1993). Although the three circles of the model are connected (see Figure 4), each component, including students' SAEs are usually received or performed independently (Barrick, 1992; Hughes, 1992) and are designed to provide agricultural experiences that align with the students' "agricultural career pathway[s]" (Croom, 2008, p. 110). To this aim, Phipps et al. (2008) posited: "SAE programs include entrepreneurship and placement experiences in farm and off-farm agribusiness settings, directed laboratory experiences, exploratory experiences, and research-based projects" (p. 6).

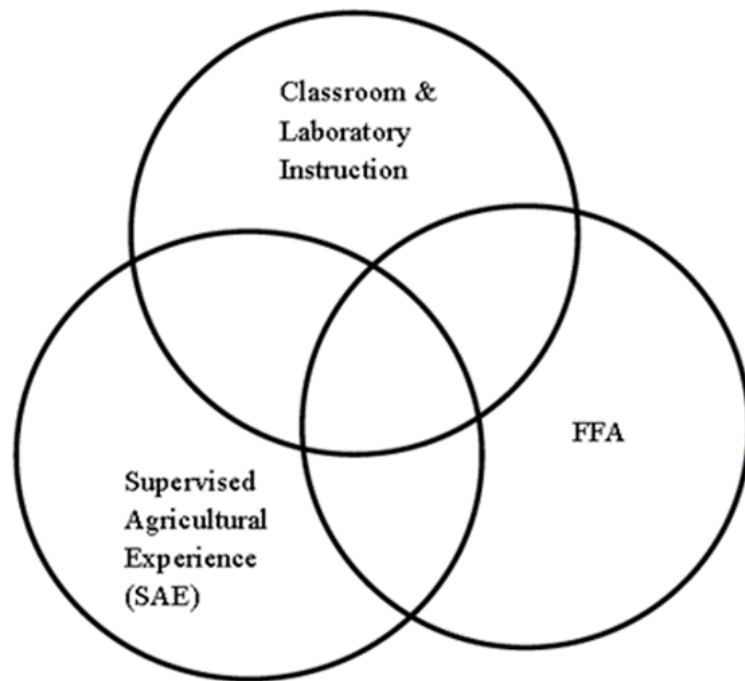


Figure 4. The Three-Circle Model of School-based, Agricultural Education in the United States (National FFA Organization, 2015a).

The SAE component of the three-circle model involves *hands-on, minds-on* learning experiences in real-world situations, such as conducting an entrepreneurship project, a research endeavor, or employment in the community, and so forth, under the supervision and guidance of a teacher or another qualified adult (Barrick et al., 1992; Croom, 2008; National FFA Organization, 2015b). All such activities would involve aspects of project-based learning. In designing the SAE, teachers are urged to consider its educational objectives and the career opportunities that may arise from such learning experiences (Camp et al., 2000; Hughes, 1992; Swortzel, 1996).

Agripreneurship is an important aspect of SAE and has been instrumental in helping students establish their own business enterprises after graduation from school (Moody, 1992). When students develop and manage their agricultural projects, they

become self-efficacious entrepreneurs (Barrick et al., 1992). Students working on agripreneurial projects acquire a variety of skills, such as creativity, good work ethics, idea generation, persistence, problem solving skills, record keeping, risk-taking, and managerial skills (Moody, 1992). Further, students gain business ideas which can be transformed into their own entrepreneurial projects (Connors, 1992). Connors (1992) added: “What better way to learn entrepreneurship than by working closely with successful agribusiness professionals” (p. 19).

In the United States, the use of project-based learning through agricultural clubs, such as *corn clubs*, during the early part of the 20th century, is credited with playing an important role in promoting and developing agriculture, as well as lifting rural communities, by facilitating the adoption of better practices and crop varieties after adult farmers observed the youth clubs’ demonstrations (Davis, 1911; Howe, 1910). The boys’ parents and other community members, where the clubs’ members presented demonstrations, were astonished by the yields they achieved and thereby motivated to adopt the better crop varieties and farming practices (Davis, 1911; Howe, 1910). The demonstrations conducted by the clubs’ members helped to extend the knowledge about agricultural education acquired in schools to their communities, and complemented the work of agricultural extension agents in these locales (Howe, 1910). To that end, Howe (1910) added:

The influence [of boys’ and girls’ agricultural clubs] upon communities at large, the parents as well as the children, has been wholesome. Beginning with an awakening interest in one thing-better seed corn, for example[,] communities have rapidly extended their interest to other features of rural improvement, with the

result that in the regions affected by the agricultural-club movement there has come about a general upward trend in the thoughts and activities of the people. (p. 6)

In Africa, project-based learning also has been used by universities and non-governmental organizations, such as Sasakawa Africa Fund for Extension Education (SAFE), to ensure that agricultural graduates, mid-career extension agents in particular, are equipped with the real-world experiences, skills, and knowledge necessary to succeed in their jobs (Kanté, Edwards, & Blackwell, 2013a, 2013b; Kwarteng & Boateng, 2012; Maguire, 2012; Mutimba & Khaila, 2011). SAFE has facilitated capacity building among extension agents to immerse them in real-world experiences through supervised enterprise/experience projects [SEPs] (Kanté et al., 2013a, 2013b; Kwarteng & Boateng, 2012; Maguire, 2012; Zinnah, 1997).

In the SEP model, mid-career extension agents, with the help of their instructors and supervisors, are guided to develop project proposals to solve farmer-focused problems identified within their respective communities, which are implemented in partnership with the local farmers (Kanté, 2010; Kanté et al., 2013a, 2013b; Mutimba & Khaila, 2011). Kwarteng and Boateng (2012) elaborated that SEPs involve real-world experiences for the mid-career extension agents, culminating in the implementation of “off-campus, farmer-focused, action research” (p. 260) projects. The approach taken by SAFE’s SEPs model is akin to that of an apprenticeship project for the agricultural extension agents who are upgrading their knowledge and skills (Kanté, 2010). The students who complete the SAFE program earn bachelor’s of science degrees, where

previously they usually held only diplomas or certificates in technical areas of agriculture (Kanté, 2010).

In Uganda, Gulu University uses project-based learning to ensure its agricultural graduates, who are mostly older youth, receive hands-on experiences by attaching them to farmers in the communities through its outreach program (Kalule, Mugonola, Odongo, & Ongeng, 2014; Roberts & Edwards, in press). The outreach program aims to facilitate diffusion of technologies to communities for increased production and improved livelihoods (Kalule et al., 2014, p. 2). Students pursuing a bachelor's degree in agriculture are partnered with farmers in surrounding communities for apprenticeships; they work with farmers on projects to acquire skills while providing technical advice to the farmers, as may be needed (Kalule et al., 2014; P. Omara, personal communication, September, 5, 2015; W. Odongo, personal communication, September 12, 2015; Roberts & Edwards, in press). These attachment partnerships enable students to acquire real-world experiences prior to their graduation (Kalule et al., 2014). Moreover, the outreach model is being revised to add aspects of agricultural entrepreneurship, involving project-based learning, i.e., *Student Enterprise Schemes* (SEs), to equip students with entrepreneurship skills for self-employment and job creation (Kalule et al., 2014).

### **Youth-Adult Partnerships**

Youth-Adult Partnerships (Y-APs) involve social interactions and cooperation between youth and adults to develop ideas, make decisions and policies, including their subsequent implementation for the growth and development of communities, as well as improved livelihoods (Akiva & Petrokubi, 2016; Zeldi et al., 2005; Zeldin et al., 2013; Zeldin & Petrokubi, 2008). Y-APs have been instrumental in helping youth engage in

community initiatives and in bridging the gap between youth, adults, and other stakeholders (Libby, Rosen, & Sedanaen, 2005). Most community initiatives were initially developed and managed by adults, which made them unpopular among the young people and prevented them from participating (Libby et al., 2005). Y-APs, therefore, arose out of the need to engage youth and adults in community-led development initiatives (Krauss et al., 2014; Libby et al., 2005). According to Camino (2000), youth can be empowered through active participation in community affairs while working with adults.

Moreover, Zeldin et al. (2013) asserted that Y-APs are “[c]onceptualized as both a developmental process and a community of practice, Y-APs involve citizens across generations working together to address common concerns” (p. 385). Y-APs involve

*(a) multiple youth and multiple adults deliberating and acting together, (b) in a collective [democratic] fashion (c) over a sustained period of time, (d) through shared work, (e) intended to promote social justice, strengthen an organization and/or affirmatively address a community issue [emphasis in original]. (Zeldin et al., 2013, p. 388)*

The interaction between the youth and adults is mutually beneficial, and both parties learn from one another (Camino, 2000; Zeldin et al., 2013; Zeldin & Petrokubi, 2008). Y-APs are distinguished from other partnerships or relationships such as apprenticeships in that they involve several youth working together with multiple adults while undertaking collective responsibility for their actions (Zeldin et al., 2013). In addition, most of these partnerships fall outside the regular school curriculum and are flexible, which allows for easy decision making without interfering with schools’

schedules and priorities (Akiva & Petrokubi, 2016; Krauss et al., 2014). Examples of these partnerships include 4-H youth programs, boys and girls clubs, and other youth leadership development initiatives (Camino, 2000; Libby et al., 2005; Zeldin et al., 2005).

Zeldin et al. (2013) identified four essential components of Y-APs: (a) authentic decision making whereby both parties work collectively to formulate decisions to attain set goals; (b) natural mentorships involving adults and the youth by which the youth receive guidance and coaching from adults to achieve stipulated goals; (c) reciprocal activity in which both the youth and adults learn from each other's experience; and (d) community inter-connectedness involving collective decision making and interactions with mutual respect for one another.

Y-APs play an important role in the growth and development of community-based livelihood programs, including youth development to build their capacity to bring about desired changes in their local settings (Akiva & Petrokubi, 2016; Mitra, 2008; Zeldin et al., 2013; Zeldin, Krauss, Kim, Collura, & Abdullah, 2015). Y-APs provide platforms for young people to express themselves on issues that concern them, while adults with mutual interests provide support and guidance (Zeldin et al., 2015). Moreover, both parties work together as a team to achieve a common goal for their own benefit and/or the community at-large (Camino, 2000, 2005; Krauss et al., 2014; Weybright et al., 2016).

Y-APs are relatively new and still evolving, especially with regard to policy and implementation (Camino (2005). However, collaboration between youth and adults is likely to facilitate change and innovation within a social system (Camino, 2005; Mitra, 2008). This may be because adults are often gatekeepers who influence and enforce a



system's prevailing norms (Rogers, 2003), and play a critical role in augmenting the efforts of youth to attain desired goals (Camino, 2005; Mitra, 2008).

Y-APs accord young people opportunities to learn a variety of life skills from adults, such as conflict resolution, decision making, effective communication practices, policy formulation, and teamwork, among others (Akiva & Petrokubi, 2016; Camino, 2005; Weybright et al., 2016; Zeldin & Petrokubi, 2008). Moreover, through interactions and the exchange of ideas, fresh insights are developed on a variety of issues, which are likely to lead to the development of new knowledge to solve existing or emerging challenges faced by communities (Mitra, 2008). In addition, adults working with youth are able to learn more about their perspectives on a number of issues, which may reduce misunderstandings, mitigate the effects of negative peer pressure, and, thus, reduce juvenile delinquency while promoting positive youth development (Camino, 2000). Further, such partnerships give youth a sense of belonging, boost their self-esteem and self-efficacy, and increase their civic engagement in the future (Krauss et al., 2014; Weybright et al., 2016; Zeldin et al., 2013; Zeldin & Petrokubi, 2008). For this reason, a number of organizations and agencies, both public and private, have supported and encouraged Y-APs as a model to simultaneously promote youth and community development (Zeldin et al., 2005).

According to Camino (2005), Y-APs are more likely to succeed if both parties work together to attain a desired goal which is bigger than the interests of either and serves the common good of the community. This calls for the development of a synergistic relationship between the actors to achieve results that transcend their individual interests and capacities (Akiva & Petrokubi, 2016; Mitra, 2008). Such a course

of action necessitates streamlining responsibilities of all participants; otherwise, the partnerships could become problematic if the roles for each party are not clearly defined and understood (Camino, 2005; Zeldin & Petrokubi, 2008).

Y-APs, however, should not take on a mentor-mentee relationship or an expert-novice apprenticeship orientation, because such approaches do not have the same impact of partnerships. Such interactions tend to evolve into hierarchical or master-subordinate relationships, thus limiting the free exchange of ideas and flow of information between the participants (Camino, 2005; Weybright et al., 2016). Socio-cultural norms and power structures in communities which do not permit young people to interact with elders while ensuring some regard for equality of status and mutual respect pose a challenge to Y-APs (Camino, 2005; Mitra, 2008; Zeldin et al., 2005; Zeldin & Petrokubi, 2008). Moreover, some adults tend to leave the responsibility for actions and results to the youth which defeats the purpose of forming partnerships and collaborating (Camino, 2005).

In terms of power sharing, sometimes adults are uncertain about delegating power to youth because they may lack the experience and judgement necessary to make critical decisions (Zeldin et al., 2005). This results in an ineffectual experience for those involved in the Y-AP because the youth are not accorded opportunities to fully express themselves; in addition, adults may be cautious to give them power if unsure whether it will be misused, and, yet, power sharing and trust is one of the key aspects of successful Y-APs (Zeldin et al., 2000). One adult interviewed by Camino (2000) said: "It's hard for us to deal with kids wanting power, when we weren't demanding the same things at their ages" (p. 18). This ambivalence toward relinquishing power applies to youth too, who may feel insecure when the adults are in control (Zeldin et al., 2005).

However, in spite of the aforementioned challenges, Y-APs continue to play an important role in youth and community development initiatives (Akiva & Petrokubi, 2016; Mitra, 2008; Zeldin et al., 2013; Zeldin, Krauss, Kim, Collura, & Abdullah, 2015). Moreover, such have been instrumental in grooming young people to take up leadership roles in communities and promoted civic engagement, including participation in democratic decision making processes that foment harmony in communities where Y-APs were implemented (Camino, 2000; Zeldin et al., 2013; Zeldin & Petrokubi, 2008).

## **Section IV**

### **Conceptual Framework**

#### **Kolb's Model of Experiential Learning**

Kolb (1984) defined learning as “the process whereby knowledge is created through the transformation of experience” (p. 38). Kolb's experiential learning model is mainly rooted in the perspectives and philosophies espoused by John Dewey, Kurt Lewin, and Jean Piaget; however, other thought leaders of experiential learning such as William James and Carl Rogers also had substantial influence on the development of Kolb's experiential learning theory (Baker, Robinson, & Kolb, 2012; Holman, Pavlica, & Thorpe, 1997; Kolb, 1984, 2014; Kolb & Kolb, 2005, 2009; Mars & Hoskinson, 2009; Marsick & Watkins, 1990; Pacalo, 2014).

Kolb contended, that in the learning process, ideas are organic and transformed as individuals encounter new experiences, and learners reflect on their experiences to make abstractions leading to the creation of new knowledge and meaning (Bell & Bell, 2016; Boud, Keogh, & Walker, 1985; Kolb, 1984, 2014; Kolb & Kolb, 2009). Reflection on what transpired is specific to the individual and involves an interplay of the cognitive and

affective domains to fully comprehend the phenomena experienced (Cope & Watts, 2000; Marsick & Watkins, 1990; Piercy, 2013).

Kolb's model on experiential learning has four phases which can lead to learning, and learners ought to go through all stages during the learning process (Bound et al., 1985; Kolb, 1981, 1984, 2014; Pacalo, 2014). This cycle or process can take place under the guidance or mentorship of a teacher or any person designated as such, or it can occur independent of facilitators. Kolb and Kolb (2005) affirmed:

Immediate or concrete experiences are the basis for observations and *reflections* [emphasis in original]. These reflections are assimilated and distilled into abstract concepts from which new implications for action can be drawn. These implications can be actively tested and serve as guides in creating new experiences. (p. 194)

Each learner, however, has a preferred learning style (Kolb, 1981, 1984; Morris et al., 2013a). Moreover, experiential learning embodies a constructivist approach (Baker et al., 2012; Kolb & Kolb, 2005). Hoover and Whitehead (1975) posited: "Experiential learning exists when a personally responsible participant(s) cognitively, affectively, and behaviorally processes knowledge, skills, and/or attitudes in a learning situation characterized by a high level of active involvement" (p. 25). Experiential learning is lifelong in nature, and as learners encounter new experiences they modify their previous knowledge and understanding to accommodate new experiences and the understanding of such (Cope & Watts, 2000; Hoover & Whitehead, 1975; Kolb, 1984, 2014; Politis, 2005). On that note, Kolb and Kolb (2005) described learning as a continuous process not always based on outcomes alone. Moreover, Dewey (1929) posited: "Education must be

conceived as a continuing reconstruction of experience” (p. 295), but not all experiences acquired by individuals result in new learning (Dewey, 1951).

Four conceptually interrelated phases or modes comprise Kolb’s model, i.e., Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE) [Baker et al., 2012; Corbett, 2005; Holman et al., 1997; Kolb, 1984, 2014; Kolb & Kolb, 2005, 2009; Mars & Hoskinson, 2009] (see Figure 5). Kolb and Kolb (2005) contended that experiential learning involves construction of knowledge through “creative tension among the four learning modes that is responsive to contextual demands” (p. 194).

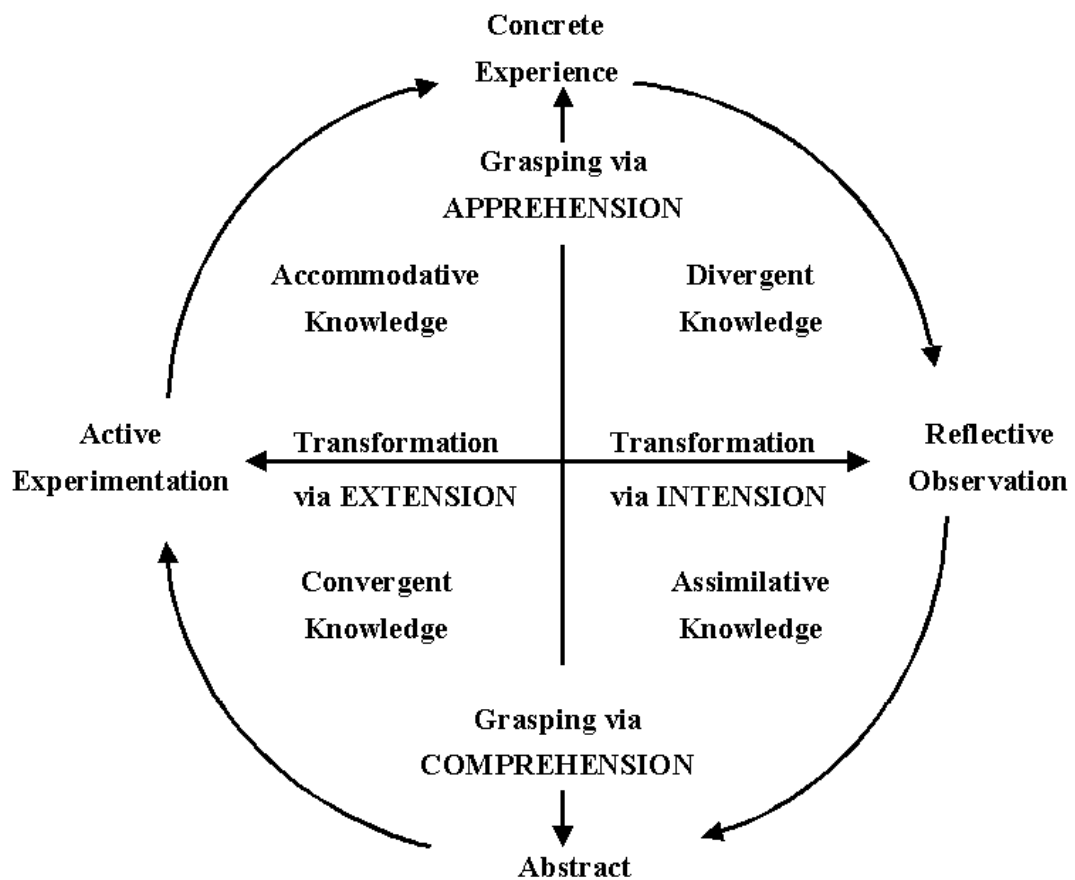


Figure 5. Kolb’s model of the experiential learning process.

Effective entrepreneurs experience all four stages of learning as outlined in Kolb's model (Garavan & O'Conneide, 1994). CE is grasped by learners apprehending experiences (Holman et al., 1997; Kolb, 1981, 1984, 2014; Kolb & Kolb, 2005, 2009). CEs in real-world environments are preferred to ACs by both aspiring and established entrepreneurs (Fitzgerald & Stokes, 2009). Moreover, a general "consensus [exists] among entrepreneurial learning scholars . . . that the only way to become entrepreneurial is through direct experience, i.e. learning-by-doing or direct observation" (Lackeus, 2013, p. 1). CE in entrepreneurship may involve establishment of business ventures or pitching business ideas to potential investors, incubation of ideas, internships, or job shadowing (Mars & Hoskinson, 2009; Morris et al., 2013a). Concrete entrepreneurial experiences in communities through outreach programs and learners' field attachments may help to improve relationships between schools and communities (Morris et al., 2013a), with the latter serving as the context in which such occurs.

RO is transformed via intentions as individuals introspectively examine and question their experiences, especially in regard to meaning (Corbett, 2007; Holman et al., 1997; Kolb, 1981, 1984, 2014; Kolb & Kolb, 2005, 2009; Mars & Hoskinson, 2009). After launching a business, entrepreneurs often reflect on their successes and setbacks as they seek to improve and grow their ventures (Oparaocha et al., 2014). Reflection also gives entrepreneurs time to learn more about their businesses based on the feedback of customers and, in some cases, mentors. AE without reflection is likely to prevent or hinder further learning and understanding (Garavan & O'Conneide, 1994). To this point, Neck and Greene (2011) stated:

Reflection is particularly important for perplexing experiences, working under conditions of high uncertainty, and problem-solving. As a result, it should not be a surprise that reflection is an integral component of entrepreneurship education and also a way of practicing entrepreneurship. (p. 65)

AC involves a learner comprehending the theoretical concepts, logic, as well as rational and objective thinking inherent to the learning process in the context through which the experiences occur (Kolb, 1981, 1984, 2014; Kolb & Kolb, 2005, 2009). At this stage, mental schemas are conceptualized based on available information about the experience. In entrepreneurship, AC may include theoretically learning about the entrepreneurial process, business plans, opportunity recognition, pricing and marketing, and risk management, among other concepts (Corbett, 2005, 2007; Heinonen & Poikkijoki, 2006; Kolb & Kolb, 2009). Evaluative judgments of learners' AC could be derived from content-based examinations or quizzes to determine their knowledge acquisition (Garavan & O'Connell, 1994).

AE may involve transformation of experience by piloting abstract ideas in real-world environments, which would be reflected in an entrepreneur's behaviors or actions (Corbett, 2005, 2007; Mars & Hoskinson, 2009; Morris et al., 2013a; Politis, 2005). Most entrepreneurs somehow try or experiment with their new ideas before implementation (Garavan & O'Connell, 1994). This may involve writing a business plan for a proposed venture or conducting market research such as getting potential customers feedback before launching the business venture (Mars & Hoskinson, 2009). Kolb's cyclical model is linked to the theory of planned behavior (Ajzen, 1991) in that each phase – CE, RO, AC, and AE – involves some kind of activity or behavior exhibited by learners as they

contemplate experiences, or reflect, and doing such is influenced by their attitudes, intentions, perceptions of control, and the role of subjective norms.

That being said, effective teaching of entrepreneurship requires actual experimentation and simulation of the entrepreneurial process in a real-world environment (Corbett, 2005; Honig, 2004; McMullan & Long, 1987; Morris et al., 2013a; Pittz, 2014). It requires the application of experiential learning approaches as espoused by Kolb's (1984) experiential learning model. The use of experiential learning in entrepreneurship education helps to overcome some of the shortcomings of other methods such as those associated with lecture (Bell & Bell, 2016; Kuratko, 2005; Piercy, 2013). For these reasons, the application of Kolb's model as the study's overarching conceptual framework was considered appropriate because, according to Garavan and O'Connell (1994), most effective entrepreneurs experience all four stages of learning, as described by Kolb (1984).

## **Theoretical Framework**

### **Entrepreneurship and the Theory of Planned Behavior**

Krueger et al. (2000) posited: "Although it is possible that some will argue otherwise, it seems evident that much of what we consider 'entrepreneurial' activity is intentionally planned behavior" (p. 413). They added "it is difficult to envision starting a business where the nascent firm is launched simply as a conditioned response to a stimulus" (Krueger et al., 2000, p. 414) but rather it involves active and conscious planning. The act of entrepreneurship is reflected in the type of behaviors exhibited by the entrepreneur (Drucker, 1985; Volkmann et al., 2010).



Further, Bird (1988) argued: “Although behavior can result from unconscious and unintended antecedents, what is of interest here [in entrepreneurship] is a conscious and intended act, the founding of a firm” (p. 442). Therefore, because entrepreneurship is a *planned behavior*, the intent of one to become an entrepreneur can be predicted to some extent by assessing an individual’s perceived intentions and attitudes toward a venture (Bagozzi, Baumgartner, & Yi, 1989; Buli & Yesuf, 2015; Davidsson, 1995; Kautonen, Gelderen, & Tornikoski, 2013; Şeşen & Pruett, 2014). Although intentions are likely the best predictors of entrepreneurial behaviors, not all intentions actually lead to establishing ventures (Heinonen & Poikkijoki, 2006).

Entrepreneurial intent refers to “those initial actions an individual takes prior to formally beginning the start-up or generating initial sales related to an on-going business” (Carr & Sequeira, 2007, p. 1091). Such steps may include developing a business plan, researching about the opportunity, market research, and mobilizing resources among other actions. Individuals are likely to form entrepreneurial intentions toward opportunities of interest which have been evaluated as feasible and worth pursuing (Amo, 2014; Erikson, 2003; Shapero & Sokol, 1982).

Although some models have been used to predict entrepreneurial behavior and startups based on an individual’s attitudes and personal characteristics, such attempts have not been as effective and robust as those based on intentions (Buli & Yesuf, 2015; Fayolle et al., 2006; Krueger & Carsrud, 1993; Krueger et al., 2000), especially as explained by the theory of planned behavior (Ajzen, 1987, 1991, 2002, 2006; Ajzen & Madden, 1986). The theory of planned behavior emanated from the theory of reasoned action (Ajzen, 2002; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). According to the

theory of planned behavior, attitudes, subjective norms, and an individual's perceived control over a behavior can be used to predict his or her intentions, which are considered precursors to the actualization of their actions (Ajzen, 1987, 1991, 2002, 2006; Ajzen & Madden, 1986; Kautonen et al., 2013) [see Figure 6].

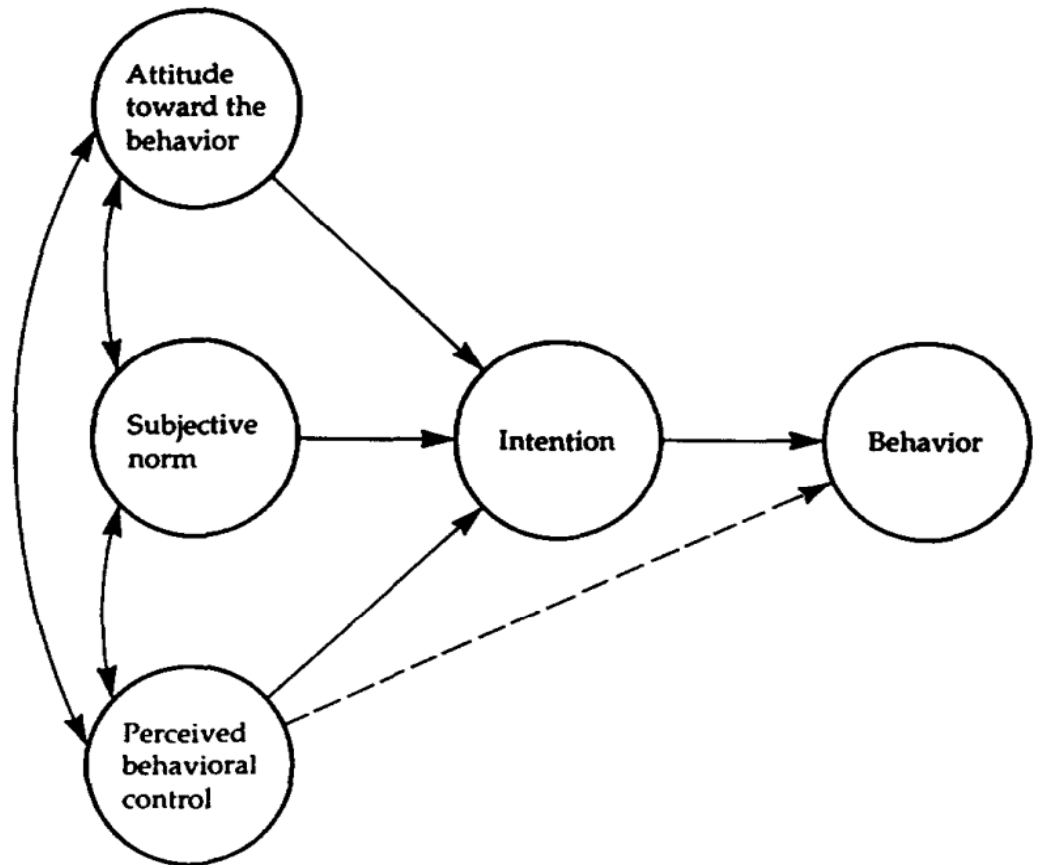


Figure 6. The Theory of Planned Behavior (Ajzen, 1991, p. 182).

Each of the three constructs undergirding the theory of planned behavior, i.e., attitude(s) toward the behavior, subjective norms, and perceived behavioral control, are conceptually independent, and a favorable outlook toward such is likely to trigger intention(s) to actualize a behavior (Ajzen, 1991, 2002; Krueger & Carsrud, 1993). An individual's intentions are central to the theory of planned behavior because such usually

embody other factors that motivate people to demonstrate certain behaviors (Ajzen, 1991). To this point, Ajzen (1991) posited:

As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance. It should be clear, however, that a behavioral intention can find expression in behavior only if the behavior in question is under volitional control, i.e., if the person can decide at will to perform or not perform the behavior. (p. 181)

In explaining the role of human behavior in predicting intentions to implement certain actions, Ajzen (1991) explicated the role of beliefs in predicting future behaviors and stated “three kinds of *salient* beliefs [emphasis in original]” (p. 189) existed that play a critical role in influencing an individual’s intentions and eventual actions. These beliefs include behavioral beliefs, normative beliefs, and control beliefs. According to Ajzen (1991), behavioral beliefs can sway an individual’s attitude toward a given behavior. Normative beliefs undergird what an individual perceives as subjective norms in regard to what is approved by members of his or her social system, including family members and peers (Ajzen, 1991, 2002). Control beliefs govern an individual’s perceived behavioral control and may arise from his or her past experiences or the experiences of others, including peers with whom the person interacts (Ajzen, 1991, 2002).

Ajzen (2005) described attitude as “a disposition to respond favorably or unfavorably to an object, person, institution, or event” (p. 3). A favorable attitude toward entrepreneurship is likely to influence an individual’s intention to become an entrepreneur (Buli & Yesuf, 2015; Joensuu-Salo et al., 2015; Kautonen et al., 2013; Marques et al., 2012). A positive attitude toward entrepreneurship may arise from

internal factors such as personal interests as well as external factors, including the influence of family members, friends, and mentors (Buli & Yesuf, 2015; Carr & Sequeira, 2007).

Subjective norms involve social pressures experienced by an individual on whether to execute a given action or behavior (Ajzen, 1987, 1991, 2002; Ajzen & Madden, 1986; Autio et al., 2001). Social and cultural norms, as well as gender stereotypes, have a significant influence on entrepreneurship and impact the type of opportunities pursued by individuals in given contexts (Pihie & Bagheri, 2013; Şeşen & Pruett, 2014; Sweida & Reichard, 2013; Vallierre et al., 2014). For this reason, Amo (2014) described entrepreneurship as “a socioeconomic phenomenon” (p. 95). However, what may be considered an opportunity in one cultural setting or community could be a taboo in another (Amo, 2014; Shapero & Sokol, 1982). Therefore, if subjective norms favor the pursuit of an entrepreneurial opportunity, it is more likely to be pursued, especially by entrepreneurs who exhibit high external loci of control and receive support from their peers, family, and mentors (Buli & Yesuf, 2015; Carr & Sequeira, 2007; Fayolle et al., 2006; Marques et al., 2012; Pihie & Bagheri, 2013; Vallierre et al., 2014).

For individuals to actualize a behavior such as entrepreneurship, they need to have sufficient perceived control and high self-efficacy for executing said action(s), including perceptions of control over the outcomes associated with the behavior (Ajzen, 1991, 2002; Baron et al., 2016; Boyd & Vozikis, 1994; Davidsson, 1995; Joensuu-Salo et al., 2015; Krueger & Carsrud, 1993). When individuals perceive having control over a behavior and hold positive intentions toward it, they are likely to demonstrate such given the recognition of an opportunity (Ajzen, 2001, 2002). However, some factors may

impact an individual's ability to actualize a given behavior such as the act of entrepreneurship. These factors could be either internal or external. For example, a case of the latter such as government regulations likely would not be under the entrepreneur's control and, therefore, inhibit his or her entrepreneurial endeavors (Kautonen et al., 2013).

Ajzen (2002) posited "that perceived behavioral control and self-efficacy are quite similar" (p. 668). Self-efficacy stems from an individual's perceived ability to successfully accomplish a given task or execute a specific behavior (Ajzen, 2002; Bandura, 1977, 1986; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001), and this perception is likely to influence the type of opportunities pursued by an entrepreneur (Kickul et al., 2008; Kirkwood, 2009; Krueger & Dickson, 1994; Sweida & Reichard, 2013). Moreover, a positive relationship exists between an individual's perceived entrepreneurial self-efficacy and his or her entrepreneurial intentions (Baron et al., 2016; Jones et al., 2012; Krueger et al., 2000). In accord, Bandura (1977) posited:

Not only can perceived self-efficacy have directive influence on choice of activities and settings, but, through expectations of eventual success, it can affect coping efforts once they are initiated. Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. (p. 194)

An entrepreneur's perceived behavioral control and self-efficacy have the most influence on his or her intention to pursue opportunities (Autio et al., 2000; Baron et al., 2016; Boyd & Vozikis, 1994; Pihie & Bagheri, 2013). Differences in individuals' perceived control over given behaviors in part account for the variance between their

intentions and actions (Ajzen, 2002). Entrepreneurs are more apt to pursue opportunities for which they perceive themselves to be capacitated and likely to bring about better returns on their investments.

Exposure to entrepreneurial activities at an early age, including entrepreneurial role models, can influence individuals having positive attitudes toward entrepreneurship and the likelihood of starting their own ventures (Bird, 1988; Honig, 2004; Peterman & Kennedy, 2003). Krueger et al. (2000) asserted that “[i]ntentions are the single best predictor of any planned behavior, including entrepreneurship” (p. 412), especially in situations where behavioral observations may not be feasible (Hattab, 2014). Souitaris, Zerbini, and Al-Laham (2007) added that “the best predictor of planned [behavior], particularly when that [behavior] is rare, hard to observe, or involves unpredictable time lags” (p. 568) are an individual’s intentions. Further, intentions, including entrepreneurial tendencies or predispositions, vary from individual to individual (Krueger & Carsrud, 1993).

Therefore, by understanding a person’s intentions, the likelihood of accurately predicting his or her behaviors, including that of entrepreneurship, increases because the pursuit of such is intentional (Autio et al., 2001; Bird, 1988; Post, 2014). Further, intentions can be actualized irrespective of mitigating circumstances and the passage of time (Bagozzi et al., 1989; Crant, 1996; Graevenitz et al., 2010) and require “persistence, perseverance, and courage” (Bird, 1995, p. 442), all of which are considered attributes of successful entrepreneurs (Bird, 1995).

## Entrepreneurial Intentions.

Entrepreneurial intentions refer to a mental state in which an individual recognizes and evaluates opportunities before selecting a course of action (Bird, 1988; Boyd & Vozikis, 1994; Hattab, 2014). Such intentions do not arise from intuition, but rather involve rational decision making, including evaluating alternatives before pursuing an opportunity (Bird, 1988). Entrepreneurial intentions are influenced by personal and external factors such as environment, market forces, government policies, and societal norms surrounding the opportunity (Bird, 1988; Erickson, 2003; Hattab, 2014; Katz & Gartner, 1988) [see Figure 7].

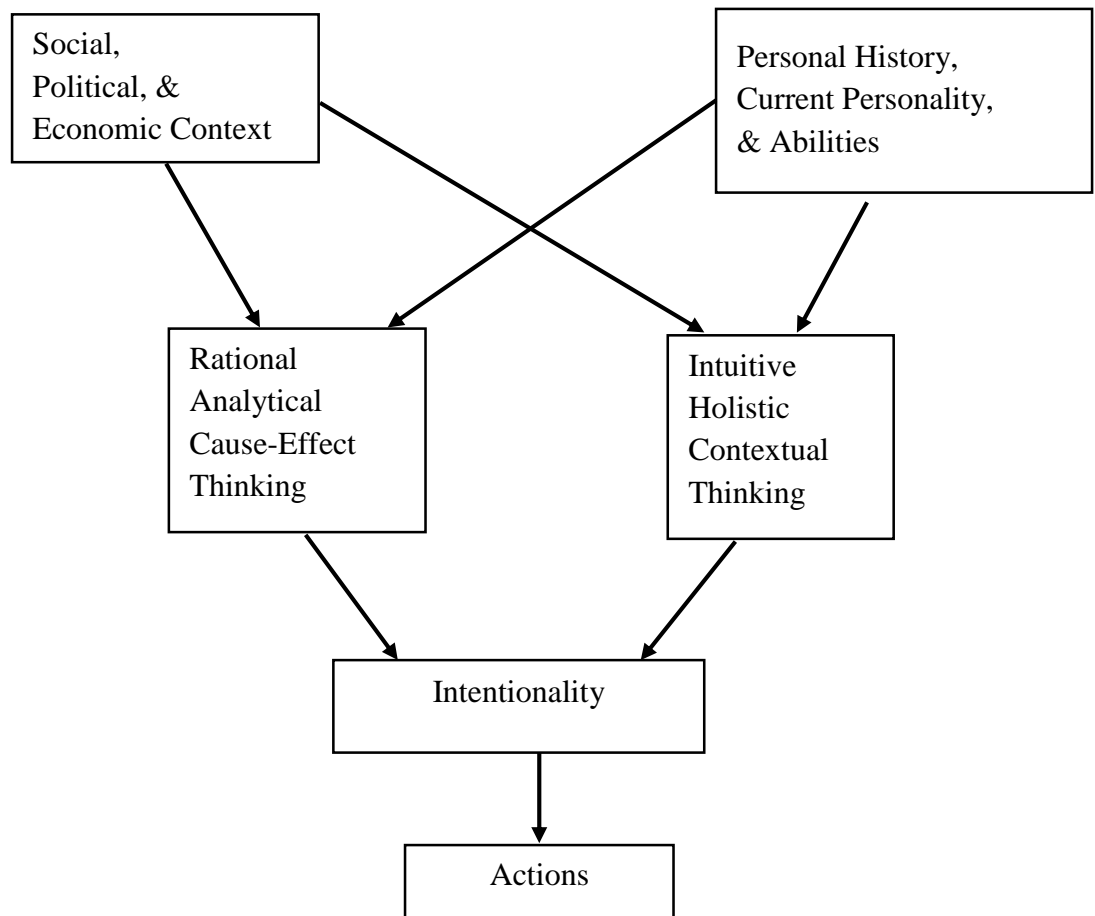


Figure 7. The contexts of intentionality (Bird, 1988, p. 444).

Bird's model of intentionality could be strengthened by integrating an individual's perceived self-efficacy (Boyd & Vozikis, 1994). "The integration of self-efficacy into Bird's model provides added insight into the cognitive process by which entrepreneurial intentions are both developed and carried out through specific behaviors" (Boyd & Vozikis, 1994, p. 66). This is because an individual's perceived self-efficacy influences his or her intentions, including entrepreneurial actions (Baron et al., 2016; Chen et al., 1998; McGee et al., 2009; Vesala et al., 2007; Wilson et al., 2007).

Souitaris et al. (2007) reported a significant and positive correlation between an individual's attitude toward and ability for self-employment, including society's subjective norms regarding such, and the person's intention to become self-employed. Kolvereid and Moen (1997) also reported a positive relationship between students who majored in entrepreneurship and their intentions to be entrepreneurs. In addition, individuals with a large number of entrepreneurs in their social networks are likely to be influenced to become entrepreneurs themselves (Crant, 1996; De Carolis & Saporito, 2006).

Some scholars have reported differences in an individual's entrepreneurial intentions based on sex. For example, research findings have indicated that teenage girls were less likely than their male counterparts to pursue entrepreneurial careers (Crant, 1996; Kourilsky & Walstad, 1998; Marlino & Wilson, 2003). Comparing overall entrepreneurial activities between Finland, Norway, and Sweden, Amo (2014) found more males than females were engaged in entrepreneurship. In addition, an individual's perceived entrepreneurial self-efficacy was found to have a much stronger influence for teenage girls in regard to their becoming entrepreneurs than boys (Kickul et al., 2008;



Wilson et al., 2007). Women tend to have much lower entrepreneurial self-efficacy, which impacts their related intentions (Kirkwood, 2009; Koellinger, Minniti, & Schade, 2008; Kourilsky & Walstad, 1998; Sweida & Reichard, 2013).

Globally, fewer female entrepreneurs exist compared to men and this could be due “to the fact that the propensity to start businesses of women is significantly lower [for women] than men” (Koellinger et al., 2008, p. 2). Adema et al. (2014) posited:

Women remain under-represented as entrepreneurs. When asked, fewer women than men say they would prefer to be self-employed. When they do choose to become entrepreneurs, they cite better work-life balance more often than men as the main motivation for starting a business. (p. 9)

In the United States, for example, even though women comprise one-half of the labor force, they own only 36% of the companies and employ fewer people compared to male-founded companies (Coleman & Robb, 2017; Miller, 2017). Further, according to Goopers and Wang (2017), between 1990 and 2016, women had “less than 10% of the entrepreneurial and venture capital labor pool” (p. 1). Coleman and Robb (2017) attributed this phenomenon to

lower levels of self-efficacy and confidence [among women] than men, and that the paucity of female role models is a big problem for would-be entrepreneurs. While many of the challenges women face are structural in nature, ‘others come in the form of cultural or attitudinal barriers.’ (para. 6)

In addition, fewer women are likely to prefer being self-employed compared to men (Adema et al., 2014) “largely because they don’t see other women entrepreneurs as role models” (Miller, 2017, para. 5). Bandura (1992) and Bandura et al. (2001) affirmed

that perceived lower self-efficacy was more likely to impact women's career aspirations than men, especially in areas that have traditionally been associated with male dominance, including entrepreneurship (Wilson et al., 2007).

Because entrepreneurship is a planned behavior exhibited by certain individuals (Bird, 1995; Drucker, 1985; Krueger et al., 2000; Volkmann et al., 2010), and, similar to most behaviors, it is possible to predict with some level of confidence an individual's likelihood of actualizing a behavior by assessing his or her intentions and attitudes toward such (Ajzen, 1987, 1991; Ajzen & Madden, 1986; Kautonen et al., 2013). Krueger et al. (2000) posited that "[i]ntentions are the single best predictor of any planned behavior, including entrepreneurship" (p. 412). Therefore, because this study also involved investigating the participants' intentions of starting agripreneurship projects in the future, it was grounded in the theory of planned behavior (Ajzen, 1987, 1991).

### **Summary**

Entrepreneurs have existed for a longtime and gave rise to the discipline of entrepreneurship (Neergaard & Ulhøi, 2007), which is now part of the formal and non-formal curriculum in many schools and universities across the globe. Though many definitions of entrepreneurship exist in the literature (Amo, 2014; Brockhaus, 1980; Volkmann et al., 2010), a universally accepted definition remains elusive (Baumol, 1968; Crant, 1996; Gartner, 1988).

Entrepreneurship as a scholarly discipline is grounded in the works of Schumpeter and Kirzner who posited two divergent perspectives, i.e., creation of opportunities versus discovery of opportunities, respectively (Dutta & Crossan, 2005; Oner & Kunday, 2016; Post, 2014). Entrepreneurship education is multidisciplinary (Low & Macmillan, 1988;

Shapiro & Sokol, 1982), and is now taught outside schools of business by other faculties to their students (Blenker et al., 2014; Morris et al., 2013a). The main cross-cutting feature in the curriculum for entrepreneurship is the development of business plans (Gartner & Vesper, 1994), but some scholars have divergent views about their efficacy in equipping students with entrepreneurial skills because business ventures are organic (Bell & Bell, 2016; Ronstadt, 1985). Students acquire entrepreneurial competencies mainly through hands-on, minds-on experiential learning opportunities (Kolb, 1984) in real-world environments, including apprenticeships and working on problems and issues, e.g., through project-based learning activities. These competencies include creativity, endurance, leadership, opportunity recognition and evaluation, persistence, risk taking, and systematic planning, among others (Bird, 1995; Liberal, 2007; Morris et al., 2013a).

Entrepreneurial competencies are reflected in the behaviors of individual entrepreneurs, and can be acquired through formal and informal educational settings (Clouse, 1990; Hattab, 2014), through an experiential learning cycle, as espoused by Kolb (1984). Kolb's model consists of four learning phases that are interrelated and successive (Baker et al., 2012; Corbett, 2005; Holman et al., 1997; Kolb, 1984, 2014). Effective entrepreneurs experience all four phases as they encounter and comprehend the entrepreneurial process and seek to establish and improve their business ventures (Garavan & O'Connell, 1994). Starting a business venture or exploiting an entrepreneurial opportunity are behaviors actualized by entrepreneurs that stem from their intentions (Krueger & Carsrud, 1993; Krueger et al., 2000), as influenced by three sources or conditions, including attitudes, subjective norms, and perceived behavior control (Ajzen, 1987, 1991; Ajzen & Madden, 1986). Therefore, entrepreneurship is more

about the behaviors exhibited by individuals than their personality traits (Davidsson, 2005; Gartner, 1988). Moreover, intentions (Ajzen, 1991) can be used to predict behaviors, including acts of entrepreneurship (see Figures 5 & 6).

Many entrepreneurial ventures evolved in the context of agriculture, i.e., *agripreneurship* (Alsos et al., 2011; Singh & Krishna, 1994). Agripreneurship has the potential to help reduce unemployment among the youth and improve their livelihoods (International Labor Organization [ILO], 2014), especially in Africa. Equipping youth with agripreneurship skills (Roberts et al., 2016) may be achieved through Y-APs (Akiva & Petrokubi, 2016; Zeldin et al., 2013; Zeldin & Petrokubi, 2008) in the form of community-based projects such as SEPs involving the integration of agriculture and entrepreneurship. Integration of the agricultural and entrepreneurship education curricula, as proposed in Uganda (Musoke, 2014; NCDC, 2013), is likely to improve students' understanding of various concepts and the applicability of such to real-world situations to solve existing or emerging challenges in local communities, such as youth unemployment, poverty, and food insecurity (ILO, 2014). Moreover, such an approach may improve students' self-efficacy (Bandura, 1977, 1986) regarding opportunity recognition and venture creation (Baron et al., 2016; Barrick et al., 1992), which are essential to entrepreneurial success.

Based on this review of literature, the researcher established a knowledge gap regarding agripreneurship and skills development among the youth of Uganda, which has likely contributed to increased unemployment and food insecurity in their communities. This study, therefore, aimed to fill that void by investigating how the integration of agricultural and entrepreneurship education, using a project-based learning approach,

could enhance students' application of agricultural knowledge and concepts, i.e., poultry science, agripreneurship, and select life skills in real-world settings, as facilitated by teachers and other adults.

## CHAPTER III

### METHODOLOGY

This chapter describes the methodology used to conduct this study. The researcher describes the study's Institutional Review Board approval, the study's purpose, research objectives and hypotheses, research design, development of the data collection instruments, training for the research assistants and facilitators, study population and selection of participants, the intervention, fidelity of the intervention, data collection, data analysis, and a summary of the methodology.

#### **Institutional Review Board Approval**

United States' federal regulations and Oklahoma State University (OSU) policies require all research involving human subjects be reviewed and approved by OSU's Institutional Review Board (IRB). The researcher submitted the research proposal, which included the purpose statement, permission request letter to school principals, recruitment script, participants' consent forms, guardian permission form, and the interview protocol (see Appendix A), for IRB approval. The proposal was reviewed by IRB and met all the guidelines required for research involving human subjects. Permission for the investigation was granted on October 14, 2015 and the study's IRB number was designated AG1445.

## **Purpose of the Study**

The primary purpose of this study was to assess how a project-based learning (PBL) approach involving agripreneurship could be used to enhance students' understanding and application of selected agricultural knowledge and concepts (i.e., poultry science and related entrepreneurial competencies) learned in school to real-world settings. In addition, the study sought to describe participants' experiences in regard to school-based, agripreneurial projects (SAPs) and their potential for improving agricultural practices and related livelihood opportunities in local communities.

## **Objectives of the Study**

Six objectives and 10 null hypotheses guided this study:

- 1) describe selected personal and professional characteristics of the participants (students and adults);
- 2) compare students' poultry science knowledge based on the instructional approach used, i.e., project-based learning featuring agripreneurship versus traditional classroom instruction;
  - Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for poultry science knowledge based on the instructional approach used.

- 3) compare students' perceived agripreneurship competencies (skills) based on the instructional approach used;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceived agripreneurship competencies based on the instructional approach used.
- 4) compare students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceptions regarding their likelihood of becoming



agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.

- 5) describe relationships between students' characteristics and other selected variables;
  - Ho: No statistically significant relationships ( $p < .05$ ) existed between students' characteristics and other selected variables.
- 6) describe participants' (students' and adults') experiences in regard to school-based, agripreneurial projects, including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills.

### **Research Design**

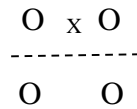
The study employed a quasi-experimental design (Ary, Jacobs, & Razavieh, 1996, 2006; Borg & Gall, 1983; Campbell & Stanley, 1966; Cook & Campbell, 1979; Creswell, 2012, 2014; Kirk, 2013). Quasi-experiments are useful in situations where researchers cannot randomly assign participants to either the treatment group or counterfactual group due to a number of factors, including ethical reasons (Ary et al., 1996, 2006; Borg & Gall, 1983; Campbell & Stanley, 1966; Creswell, 2012, 2014; Kirk, 2013). Campbell and Stanley (1966) encouraged researchers to use quasi-experimental designs to “raise awareness of the kinds of settings in which opportunities to employ them occur” (p. 34) and true experimentation is not feasible. However, because researchers cannot randomly assign participants to counterfactual or treatment groups in quasi-experiments, they ought to be aware of the various threats to validity such a design may pose, especially internal and external threats (Ary et al., 1996, 2006; Borg & Gall, 1983; Campbell & Stanley,

1966; Cook & Campbell, 1979). When researchers become aware of the shortcomings of their designs, it helps them when interpreting findings in regard to other possible factors that may have impacted the results other than an investigation's treatment (Ary et al., 1996, 2006; Campbell & Stanley, 1966; Cook & Campbell, 1979).

However, in spite of the aforementioned shortcomings which may be associated with quasi-experimental designs, Campbell and Stanley (1966) asserted such are “deemed worthy of use *where better designs are not feasible* [emphasis in original]” (p. 34). Ary et al. (1996) added: “These designs [quasi-experimental] permit one to reach reasonable conclusions even though full control is not possible” (p. 343). For example, in classrooms or other natural settings where it would be inappropriate or impractical to randomly assign participants or organisms to treatment or counterfactual groups without adverse negative psychological or emotional distress, or even destroying the natural habitat (Ary et al., 1996, 2006; Borg & Gall, 1983; Campbell & Stanley, 1966; Creswell, 2012). Several designs exist that could be employed in quasi-experiments, including equivalent materials samples design, equivalent times samples design, nonrandomized control group, one-group pretest-posttest design, one-group posttest-only design, posttest-only design with nonequivalent groups, and time series, among others (Ary et al., 1996, 2006; Campbell & Stanley, 1966; Cook & Campbell, 1979; Creswell, 2014).

In this study, the researcher used a nonrandomized control group or pretest-posttest design with nonequivalent groups (see Figure 8 and Table 3), also referred to as *nonequivalent control group design* (Borg & Gall, 1983; Campbell & Stanley, 1966; Cook & Campbell, 1979; Dimitrov & Rumrill, Jr., 2003; Fife-Schaw, 2012; Schweigert, 2012; Shaughnessy, Zechmeister, & Zechmeister, 2006). This design was chosen because

it did not involve random assignment of participants to treatment or counterfactual groups. In this design, both groups are “given a pretest and a posttest, but in which the control group and the experimental group do not have pre-experimental sampling equivalence” (Campbell & Stanley, 1966, p. 47), rather, the groups constitute naturally assembled entities. Campbell and Stanley (1966) stated: “The assignment of X [treatment] to one group or the other is assumed to be random and under the experimenter’s control” (p.47). In Figure 8, X is used to denote a treatment or intervention used in the experimental group (Borg & Gall, 1983; Campbell & Stanley, 1966; Cook & Campbell, 1979). This type of design is common in educational research where it is difficult to randomly assign students to either a treatment or control (counterfactual) group (Ary et al., 1996, 2006; Borg & Gall, 1983; Campbell & Stanley, 1966).



*Figure 8.* Research design for nonequivalent control group design. Adapted from “Experimental and Quasi-Experimental Designs for Research” by Campbell & Stanley, 1966, p. 47; “Quasi-experimentation Design and Analysis Issues for Field Settings” by Cook & Campbell, 1979, p. 104; and “Educational Research: An Introduction” by Borg & Gall, 1983, p. 682.

Table 3

*Research Design to Compare Students' Poultry Science Knowledge depending on the Instructional Approach received: A Project-based Learning Approach featuring Agripreneurship versus Traditional Classroom Instruction.*

Group	Pretest	Intervention	Posttest
Counterfactual Group	Pretest on poultry knowledge	—	Posttest on poultry knowledge
Treatment Group	Pretest on poultry knowledge	Implemented a broiler project, kept journals, and received training in agripreneurship	Posttest on poultry knowledge

*Note.* All students in both groups received classroom instruction about poultry using traditional classroom instruction as stipulated by the NCDC (2008), but the treatment group students implemented the knowledge acquired in their classrooms to real-world environments through a broiler project and received additional training on agripreneurship.

The use of nonequivalent control or counterfactual group design helps researchers to control for some of the threats to internal validity which may exist when using only a pretest/posttest design (Ary et al., 1996, 2006; Borg and Gall, 1983; Campbell & Stanley, 1966). The threats to internal validity controlled for include history, instrumentation, maturation, mortality, testing, and selection (Ary et al., 1996, 2006; Campbell & Stanley, 1966; see Table 4).

Table 4

*Sources of Invalidity for a Nonequivalent Control Group Design*

	Sources of Invalidity											
	Internal							External				
	History	Maturation	Testing	Instrumentation	Regression	Selection	Mortality	Interaction of Selection and Maturation, etc.	Interaction of Testing and X	Interaction of Selection and X	Reactive Arrangements	Multiple – X Interference
Nonequivalent Control Group Design	+	+	+	+	?	+	+	-	-	?	?	

$$\begin{array}{r} O \quad x \quad O \\ \hline O \quad O \end{array}$$

Adapted from “Experimental and Quasi-Experimental Designs for Research” by Campbell & Stanley, 1966, p. 40. *Note.* “In the table, a minus [sign] indicates a definite weakness, a plus [sign] indicates that the factor is controlled, a question mark indicates a possible source of concern, and a blank indicates that the factor is not relevant” (Campbell & Stanley, 1966, p. 8).

Further, the nonequivalent control group design also assists researchers in controlling for the reactive effects which may be associated with an experiment; for instance, if the participants become aware of being observed or realize they are part of an experiment and behave differently than they may have otherwise (Ary et al., 1996, 2006; Campbell & Stanley, 1966; Kirk, 2013). When using a nonequivalent control group design, the two groups may not be aware that an experiment is being conducted which can be helpful in generalizing the findings to the population of interest (Ary et al., 1996, 2006; Campbell & Stanley, 1966; Kirk, 2013). However, other threats to internal validity, such as the interaction of selection and maturation, and statistical regression, may still remain as potential sources of invalidity when using this type of design (Ary et al., 1996, 2006; Campbell & Stanley, 1966).

### **Development of the Study's Data Collection Instrument**

The study's survey instrument was developed and written in English by the researcher (see Appendix B), because English is the medium of instruction in Uganda's secondary schools (Openjuru, 2010). Survey instruments are cost effective, efficient, and useful in collecting data from large samples in a short period of time (Ary et al., 1996, 2006; Gay, Mills, & Airasian, 2009). Moreover, when administered directly to the participants, questionnaires tend to generate a high response rate (Ary et al., 1996, 2006).

The instrument consisted of three parts, each addressing different aspects of the study. The first part included Likert scale items measuring students' perceived agripreneurship competencies. Thirty-three items on the scale measured six constructs related to agripreneurship competencies (see Appendix B). The response categories included 1 (*Strongly disagree*), 2 (*Disagree*), 3 (*Neutral/Undecided*), 4 (*Agree*), and 5

(*Strongly agree*) (Ary et al., 1996, 2006; Boone & Boone, 2012; Clason & Dormody, 1994; Gliem & Gliem, 2003; Likert, 1932; Uebersax, 2006). The constructs and related items measuring students' perceived agripreneurship competencies were derived from the entrepreneurship literature (Bird, 1995; Laguador, 2013; Lans, Bergevoet, Mulder, & Van Woerkum, 2005; Liberal, 2007; Mitchelmore & Rowley, 2010; Morris, Webb, Fu, & Singhal, 2013; Paladan, 2015) but contextualized to agriculture. The six entrepreneurship constructs were (a) visionary and futuristic oriented, (b) endurance and risk taking propensity, (c) innovativeness and opportunity recognition, (d) leadership and management of agricultural ventures, (e) marketing and communication, and (f) need for autonomy and control of agricultural ventures (see Appendix B). A Likert-type item, i.e., a single item used to measure perception (Ary et al., 1996; Boone & Boone, 2012; Clason & Dormody, 1994; Gliem & Gliem, 2003; Likert, 1932; Uebersax, 2006), was used to record students' perceived likelihood of becoming agripreneurs (see Appendix B). The responses for this item included 1 (*Not likely at all*), 2 (*Unlikely*), 3 (*Not sure/Undecided*), 4 (*Likely*), and 5 (*Highly likely*).

Uebersax (2006) posited: "A Likert scale is never an individual item; it is always a set of several items, with specific format features, the responses to which are added or averaged to produce an overall score or measurement" (p. 3). Where a single item is used to measure attitudes or perceptions of participants, it is referred to as Likert-type item and not a Likert scale (Ary et al., 1996, 2006; Boone & Boone, 2012; Clason & Dormody, 1994; Gliem & Gliem, 2003; Uebersax, 2006).

The second part of the instrument included 30 items which were used to assess students' poultry science knowledge (see Appendix B). The questions about poultry

science were derived from the Ordinary Level syllabus for principles and practices of agriculture, as developed by the NCDC (2008), and other items were modified from past examinations created by the Uganda National Examinations Board (UNEB). The UNEB (2017) is the body mandated by Uganda's constitution to assess students' educational achievement in elementary and secondary schools, as well as other post-primary institutions. For the posttest, the researcher developed 30 alternate items (Beglinger et al., 2005; Benedict & Zgaljardic, 1998; Duff, Westervelt, McCaffrey, & Haase, 2001) to assess students' poultry science knowledge (see Appendix C). The use of an alternate form test helps to reduce practice effects which may make participants perform better on a test after having previous exposure to the exact same measure (Beglinger et al., 2005; Benedict & Zgaljardic, 1998; Duff et al., 2001; Popham, 1993).

The third part of the survey instrument included nine items that described the participants' personal characteristics, including age, sex, description of their home environment, and whether they kept poultry at home. Further, students were asked if they reared poultry for commercial purposes at home, how much learning about poultry they had experienced in school, if they had previously enrolled in an entrepreneurship course, and how much they knew about agricultural entrepreneurship (see Appendix B).

### **Validity, Reliability, and Field Testing of the Survey Instrument**

Validity of an instrument refers to the extent such measures the underlying concepts it purports to measure (Ary et al., 1996, 2006; Borg & Gall, 1983; Bryman, 2004; Creswell, 2012, 2014; Shaughnessy et al., 2006), which is essential for researchers to "draw meaningful and useful inferences from scores on particular instruments" (Creswell, 2014, p. 250). A panel of experts from the Department of Agricultural



Education, Communications and Leadership (AECL) and OSU's School of Entrepreneurship reviewed the instrument for content and face validity; in addition, four agricultural and entrepreneurship teachers from Uganda reviewed it.

Creswell (2012) defined content validity as “the extent to which the questions on the instrument and the scores from these questions are representative of all possible questions that could be asked about the content or skills” (p. 618). On the other hand, face validity refers to “the degree to which a test appears to measure what it claims to measure” (Gay et al., 2009, p. 155) and is based on the perceptions of the individuals completing the instrument. Ary et al. (1996) stated: “Subjects are more inclined to respond to questions they perceive to be relevant and meaningful than to questions whose purpose they do not comprehend” (p. 462). The panel of experts also helped ensure the instrument had sufficient face validity.

Reliability is an important aspect in social science research involving survey instruments if researchers are to reach valid conclusions about their studies. The measurement of constructs must be consistent or stable over time when repeated using the same instrument with individuals who have similar aptitudes and cognitive abilities (Ary et al., 1996, 2006; Bryman, 2004; Creswell, 2012, 2014; Gay et al., 2009; Shaughnessy et al., 2006; Tavakol & Dennick, 2011). Tavakol and Dennick (2011) affirmed that “the reliability of an instrument is closely associated with its validity. An instrument cannot be valid unless it is reliable” (p. 53). When an instrument is reliable, it helps to minimize errors which can bias a study's findings (Ary et al., 1996, 2006; Bryman, 2004; Gay et al., 2009). If an instrument has a smaller error and is stable, it is

more reliable and researchers can be more confident about the results obtained by using it (Ary et al., 1996, 2006; Bryman, 2004; Creswell, 2012; Gay et al., 2009).

Reliability estimates provide researchers with a measure to determine the amount of error that may be present in a test, and this can be achieved by use of Cronbach's alpha which measures the internal consistency of a scale (Ary et al., 1996, 2006; Bryman, 2004; Field, 2013; Tavakol & Dennick, 2011). This measure of internal consistency is useful in determining to what extent items used in a scale "measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test" (Tavakol & Dennick, 2011, p. 53). Tavakol and Dennick (2011) recommended researchers measure Cronbach's alpha each time a test is administered to participants, i.e., post hoc reliability analysis, and to not rely only on Cronbach's alpha estimates published from previous studies. This is because published alpha values are for participants who were part of studies at a particular time, and may differ from subjects in other studies due to a number of variables and conditions.

Most studies recommend acceptable values of alphas ranging from .68 to .95 (Bryman, 2004; Field, 2013; Scott & Bruce, 1995; Tavakol & Dennick, 2011), with values of .70 to .95 cited most often in published literature (Bryman, 2004; Field, 2013; Nunnally, 1970; Tavakol & Dennick, 2011). However, according to Berthoud (2000), a Cronbach's alpha value of .60 is also acceptable. Moreover, Nunnally (as cited in Field, 2013) observed that "in early stages of research, values as low as .5 will suffice" (p. 709). Further, Nunnally (1967) stated: "In the early stages of research on predictor tests or hypothesized measures of a construct, one saves time and energy by working with instruments that have only modest reliability, for which purpose reliabilities of .60 or .50

will suffice” (p. 226). The Cronbach’s alpha reliability estimates for the constructs measuring agripreneurship competencies in this study’s instrument are reported in Table 5, and include reliability estimates from both the pilot test and the actual investigation.

Table 5

*Reliability Estimates for the Measurement of Students’ Agripreneurship Competencies: Pilot Test and Post Hoc*

Constructs	Cronbach’s alpha reliability estimates – Pilot test	Cronbach’s alpha reliability estimates – Post hoc
Endurance and risk taking propensity	$\alpha = .82$	$\alpha = .70$
Being visionary and futuristic oriented	$\alpha = .84$	$\alpha = .62$
Marketing and communication	$\alpha = .84$	$\alpha = .75$
Leadership and management of agricultural ventures	$\alpha = .73$	$\alpha = .78$
Innovativeness and opportunity recognition	$\alpha = .82$	$\alpha = .76$
A need for autonomy and control of agricultural ventures	$\alpha = .69$	$\alpha = .52$

When using self-administered instruments, it is recommended that researchers pilot or field test such prior to administration to their target participants (Ary et al., 1996, 2006; Borg & Gall, 1983; Bryman, 2004; Creswell, 2012; Gay et al., 2009). Field testing helps researchers know if the respondents are capable of understanding and completing

the instrument (Ary et al., 1996, 2006; Borg & Gall, 1983; Bryman, 2004; Creswell, 2012; Gay et al., 2009). Further, field testing assists researchers in determining if the wording of instructions and items is clear; and doing such provides opportunities to conduct preliminary data analysis and evaluate the study's feasibility and/or make appropriate changes to the instrument as may be necessary (Borg & Gall, 1983; Bryman, 2004; Creswell, 2012; Gay et al., 2009). In addition, field testing aids researchers in addressing deficiencies or in making clarifications to further improve their instruments (Bryman, 2004; Creswell, 2012; Gay et al., 2009).

Field testing of the instrument was conducted in November of 2015 at three different schools in Uganda: Gayaza High School, Jinja College, and Kyambogo College. (*Note.* In Uganda, the word *college* is sometimes used interchangeably with *secondary school* to refer to high schools). Twenty students from each of these schools completed the instrument. The students in the field test were considered similar to the target population in the final study. Two of the schools are single sex schools and one was a mixed school, including both male and female students. Gayaza High School is an all-girls school, Jinja College is an all-boys school, and Kyambogo College is a mixed school. Field testing of the instrument enabled the researcher to calculate the reliability estimates of the constructs as reported in Table 5.

During data entry, it was discovered that one of the items measuring the construct of *need for autonomy and control* was worded negatively; therefore, the researcher reverse coded it for analysis. Regarding questions about the students' personal characteristics, the researcher deleted one item that required participants to indicate their class level, because all participants in the final study were in Senior Two. Further, based

on the feedback received from the field test, the researcher made minor grammatical adjustments to the items to improve readability. After making these changes, the researcher determined that the instructions and items comprising the instrument were clear and understandable and it could be completed by participants with aptitudes similar to those who participated in the study's field test.

### **Training for the Study's Research Assistants and Facilitators**

The study employed two research assistants who were teachers of agriculture in secondary schools in Uganda. Both assistants had prior experience conducting social science research. One of the research assistants had recently finished his master's thesis involving collecting data from human subjects, and, therefore, was familiar with the appropriate and ethical procedures involving research with human subjects. The other research assistant had worked with the investigator on other research projects that involved human subjects and was well versed with the appropriate and ethical procedures that ground research involving human subjects. Both research assistants were informed about the procedural and ethical guidelines that must be followed when conducting research involving human subjects, including ensuring confidentiality and voluntary participation.

Three Skype meetings were held by the researcher with the research assistants during the months of September, October, and November of 2015 prior to the field test and before the actual study. The researcher briefed the assistants about the study's purpose and objectives, including how the data should be collected and secured to ensure confidentiality. Follow up communications and discussions were made via electronic mail messages, Facebook messages, telephone calls, and WhatsApp messages. Further,

the researcher and his assistants formed a WhatsApp group platform on which they readily shared and communicated information.

The study employed 12 facilitators who helped with the training, guidance, and mentoring of students. These individuals included four teachers of agriculture, two entrepreneurship teachers, two extension educators – one was a specialist in poultry and the other in entrepreneurship and small business development - and four poultry farmers who provided field trip experiences for the students in the treatment group. The researcher worked with the teachers and extension agents through a series of online meetings via Skype, Google documents, and WhatsApp group chats to develop training modules for agripreneurship that would mirror the national curriculum for agriculture and entrepreneurship subjects (see Appendix D). Follow up meetings were conducted between the facilitators during the course of the study to ensure proper organization and scheduling of the trainings. All trainings and preparations for the facilitators occurred from December of 2015 through early February of 2016 prior to the opening of schools for the first term of 2016.

### **Study Population and Sample Selection**

The population of the study included Senior Two students, an equivalent to ninth grade in the U.S. education system, in four boarding secondary schools in Uganda. The schools included Busoga College Mwiri, Iganga Girls' Senior Secondary School, Wanyange Girls' Senior Secondary School, and Kiira College Butiki. Busoga College Mwiri and Kiira College Butiki are boys' only boarding schools, and Iganga Girls' Senior Secondary School and Wanyange Girls Senior Secondary School are girls' only boarding schools. Although Iganga Girls' Senior Secondary School has a small number of boys

with special needs, it is considered an all girls' school in Uganda. In this study, Busoga College Mwiri and Wanyange Girls Senior Secondary School comprised the counterfactual group (see Figure 9), and Iganga Girls' Senior Secondary School and Kiira College Butiki comprised the treatment group (see Figure 9).

The schools were purposely selected because of their location, i.e., eastern Uganda, and all four schools are boarding schools situated approximately 30 miles from one another which facilitated monitoring and supervision during the study. Their being boarding schools helped minimize the interaction of participants in the treatment and counterfactual groups during the study. Further, these schools are classified under the same grouping/level by the Ministry of Education and Sports in Uganda (I. A. Nseko, principal, Iganga Girls' Secondary School, personal communication, January 10, 2016). All four schools were traditional public schools, and rank among the top 100 schools based on Uganda's national examinations results, both at Ordinary and Advanced Levels (I. A. Nseko, principal, Iganga Girls' Secondary School, personal communication, January 10, 2016; Tumwine, 2016).

The total population of all Senior Two students in the selected schools was 894 students. The researcher used the guidelines recommended by Krejcie and Morgan (1970) to determine a representative sample to obtain a 95% confidence level, i.e.,  $p$  level = .05. Based on their guidelines, the recommended sample size from a population of 894 students was 269. However, the researcher over sampled ( $n = 320$ ) to address the likelihood of the attrition/mortality of some participants during the study or if any of the instruments filled by participants were deemed unusable for data analysis.

A stratified sampling technique was employed to select participants for the study (Ary et al., 1996, 2006; Borg & Gall, 1983; Creswell, 2012; see Table 6 and Figure 9). Stratified sampling involves dividing the population into subgroups, or strata, based on predetermined characteristics, and randomly selecting participants from each of the subgroups. The strata in this case were based on existing Senior Two groupings known as *streams* in Uganda's public schools. In streams, students are divided into sub-groups based on academic aptitude and performance (Sukhnandan & Lee, 1998). Stratified sampling increases the likelihood that the attributes of interest found in the population will be present in the selected sample with a similar distribution (Ary et al., 1996, 2006; Borg & Gall, 1983; Creswell, 2012). Ary et al. (1996) stated that "stratified sampling may give us [, i.e., researchers,] a more representative sample than simple random sampling" (p. 178). Using simple random sampling may lead to over representation or underrepresentation of certain attributes, especially if the said characteristics are not uniformly distributed in the population (Ary et al., 1996, 2006).

The sample participants in this study were 320 students who were divided equally among the treatment and counterfactual groups; each group included 160 participants (see Figure 9). The 160 participants in each group were further sub-divided among the respective schools to obtain an equal number of participants, i.e., 80 boys and 80 girls, in the sample by group (see Figure 9).

At the time of the study, Busoga College Mwiri had only two streams in Senior Two with a total population of 80 students, and, as a result, all the students in Senior Two at the school were recruited for the study. However, to ensure representativeness in the other three schools, participants were selected as a ratio of the class population to the



total number of Senior Two students in that particular school multiplied by 80 to arrive at a representative sample (see Table 6 & Figure 9). Wanyange Girls' Secondary School had a total population of 180 Senior Two students distributed in three streams. Kiira College Butiki and Iganga Girls' Secondary School each had four streams, with a total population of 312 and 322 students in Senior Two, respectively (see Table 6 & Figure 9). After determining the number of participants per stream, the researcher randomly selected the actual participants by stream based on their numbers on the class roll using randomizer.org. The students whose names on the class roll corresponded with the numbers drawn were selected to participate in the study (see Table 6).

Table 6

*Sets of Participants Selected using Research Randomizer (www.randomizer.org)*

Schools	Streams in Senior Two Class	Number of Participants Selected by Stream	Actual Participants Randomly Selected
Iganga Girls' Secondary School (a sample of 80 participants were selected from a student population of 322 in Senior Two)	Senior 2 North had 66 students	$66/322*80 = 16.39$ ; ~ 16 students selected	5, 61, 25, 44, 21, 54, 4, 33, 48, 65, 7, 55, 37, 38, 24, 52
	Senior 2 East had 78 students	$82/322*80 = 20.37$ ; ~ 20 students selected	37, 38, 32, 19, 65, 1, 76, 24, 8, 44, 66, 3, 39, 23, 48, 27, 20, 12, 57, 73
	Senior 2 West had 99 students	$99/322*80 = 24.60$ ; ~ 25 students selected	49, 26, 78, 86, 99, 12, 65, 55, 71, 34, 47, 66, 53, 36, 22, 52, 31, 90, 79, 58, 95, 80, 60, 6, 15
	Senior 2 South had 75 students	$75/322*80 = 18.63$ ; ~ 19 students selected	67, 35, 14, 15, 72, 21, 41, 39, 50, 53, 27, 34, 19, 33, 18, 22, 60, 6, 28

Schools	Streams in Senior Two Class	Number of Participants Selected by Stream	Actual Participants Randomly Selected
Kiira College Butiki (a sample of 80 participants were selected from a student population of 312 in Senior Two)	Senior 2W had 79 students	$79/312*80 = 20.26$ ; ~ 20 students selected	76, 63, 54, 5, 49, 56, 14, 18, 3, 38, 22, 25, 24, 16, 68, 64, 20, 26, 50, 8
	Senior 2M had 78 students	$78/312*80 = 20$ ; 20 students selected	56, 61, 48, 14, 10, 78, 77, 3, 76, 45, 53, 23, 59, 44, 2, 71, 47, 26, 17, 43
	Senior 2G had 79 students	$79/312*80 = 20.26$ ; ~ 20 students selected	56, 40, 18, 36, 69, 10, 62, 35, 67, 15, 25, 47, 19, 61, 70, 58, 50, 6, 16, 34
	Senior 2B had 76 students	$76/312*80 = 19.49$ ; ~ 20 students selected	35, 62, 53, 61, 14, 7, 48, 66, 74, 45, 32, 37, 8, 50, 18, 58, 76, 19, 10, 3

Schools	Streams in Senior Two Class	Number of Participants Selected by Stream	Actual Participants Randomly Selected
Wanyange Girls Secondary School (a sample of 80 participants were selected from a student population of 180 in Senior Two)	Senior 2 Blue had 60 students	$60/180*80 = 26.67$ ; ~ 27 students selected	17, 38, 45, 8, 59, 30, 43, 52, 34, 11, 18, 31, 22, 50, 55, 36, 46, 37, 14, 23, 28, 56, 12, 21, 53, 10, 40
	Senior 2 Green had 60 students	$60/180*80 = 26.67$ ; ~ 27 students selected	34, 16, 17, 22, 24, 1, 47, 56, 59, 5, 49, 15, 54, 41, 26, 32, 8, 44, 23, 14, 38, 19, 42, 28, 37, 11, 9
	Senior 2 Yellow had 60 students	$60/180*80 = 26.67$ ; ~ 27 students selected <sup>a</sup>	54, 29, 56, 40, 60, 19, 27, 4, 45, 10, 23, 38, 30, 21, 43, 39, 17, 49, 31, 55, 50, 18, 5, 11, 46, 53

*Note.* The students' names on the schools' class rolls were arranged alphabetically and numbered from one onward up to the last name on the roll. Therefore, the random number selected corresponded with the name of a student on the roll, and he or she was selected to participate in the study. All students from Busoga College Mwiri were selected because of their small population and having only two streams. <sup>a</sup>At Wanyange Girls Secondary School, the researcher rounded off the number obtained from the calculations of selected participants by stream to the nearest whole number which made the total population

exceed the required 80 participants per school. This procedure necessitated that the researcher select only the first 26 participants randomly generated from Senior Two Yellow instead of 27 as was the case with the school's other two streams.

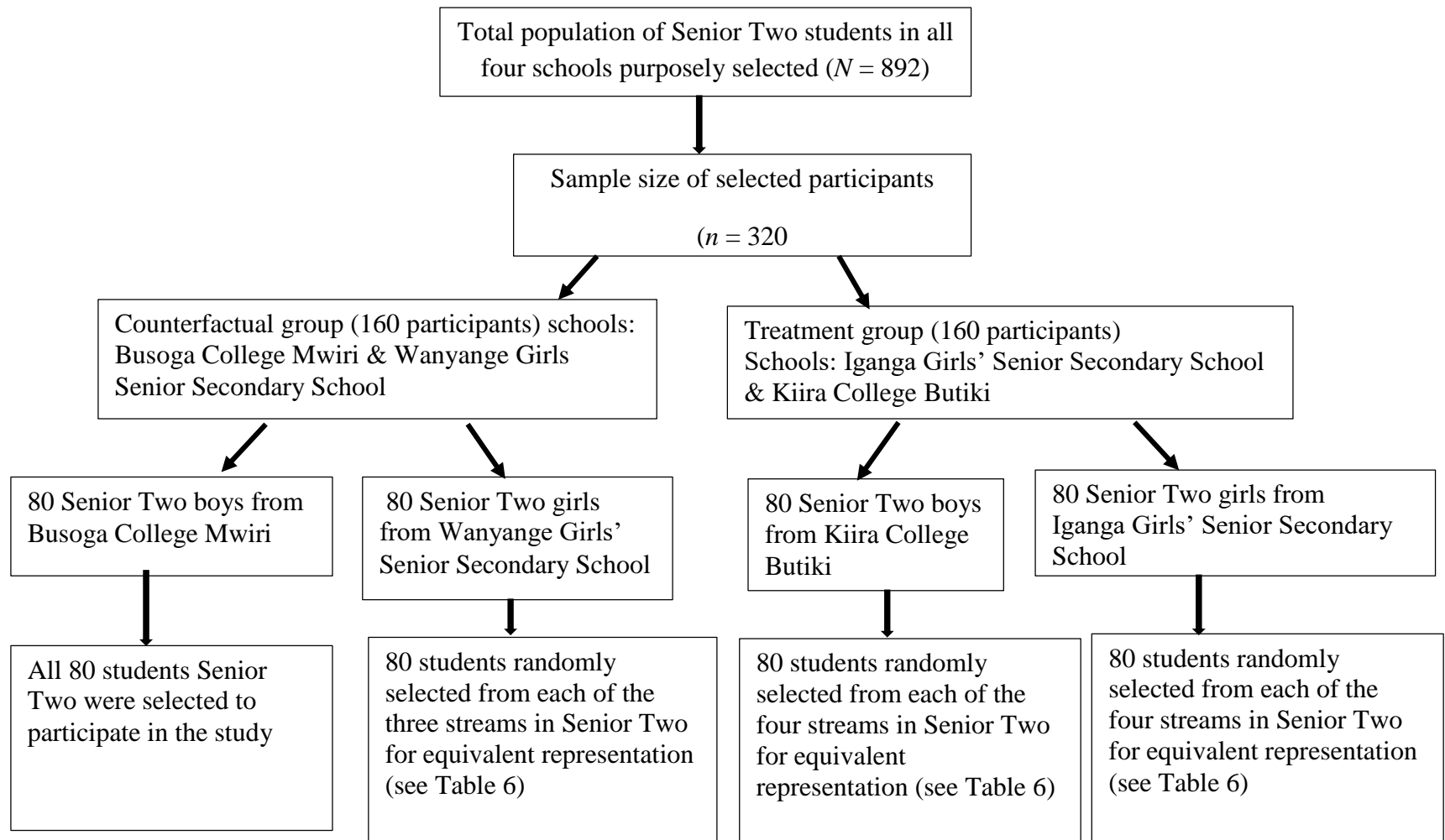


Figure 9. Diagrammatic representation of how the samples were selected for the treatment and counterfactual groups. The term *stream* refers to a group of students within a particular class, in this case the schools' Senior Two students. With streaming, the students are grouped together in most cases based on their academic performance or general aptitude (Sukhnandan & Lee, 1998).

### **The Study's Intervention**

The participants were divided into treatment and counterfactual groups (see Table 6 & Figure 9). Students in the counterfactual group received traditional instruction on poultry science from their agriculture teachers, as stipulated in the Ordinary Level agricultural course teaching syllabus created by the NCDC (2008). On the other hand, in addition to receiving traditional instruction on poultry science from their agricultural teachers, the treatment group students were provided funding to implement what they had learned about poultry in their classrooms to real-world settings as poultry rearing or keeping projects, i.e., *Student Agripreneurship Projects (SAPs)* [see Figure 10].

To this aim, participants of each school in the treatment group received 200 day-old broiler chicks, as well as the necessary feed and other related inputs to raise their birds. The students were mentored on how to care for the broiler chicks from day one through to their being marketed (8 weeks). Further, these participants received training in agricultural entrepreneurship (see Appendix D to view training modules), which was contextualized for a poultry enterprise. In addition, each weekend for eight weeks the treatment group students interacted with poultry farmers in their communities, whereby the students and adults shared knowledge, experiences, and learned about one another's respective poultry enterprises (see Figure 10). The agricultural and entrepreneurship teachers guided the participants in the treatment group to develop a business plan for their broiler projects using a template provided by the facilitators (see Appendix E). The students also kept journals in which they wrote about experiences with the projects and their agripreneurship training (Pavlovich, 2007; Scott et al., 2015, 2016).

In the third and fifth weeks of the project, participants, with the help of extension educators and their agricultural teachers, visited four entrepreneurial farmers in the region who kept poultry for commercial purposes. The farmers raised broilers and/or layers and were located about 30 miles from the students' schools. The field trips involved mutual exchange of knowledge between the farmers and the students. The students learned about various projects the farmers were conducting and had opportunities to ask questions related to commercial poultry production and agripreneurship in general. Further, they shared with the farmers what they had learned at school about poultry production, including their experiences with the SAPs they were implementing at their respective schools. Figure 10 illustrates the overall synergistic relationship for the treatment group between the researcher's institution, participating schools, including the respective administrators, student participants, and teachers, as well as the farmers and extension educators. The SAPs were the broiler projects the students implemented at their schools with support from the various stakeholders and the researcher.



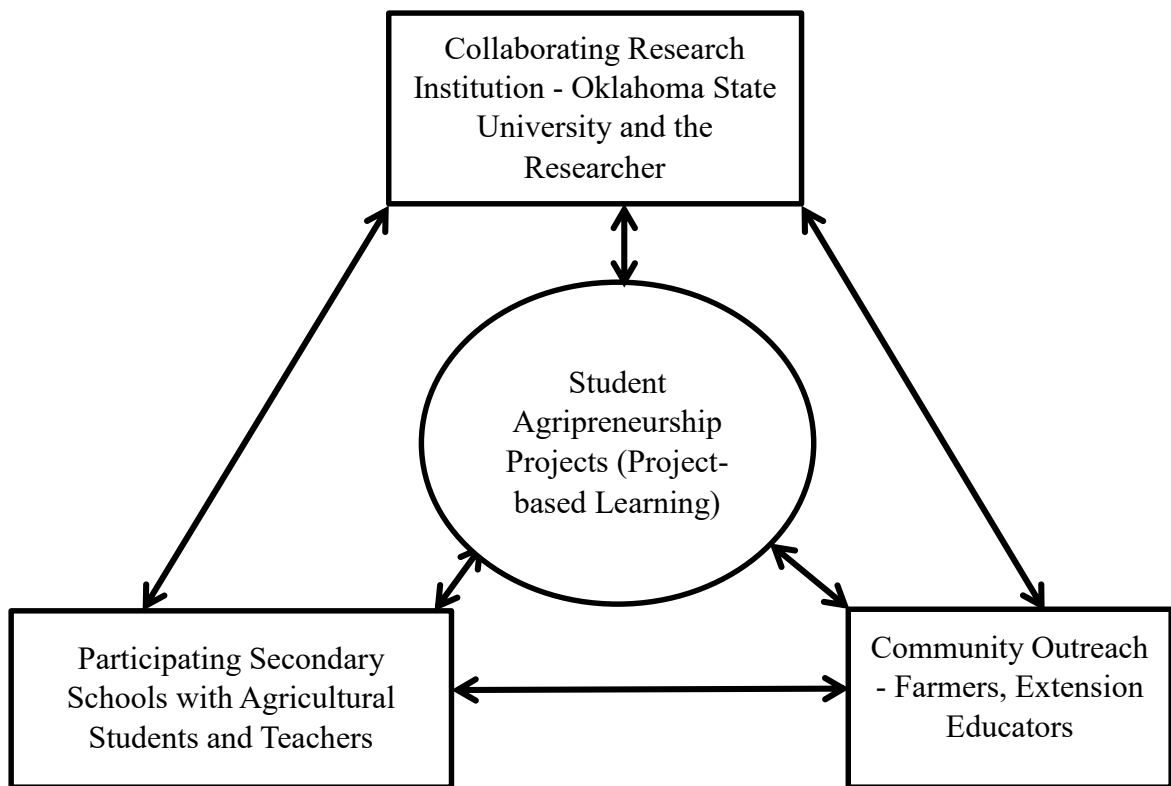
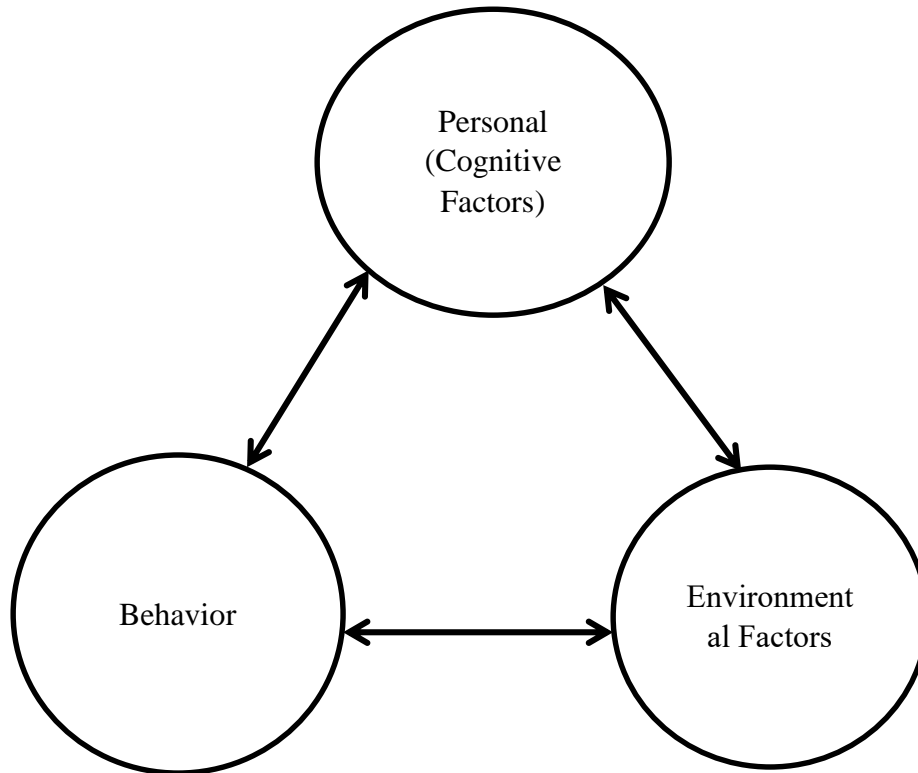


Figure 10. Diagrammatic representation of the synergistic and reciprocal flow of communication about the study's intervention between and among its participant groups.

Figure 10 is theoretically related to Albert Bandura's (1978, 1986, 1989) reciprocal determinism model (see Figure 11). According to Bandura's reciprocal determinism model, an individual's *behavior* influences or is influenced by *personal* and *environmental factors* (Bandura, 1978, 1986, 1989). In Figure 10, students' *personal factors*, such as interest and learning about agripreneurship (cognition), was supported by the researcher, and students in the treatment group also received training and mentorship from teachers/extension educators, including interaction with the entrepreneurial farmers, i.e., *environmental factors*. This, in turn, led to successful development and implementation of their SAPs, i.e., the *behavior*. The environmental factors play a role in individuals' perceptions and beliefs which impacts their behaviors (Bandura (1978)). See

Figure 11 for a diagrammatic depiction of the interaction between personal (cognitive), environmental, and behavioral factors.



*Figure 11.* “Schematic representation of the three alternative conceptions of interaction.” Adapted from “The Self System in Reciprocal Determinism” by Albert Bandura, 1978, p. 345.

### **Fidelity of the Study’s Intervention**

Several terms are used interchangeably to imply fidelity of an intervention, including adherence, compliance, fidelity of implementation, treatment fidelity, and treatment integrity, among others (Breitenstein, Gross, Garvey, Hill, Fogg, & Resnick, 2010; Carroll, Patterson, Wood, Booth, Rick, & Balain, 2007; Horner, Rew, & Torres, 2006; Nelson, Cordray, Hulleman, Darrow, & Sommer, 2012). Fidelity of an intervention

refers to the extent to which an intervention was delivered to participants as intended or described by the researcher (Breitenstein et al., 2010; Carroll et al., 2007; Horner et al., 2006; Nelson et al., 2012). Fidelity of an intervention is important because it impacts the findings and deductions made about the study as a whole based on the intervention, i.e., internal validity (Horner et al., 2006). Nelson et al. (2012) described five aspects of fidelity:

[A]dherence (did implementers do what was expected?), exposure (did participants receive as much as expected?), quality of delivery (did implementers perform activities in the manner expected?), participant responsiveness (did participants follow through as expected?), and program differentiation (did the treatment condition differ from the control condition as expected?). [p. 375]

Horner et al. (2006) argued that intervention fidelity can be improved by developing manuals elaborating the intervention, including the goals and procedures for its implementation. Further, training of individuals engaged with the intervention improves fidelity (Horner et al., 2006). The researcher trained the facilitators and research assistants who delivered and managed the intervention to enhance its fidelity. In addition, the researcher worked with the teachers and facilitators to develop the training modules for agripreneurship (see Appendix D). Further, the students learned poultry science from the agriculture teachers of their respective schools. However, in the case agripreneurship, the same facilitators taught all of the treatment group students which ensured they received similar content. Students journaled their experiences about the trainings received and their experiences with the broiler projects as well as the adult poultry growers and entrepreneurs. Videorecordings and visual images were taken by the

research assistants, including the training materials used by the students, and sent to the researcher for analysis. Having multiple sources of information about how the intervention was conducted and students journaling their experiences helped ensure fidelity of the study's treatment. (See Appendix H for a description of data sources regarding the study's fidelity of treatment).

### **Data Collection**

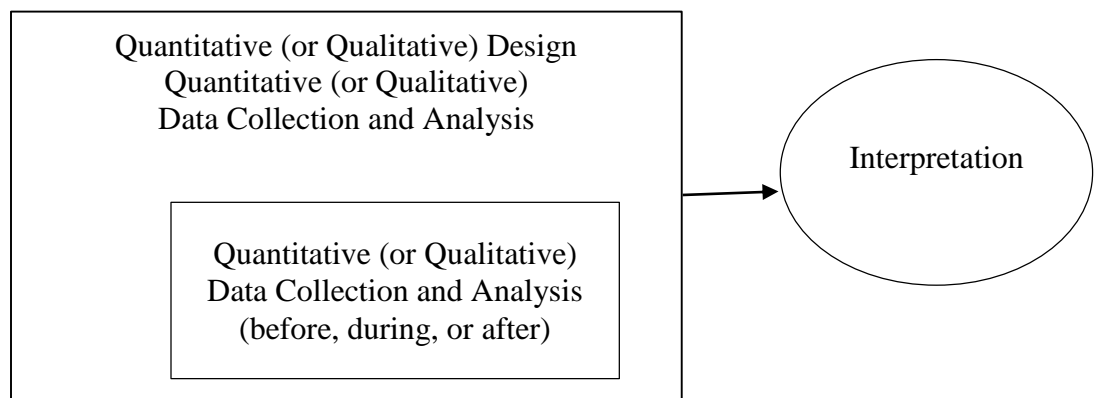
The data were collected using a mixed methods approach, an embedded design in particular (Creswell, 2012; Creswell & Plano Clark, 2011; Messer, Steckler, & Dignan, 1999; Plano Clark & Creswell, 2008; Victor, Ross, & Axford, 2004). Johnson and Onwuegbuzie (2004) defined mixed methods research "*as the class of research where the researcher mixes or combines quantitative and qualitative data research techniques, methods, approaches, concepts and language into a single study* [emphasis in original]" (p. 17). The authors added: "A key feature of mixed methods research is its methodological pluralism or eclecticism, which frequently results in superior research (compared to monomethod research)" (p. 14). Mixed methods offer a holistic approach to research and are helpful in mitigating the shortcomings if qualitative or quantitative methods were used alone to investigate a phenomenon (Creswell, 2012; Johnson & Onwuegbuzie, 2004).

In this study, an embedded design, as espoused by Creswell and Plano Clark (2011), was used. In an embedded design, the researcher collects both quantitative and qualitative data at the same time or one after the other (see Figure 12), but, in most cases, the aim is to answer different questions in the study (Creswell, 2012; Creswell & Plano Clark, 2011; Plano Clark & Creswell, 2008). Embedded designs are useful to address

questions about a phenomenon for which the use of quantitative or qualitative approaches alone would be inadequate (Creswell & Plano Clark, 2011). Creswell (2014) posited embedded designs may involve

either the convergent or sequential use of data, but the core idea is that either quantitative or qualitative data is embedded within a larger design (e.g., an experiment) and the data sources play a supporting role in the overall design. (p. 16)

Moreover, Creswell and Plano Clark (2011) asserted: “The embedded design is used to enhance the application of traditional quantitative or qualitative design” (p. 92).



*Figure 12.* An Embedded Design (Creswell, 2012, p. 541; Creswell & Plano Clark, 2011, p. 70).

In an embedded design, both quantitative and qualitative data are collected and complement one another as well as help to triangulate findings derived from the primary data set (Creswell, 2012, 2014; Creswell & Plano Clark, 2011). For example, in this study, the primary data were quantitative, but the researcher also collected secondary data, i.e., qualitative data, to answer a different set of questions and to also triangulate

findings emanating from the quantitative data (Creswell, 2012, 2014). Creswell (2012) affirmed the use of such a research design:

The purpose of the embedded design is to collect quantitative and qualitative data simultaneously or sequentially, but to have one form of data play a supportive role to the other form of data. The reason for collecting the second form of data is that it augments or supports the primary form of data. The supportive data may be either qualitative or quantitative, but most examples in the literature support adding qualitative data into a quantitative design. (p. 544)

Whereas quantitative data is mainly exploratory and give researchers the *bigger picture*, collecting qualitative data assist researchers to understand better and more deeply explain the phenomenon under study (Creswell, 2012, 2014). The quantitative data inform the researcher about the outcomes of the experiment; however, collecting qualitative data allows the investigator to understand better the participants' experiences with regard to the experiment (Creswell, 2012). The secondary data may be collected at the start, during, or at the end of the study (Creswell, 2012, 2014; Creswell & Plano Clark, 2011). The different forms of data – quantitative and qualitative – are analyzed separately (Creswell, 2012; Creswell & Plano Clark, 2011), and the researcher decides how to use the secondary data, or when to incorporate such “into the primary data set” (Creswell & Plano Clark, 2011, p. 219).

Creswell and Plano Clark (2011) outlined four guidelines to follow when collecting qualitative data in an embedded design:

(1) [D]esigning the overall experience and deciding the reason why qualitative data need to be collected, (2) collecting and analyzing qualitative data to enhance

the experimental design, (3) collecting and analyzing quantitative outcome data for the experimental groups, and (4) interpreting how the qualitative results enhanced the experimental procedures and/or understanding of the experimental outcomes. (p. 92)

However, Creswell (2012) noted that the collection of qualitative data at a time when the experiment is ongoing might “influence the outcomes” (p. 545). Therefore, researchers ought to collect qualitative data when the experiment ends, or have the participants journal their experiences during the study and submit such for analysis at the end of the investigation (Creswell, 2012; Creswell & Plano Clark, 2011; Victor et al., 2004).

In this study, the researcher followed the basic procedures for implementing an embedded design espoused by Creswell and Plano Clark (2011) [see Figure 13]. The quantitative data were collected using a pretest/posttest approach. The qualitative data were collected during the course of the intervention, whereby students journaled about their experiences (Creswell, 2012; Creswell & Plano Clark, 2011; Victor et al., 2004) regarding the broiler projects and the agripreneurship training received. Further, the research assistants took visual images and recorded videos of the agripreneurship training sessions, including the projects activities. Additional qualitative data were gathered retrospectively at the end of the study from the student participants and from some of the adult facilitators (Creswell & Plano Clark, 2011; Messer et al., 1999).

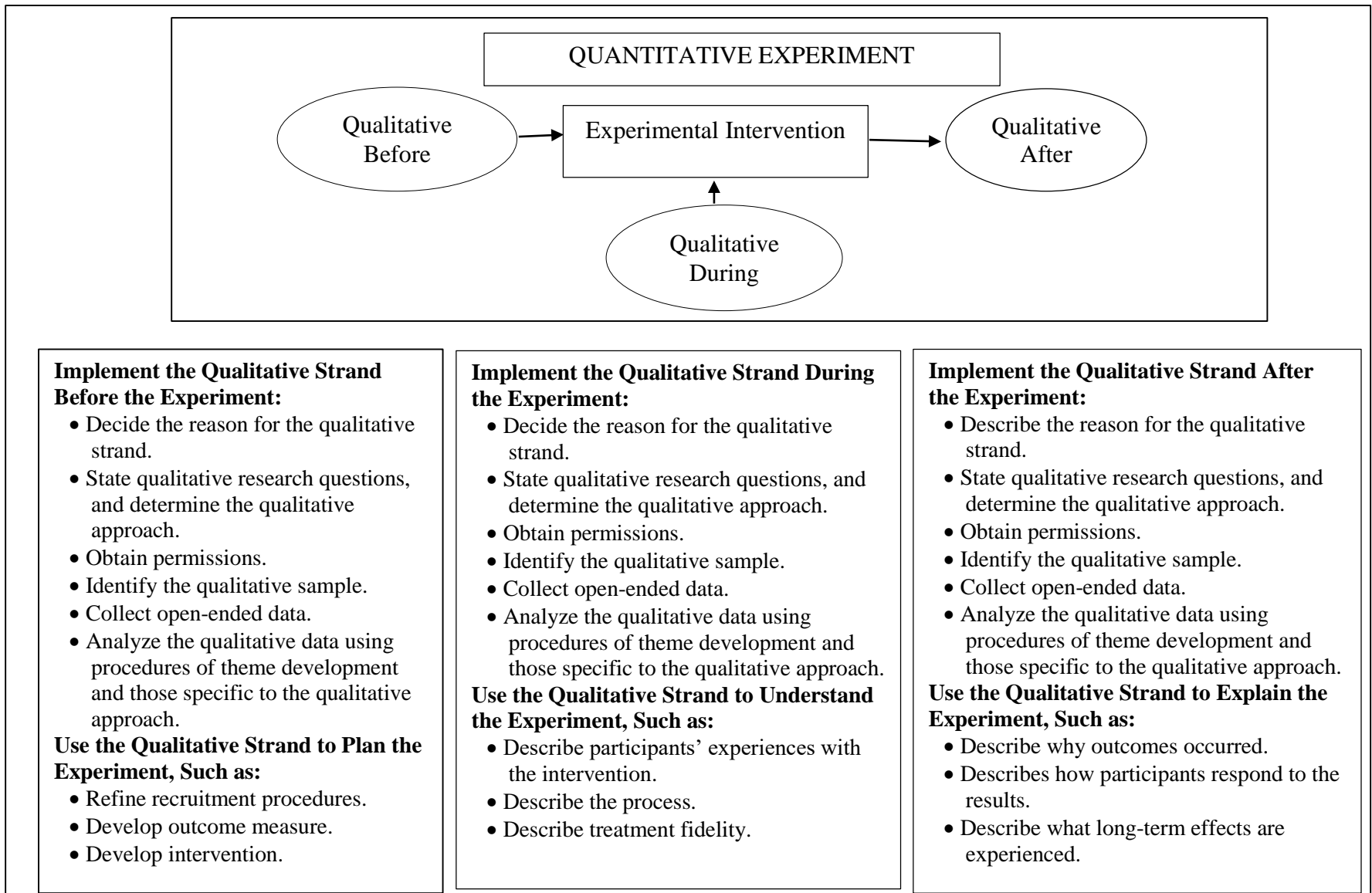


Figure 13. Flowchart of the Basic Procedures in Implementing an Embedded Design (Creswell & Plano Clark, 2011, p. 93)



Qualitative data were collected from eight adult facilitators through personal interviews; and the researcher conducted two focus group interviews to gather data from student participants in the treatment group (Bailey, 2012; Creswell & Plano Clark, 2011; Krueger, 1994; Messer et al., 1999; Morgan, 1997; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009; Popham, 1993). The first focus group interview included 10 boys from Kiira College Butiki, and the second focus group had 12 girls from Iganga Girls' Secondary School who volunteered to be interviewed about their experiences with the project (see interview protocol Appendix F). The agricultural teachers in both schools requested that all students who had participated in the project attend their respective interview sessions but only 10 from Butiki and 12 from Iganga volunteered to be interviewed. Though the size of focus group interviews may vary, the ideal recommended group sizes range from six to twelve participants (Bryman, 2004; Carlsen & Glenton, 2011; Morgan, 1997; Popham, 1993; Tynan & Drayton, 1988).

Bryman (2004) stated: "The original idea for the focus group – the focused interview – was that people who were known to have had a certain experience could be interviewed in a relatively unstructured way about that experience" (p. 347). Bryman (2004) added: "The focus group offers the researcher the opportunity to study the ways in which individuals collectively make sense of a phenomenon and construct meanings around it" (p. 348). Focus group interviews provide a platform for a study's participants to share meaningful experiences about a social phenomenon (Bailey, 2012). Popham (1993) posited that "focus group interviews will usually yield certain insights and understanding that are simply not obtainable through quantitative methods alone" (p. 204).

The personal interviews of the adult participants were guided by a semi-structured interview protocol (Bryman, 2004; Creswell, 2013; Groenewald, 2004; Lincoln & Guba, 1985; Yin, 2011) with two overarching, open-ended questions about their experiences with regard to the study's phenomenon, (see Appendix G). Patton (2015) stated: "Open-ended questions and probes yield in-depth responses about people's experiences, perceptions, opinions, feelings, and knowledge. Data consists of verbatim quotations with sufficient context to be interpretable" (p. 14). The researcher interviewed the participants via Skype (Bertrand & Bourdeau, 2010; Deakin & Wakefield, 2014), and, with their consent, the interviews were recorded using Evaer<sup>R</sup> software during July and August of 2016. Video interviews provide researchers "with an opportunity to not just talk to the respondent but to see them in real time" (Deakin & Wakefield, 2014, p. 4). Further, "the only differentiation between Skype interviewees and face-to-face interviewees [is] geographical proximity" (Deakin & Wakefield, 2014, p. 607). Length of the interviews varied from one to two hours (Onwuegbuzie et al., 2009; Popham, 1993; Tynan & Drayton, 1988).

During collection of the qualitative data, the researcher was guided by Tracy's (2010) eight procedural guidelines to ensure a sincere, ethical, and quality study. These guidelines included "(a) worthy topic, (b) rich rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contribution, (g) ethics, and (h) meaningful coherence" (p. 839). Tracy (2010) stated: "Sincerity as an end goal can be achieved through self-reflexivity, vulnerability, honesty, transparency, and data auditing" (p. 841). The researcher acknowledges his interest in youth and agricultural development through agripreneurship. He has invested time, effort, and resources in trying to understand this phenomenon,

including co-teaching a course about agripreneurship in OSU's Spears School of Business.

Further, the researcher served formerly as an agricultural teacher at one of the schools that participated in the investigation, and he has published research on youth development in and for the agricultural sector of Uganda. Therefore, the researcher's background could have been a potential source of bias in the study. However, because of his self-awareness and acknowledgement, the researcher did a self-reflection, and bracketed (*epochéd*) his preconceived ideas and opinions about the topic to ensure objectivity and honesty during data collection and analysis (Merriam, 2009; Moustakas, 1994; Tracy, 2010). Merriam (1998) posited that a researcher's "prior beliefs about a phenomenon of interest [should be] . . . temporarily put aside, or bracketed, so as not to interfere with seeing or intuiting the elements or structure of the phenomenon" (p. 16). Therefore, bracketing oneself is important in qualitative research because the researcher *is* the instrument (Guba, 1981; Lincoln & Guba, 1985; Merriam, 1998); bracketing was instituted by the researcher to reduce the likelihood of bias.

The worthiness of the research was established through a review of literature to determine an *existing gap* in the knowledge base, and the researcher posited that the findings of this study may play a substantial role in filling that void. Rich rigor was achieved by asking appropriate questions and probing to get a detailed description of the participants' experiences (Charmaz, 2014; Tracy, 2010). The researcher recorded field notes and conducted appropriate follow-up interviews with some of the participants for clarification, including careful data analysis to achieve rich rigor (Groenewald, 2004, 2008; Lincoln & Guba, 1985; Tracy, 2010).

Further, additional data were collected through qualitative content analysis of the student participants' journal entries, training materials (agriprenurship word puzzle game; see Appendix I), student posters, visual images relating to their projects, and video recordings (Bryman, 2004; Charmaz, 2014; Elo & Kyngas, 2008; George et al., 2014; Hsieh & Shannon, 2005; Mayring, 2000; Patton, 2015; Strauss, 2003). Hsieh and Shannon (2005) described qualitative content analysis "as a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (p. 1278). Content analysis involves objective and systematic evaluation as well as analysis of documents, including visuals and printed or written texts such as journal entries (Bryman, 2004; Elo & Kyngas, 2008; Zhang & Wildemuth, 2009). Bryman (2004) stated: "Content analysis is a flexible method that can be applied to a variety of different media" (p. 181). Moreover, it enables researchers to gain "direct information from study participants without imposing preconceived categories or theoretical perspectives" (Hsieh & Shannon, 2005, pp. 1279-1280).

Having multiple data sources describing the participants' experiences assisted in triangulating the data to ensure consistency, credibility, and validity of the analysis and related interpretations thereafter (Creswell, 2013; Merriam, 2009; Patton, 2015). Charmaz (2014) stated: "The quality of your study starts with the data, as does its credibility. The depth and scope of the data make a difference. A study based upon rich, substantial, and relevant data stands out" (p. 32).

In this study, both the qualitative and quantitative data were analyzed separately (Creswell, 2012; Creswell & Plano Clark, 2011). The data were collected to answer

different questions surrounding the same phenomenon (Creswell, 2012; Creswell & Plano Clark, 2011; Plano Clark & Creswell, 2008).

### **Coding and Analysis of the Study's Quantitative Data**

The data were hand-entered by the researcher into the Statistical Package for Social Scientists (SPSS) data file, version 21 using his office computer which was password protected to ensure safety and confidentiality of the data. Likert scale items measuring students' agripreneurship competences were coded and entered as 5 = *Strongly agree*, 4 = *Agree*, 3 = *Neutral/Undecided*, 2 = *Disagree*, and 1 = *Strongly disagree*. One item which was worded negatively in the scale was reverse coded and entered as 5 = *Strongly disagree*, 4 = *Disagree*, 3 = *Neutral/Undecided*, 2 = *Agree*, and 1 = *Strongly agree*. The researcher set real limits for the purpose of interpreting the Likert scales: 1.00 to 1.49 = *Strongly disagree*, 1.50 to 2.49 = *Disagree*, 2.50 to 3.49 = *Neutral/Undecided*, 3.50 to 4.49 = *Agree*, and 4.50 to 5.00 = *Strongly agree*. The Likert-type question about students' likelihood of becoming agricultural entrepreneurs after school was coded and entered as 5 = *Highly likely*, 4 = *Likely*, 3 = *Not sure/Undecided*, 2 = *Unlikely*, and 1 = *Not likely at all*. The numeric range of this item's real limits was the same as the multi-item scale. The grades obtained by students from the poultry knowledge test were entered as scores ranging from 0 to 30; each test item was worth one point (see Appendix B & C).

The students' ages were entered as number of years provided by the participants, i.e., a continuous variable. Students' sexes were coded and entered as 1 = *Male* and 2 = *Female*. Data describing students' home environments were or locations coded and entered as 1 = *Town*, 2 = *Rural*, and 3 = *Mixed/Peri-urban*; data about students keeping

poultry at home were coded as *1 = Yes* and *2 = No*, and the same coding was used to record responses about students who reared poultry for commercial purposes. Further, the question inquiring on how much a student had learned about poultry in school was coded and entered as *1 = None, 2 = Very little, 3 = Little, 4 = Much, and 5 = A great deal*. The question asking if the students had previous training in entrepreneurship was coded and entered as *1 = Yes* and *2 = No*; and the item inquiring about how much the students who had learned about entrepreneurship knew about agricultural entrepreneurship was coded and entered as *1 = None, 2 = Very little, 3 = Little, 4 = Much, and 5 = A great deal* (see Appendix B). The same real limits were used as appropriate for interpreting these findings.

During data entry, the researcher found that some of the participants did not complete both the pretest and the posttest of poultry science knowledge. Therefore, the researcher decided to exclude from analysis all participants who had not completed both tests. This left 280 usable responses to the knowledge test, 70 from each of the four schools. In addition, some of the participants had not responded to other items; in these cases, the researcher replaced all missing data with 999 before conducting a computer-aided analysis of the data. The data were analyzed using SPSS software, version 21.

Descriptive statistics, including means, modes, frequencies, and percentages were calculated and reported. The researcher ran a one-way analysis of variance (ANOVA) and observed statistically significant mean differences between the treatment and counterfactual groups on the pretest for agripreneurship competencies and the poultry knowledge test. The mean differences between the two groups were significantly statistically different at  $p < .05$ ; subsequently, an analysis of covariance (ANCOVA) was

conducted (Cohen, 1988; Cook & Campbell, 1979; Dimitrov & Rumrill, Jr., 2003; Dugard & Todman, 1995; Field, 2013; Pedhazur, 1997). ANCOVA is a more robust test compared to ANOVA and reduces the error, which increases “the precision of the analysis” (Pedhazur, 1997, p. 637). Kirk (2013) stated: “The goals of analysis of covariance, ANCOVA, are to reduce error variance, remove sources of bias from an experiment, and obtain adjusted estimates of population means” (p. 621). Further, ANCOVA adjusts “the posttest means for differences among groups on the pretest, because such differences are likely to occur with intact groups” (Dimitrov & Rumrill, Jr., 2003, p. 161).

Bivariate correlational analysis was conducted between selected dependent and independent variables to determine the strength of associations. Cramers’  $V$  was used to measure associations between nominal and ordinal variables, as well as nominal by nominal variables (Bryman, 2004; Field, 2013). Phi coefficient was employed to measure the strength of relationships between selected dichotomous variables (Bryman, 2004; Field, 2013). Point-biserial correlation coefficient was used to measure the strength of association between selected dichotomous and continuous variables (Bryman, 2004; Field, 2013). Spearman’s correlation coefficient was calculated to measure relationships between two ordinal variables, as well as between dichotomous and ordinal variables (Bryman, 2004; Field, 2013).

The magnitudes of correlation coefficients were described based on Davis’ conventions (as cited in Miller, 1994). The adjectives used to describe the magnitudes include *negligible* ( $r = .01$  to  $.09$ ), *low* ( $r = .10$  to  $.29$ ), *moderate* ( $r = .30$  to  $.49$ ), *substantial* ( $r = .50$  to  $.69$ ), *very high* ( $r = .70$  to  $.99$ ), and *perfect* ( $r = 1.00$ ). The

researcher set an a priori of .05 to determine if the selected relationships were statistically significant (Kirk, 2013; Pedhazur, 1997).

### **Transcription, Coding, Analysis, and Interpretation of the Qualitative Data**

The study's focus group interviews with students and adult participants were transcribed verbatim by the researcher and imported into NVivo 11 qualitative data analysis software for organization and analysis (QSR International, 2013, 2016). The participants' responses were given equal weight, i.e., *horizontalization* of the data occurred (Merriam, 2009; Moustakas, 1994), and such were later reduced to significant statements and converted into codes by the researcher (Creswell, 2013; Saldaña, 2016; Strauss, 2003). "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2016, p. 4). Strauss (2003) stated: "Any researcher who wishes to become proficient at doing qualitative analysis must learn to code well and easily. The excellence of the research rests in large part on the excellence of the coding" (p. 23).

In addition, the researcher memoed about key ideas or themes on which he reflected during data analysis and interpretation (Groenewald, 2004, 2008; Strauss, 2003). Based on the researcher's evaluation and judgement, codes were categorized into emergent themes (Moustakas, 1994; Ryan & Bernard, 2003; Saldaña, 2016). Saldaña (2016) stated: "A theme can be an *outcome* of coding, categorization, or analytic reflection, but it is not something that is, in itself, coded" (p. 15). The researcher analyzed the themes to establish the essence of the participants' experiences in regard to school-based, agripreneurial projects (SAPs), including the potential of such to improve



agricultural practices in their communities, and the students' acquisition of agripreneurship, leadership, communication, and teamwork skills.

### **Summary of the Methodology**

A quasi-experimental design involving a nonequivalent control group was used in this study (Campbell & Stanley, 1966; Cook & Campbell, 1979). This type of research design is employed frequently in educational settings where it may not be possible to assign participants to treatment or counterfactual groups due to a variety of reasons (Ary et al., 1996, 2006; Campbell & Stanley, 1966). The study's survey instrument was developed by the researcher and reviewed by a panel of experts from OSU's Department of Agricultural Education, Communications, and Leadership and School of Entrepreneurship, as well as by four agricultural and entrepreneurship teachers from Uganda, for content and face validity. A field test of the instrument was conducted among students similar to the participants in the final study. And based on feedback from the study's field test, modifications were made, as appropriate, to improve the instrument's readability and to calculate the reliability estimates of its constructs (see Table 5).

Two research assistants were involved with the study, and both had prior experience conducting social science research. The assistants were informed about the procedural and ethical guidelines that must be followed when conducting research involving human subjects, including ensuring confidentiality and voluntary participation. Preparatory meetings, discussions, and follow-up communication were made via electronic mail messages, Facebook messages, telephone calls, and WhatsApp messages.

Further, the researcher and his assistants formed a WhatsApp group platform on which they shared information and communicated.

Four schools participated in the final study, i.e., two boys' schools and two girls' schools. These schools included Busoga College Mwiri and Wanyange Girls Secondary School which comprised the study's counterfactual group, and Kiira College Butiki and Iganga Girls' Secondary School served as the treatment group. The schools were purposely selected because of their locations, i.e., eastern Uganda. Participants from these schools were Senior Two students. A stratified sampling technique was employed to select participants for the study (Ary et al., 1996, 2006; Borg & Gall, 1983; Creswell, 2012; see Table 6 and Figure 9). The sample for this study included 320 students who were divided equally among the treatment and counterfactual groups; each group had 160 participants (see Figure 9). The 160 participants in each group were further sub-divided among the respective schools to obtain an equal number of participants, i.e., 80 boys and 80 girls, in the sample by group (see Figure 9). Two-hundred and eighty students provided usable responses for quantitative data analysis.

The students in the counterfactual group received traditional instruction on poultry science from their agricultural teachers, as stipulated in the Ordinary Level agricultural course teaching syllabus provided by the NCDC (2008). On the other hand, in addition to receiving traditional instruction on poultry science from their agriculture teachers, the treatment group students were provided funding to implement what they had learned about poultry in their classrooms to real-world settings as broiler raising projects, i.e., *Student Agripreneurship Projects (SAPs)* [see Figure 10]. Further, the treatment group students interacted with poultry farmers in their communities whereby the students

and adults shared knowledge, experiences, and learned about their respective poultry enterprises (see Figure 10).

The study's fidelity of treatment was ensured through training of the facilitators and research assistants who delivered and managed the intervention. The researcher worked with the teachers and facilitators to develop the training modules for agripreneurship (see Appendix D). Further, the students learned poultry science from the agriculture teachers of their respective schools. Students in the treatment group received agripreneurship training from the same facilitators which ensured they were given similar content. In addition, they journaled about their training experiences, their broiler projects, and regarding their interactions with adult poultry growers and entrepreneurs. Further, the research assistants took visual images and recorded videos about the training that were sent to the researcher for analysis and to assess the study's fidelity of treatment.

A mixed methods approach, an embedded design in particular, was used to collect the data (Creswell, 2012; Creswell & Plano Clark, 2011; Messer et al., 1999). Using an embedded design to gather data provides researchers with multiple sources of findings that answer various questions and enables triangulation (Creswell & Plano Clark, 2011). Moreover, it offers a holistic approach to research which is useful in addressing shortcomings associated with using only qualitative or quantitative procedures to investigate a phenomenon (Johnson & Onwuegbuzie, 2004).

The study's quantitative data were collected using a survey instrument developed by the researcher (see Appendices B & C). A pretest and a posttest were administered to students in both groups (Campbell & Stanley, 1966). For the posttest, the researcher employed alternate form questions to measure the students' poultry science knowledge.

The use of alternate form tests is useful in reducing practice effects which may make participants perform better on a test due to previous exposure to the same measure (Beglinger et al., 2005; Benedict & Zgaljardic, 1998; Duff et al., 2001). Qualitative data were collected from both students and adult participants by conducting focus group and personal interviews (Bailey, 2012; Creswell & Plano Clark, 2011; Onwuegbuzie et al., 2009) via Skype (Deakin & Wakefield, 2014). Further, additional data were obtained by analyzing students' journal entries, training materials, videos, and visual images (Charmaz, 2014; George et al., 2014; Hsieh & Shannon, 2005). Quantitative data were coded and analyzed using SPSS software version 21, and the qualitative data were analyzed using NVivo 11 analysis software (QSR International, 2013, 2016).

In the case of the quantitative data, descriptive statistics, including means, modes, frequencies, and percentages, were calculated and reported. In addition, ANCOVA and tests of relationships between selected variables were conducted. The qualitative data were analyzed, coded, and categorized to determine emerging themes.

## CHAPTER IV

### FINDINGS

In this chapter, the findings addressing the study's research objectives and hypotheses are presented in two distinct sections, i.e., quantitative and qualitative. Results from the quantitative strand are presented in the first section, followed by findings from the qualitative strand in the second section.

The first section contains a description of the students' personal and professional characteristics. In addition, other findings addressing the four quantitative objectives of the study are presented, including comparing students' poultry science knowledge depending on the instructional approach received, i.e., a project-based learning approach featuring agripreneurship versus traditional classroom instruction; comparison of students' perceived agripreneurship competencies (skills) depending on the instructional approach received; and a comparison of students' intentions regarding their likelihood of starting agripreneurship projects in the future depending on the instructional approach received. Further, this section also provides a description of relationships between students' characteristics and other selected variables.

Such relationships include (a) association between students who raised (reared) commercial poultry and their knowledge of agripreneurship before the study;

(b) association between students who reared commercial poultry and their intent to become agripreneurs in the future before the study; (c) association between students raising poultry at home and their learning about poultry keeping in school before the study; (d) association between students' sex and their knowledge of agripreneurship before the study; (e) association between students' sex and their learning about poultry keeping at school before the study; (f) association between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future before the study; (g) association between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future before the study by group; (h) association between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future after the study; (i) association between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future after the study by group; (j) association between students' home location (environment) and their keeping poultry for commercial purposes before the study; (k) association between students' home location (environment) and their keeping poultry at home before the study.

Other testes of relationships were (l) association between students' sex and their enrollment in entrepreneurship as a subject before the study; (m) association between students' sex and their commercial poultry keeping before the study; (n) association between students' sex and their poultry keeping at home before the study; (o) association between students' ages and sexes; (p) association between students' sex and their pretest poultry knowledge scores; (q) association between students' sex and their posttest poultry knowledge scores; (r) association between students' perceptions of agripreneurship knowledge and their likelihood to become agripreneurs in the future before the study; (s)

association between students' learning about poultry keeping in school and their perceived knowledge of agripreneurship before the study; and (t) association between students' perceptions of learning about poultry keeping in school and their likelihood of becoming agripreneurs in the future before the study.

In the second section, a description of the personal and professional characteristics of participants who were part of the study's focus groups, as well as those adults who participated in personal interviews, is provided. Further, the themes emerging from analysis of the qualitative data, and the *essence* of participants' experiences with regard to school-based, agripreneurial projects (SAPs), including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills, are presented.

### **Purpose of the Study**

The primary purpose of this study was to assess how a project-based learning (PBL) approach involving agripreneurship could be used to enhance students' understanding and application of selected agricultural knowledge and concepts (i.e., poultry science and related entrepreneurial competencies) learned in school to real-world settings. In addition, the study sought to describe participants' experiences in regard to school-based, agripreneurial projects (SAPs) and their potential for improving agricultural practices and related livelihood opportunities in local communities.

### **Objectives of the Study**

Six objectives and 10 null hypotheses guided this study:

- 1) describe selected personal and professional characteristics of the participants (students and adults);
- 2) compare students' poultry science knowledge based on the instructional approach used, i.e., project-based learning featuring agripreneurship versus traditional classroom instruction;
  - Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for poultry science knowledge based on the instructional approach used.
- 3) compare students' perceived agripreneurship competencies (skills) based on the instructional approach used;
  - Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceived agripreneurship competencies based on the instructional approach used.



- Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceived agripreneurship competencies based on the instructional approach used.
- 4) compare students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
- 5) describe relationships between students' characteristics and other selected variables;
- Ho: No statistically significant relationships ( $p < .05$ ) existed between students' characteristics and other selected variables.
- 6) describe participants' (students' and adults') experiences in regard to school-based, agripreneurial projects, including the potential of such to improve

agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills.

### **Section One: Findings Derived from the Study's' Quantitative Data**

#### **Findings for Objective One**

##### **Personal characteristics of the student participants.**

Based on the usable responses, data from 280 student participants were analyzed. The findings indicated students were evenly split between the treatment and the counterfactual groups, i.e., 140 student participants in each group (see Table 7). Both groups had an equal distribution of student participants by sex, i.e., 50.00% male and 50.00% female (see Table 7). The ages of the student participants ranged from 12 to 20 years, with the modal age being 14 years (40.36%; see Table 7). The mean age of the student participants was 14.59 years (see Table 7); twelve student participants (4.29%) did not report their ages (see Table 7). The modal home location or environment as indicated by the student participants was *mixed/peri-urban*, i.e., 36.79% indicated they lived near a *town*; 36.43% of the student participants lived in a *town*, 25.71% lived in *rural* areas, and 1.07% did not respond to this question (see Table 7).

A majority of the student participants (77.14%) indicated they kept or had kept poultry at home, 21.07% of student participants indicated they had not, and 1.79% of the student participants did not provide a response (see Table 7). Slightly more than one-half of the student participants (50.71%) indicated they had not reared poultry for commercial purposes compared to 48.21% who did rear poultry at home for commercial purposes, and 1.07% of the student participants did not provide a response (see Table 7). Slightly more than three-in-four student participants (75.72%) indicated they had *little, very little*

or *none* in regard to learning about poultry keeping in school before the study, and only 23.21% indicated they had *much* or *a great deal* of learning about poultry keeping in school before the study; 1.07% of the student participants did not provide a response to this question (see Table 7).

A majority of the student participants (56.07%) indicated they had not previously enrolled in entrepreneurship as a subject of study; 42.86% of the student participants indicated they had previously enrolled in entrepreneurship as a subject at their schools, and 1.07% of student participants did not provide a response (see Table 7). Six-in-ten (60.00%) of the students indicated they had *little*, *very little*, or *none* in regard to knowledge or understanding about agricultural entrepreneurship (agriprenurship), and almost two-in-ten (18.92%) indicated they had *much* to *a great deal* of knowledge or understanding of agriprenurship before the study (see Table 7). Slightly more than two-in-ten (21.07%) of the student participants did not respond to the question asking about their previous knowledge of agriprenurship (see Table 7).

Table 7

*Personal Characteristics of the Study's Student Participants*

Characteristics	<i>f</i>	%	<i>M</i>
<b>Sex</b>			
Male	140	50.00	
Female	140	50.00	
<b>Age</b>			
12	1	0.36	
13	38	13.57	
14	113	40.36	
15	62	22.14	
16	36	12.86	
17	12	4.29	
18	4	1.43	
19	1	0.36	
20	1	0.36	
No response	12	4.29	
Average age			14.59
<b>Home location (environment)</b>			
Mixed/Peri-urban (near town)	103	36.79	
Town	102	36.43	
Rural	72	25.71	
No response	3	1.07	

---

Characteristics	<i>f</i>	<i>%</i>	<i>M</i>
<b>Currently keep poultry at home</b>			
Yes	216	77.14	
No	59	21.07	
No response	5	1.79	
<b>Reared poultry for commercial purposes</b>			
Yes	135	48.21	
No	142	50.71	
No response	3	1.07	
<b>Learned about poultry keeping</b>			
previously in school			
None	40	14.29	
Very little	82	29.29	
Little	90	32.14	
Much	37	13.21	
A great deal	28	10.00	
No response	3	1.07	
<b>Enrolled in entrepreneurship as a</b>			
subject			
Yes	120	42.86	
No	157	56.07	
No response	3	1.07	

---

Characteristics	<i>f</i>	<i>%</i>	<i>M</i>
Knowledge about agricultural entrepreneurship (agripreneurship)			
None	63	22.50	
Very little	61	21.79	
Little	44	15.71	
Much	37	13.21	
A great deal	16	5.71	
No response	59	21.07	

***Personal characteristics of the student participants by group.***

An equal number of male and female students participated in each group (see Table 8). Both the treatment and counterfactual groups each had 70 male (50.00%) and 70 female (50.00%) student participants (see Table 8). The age range for the student participants in the counterfactual group varied from 13 years to 20 years, with the modal age being 14 years (40.71%; see Table 8). The youngest student participants in the counterfactual group were 13 years old (6.43%), and the oldest student participant in this group was 20 years (0.71%; see Table 8). Eight participants (5.71%) did not respond to this question. The mean age for the counterfactual group students was 14.81 years. On the other hand, the ages of the treatment group students ranged from 12 years (0.71%) to 18 years (1.43%), with the modal age being 14 years (40.00%; see Table 8). Four student participants in the treatment group did not report their ages (2.86%; see Table 8). The mean age for the treatment group students was 14.37 years (see Table 8).

The modal home location (environment) for student participants in the counterfactual group was *town* (47.14%). Almost one-half (47.14%) of the students in the counterfactual group indicated that they lived in a *town* setting compared to 31.43% who lived near a town, i.e., a *mixed/peri-urban* setting (see Table 8). One-in-five student participants (20.00%) in the counterfactual group indicated they lived in a *rural* setting, and 1.43% of the student participants in this group did not provide a response (see Table 8). In the case of the treatment group student participants, the modal home location (environment) was *mixed/peri-urban*, i.e., 42.14% of student participants indicated they lived near a *town*; 31.43% lived in a *rural* setting; slightly more than one-in-four student participants (25.71%) resided in a *rural* area, and one student participant (0.72) did not provide a response (see Table 8).

An equal number of student participants (77.14%) in both the counterfactual and treatment groups indicated that they kept poultry at home; 22.14% of the counterfactual group and 20.00% of the treatment group, respectively, indicated that they did not keep poultry at home; one student participant in the counterfactual group and four in the treatment group did not respond to this question (see Table 8). A majority of student participants (56.43%) in the counterfactual group indicated they had reared poultry for commercial purposes; 42.14% of the students had not reared poultry for commercial purposes; and two did not provide a response (see Table 8). In the case of the treatment group, almost six-in-ten of the students (59.29%) indicated they had never reared poultry for commercial purposes; 40.00% indicated they had reared poultry for commercial purposes, and only one student participant did not respond to this question (see Table 8).

More than seven-in-ten of the student participants in both the counterfactual (72.85%) and treatment groups (78.57%) indicated that they had *little, very little, or none* in regard to learning about poultry keeping at school before the study; 25.72% of the counterfactual group and 20.71% of the treatment group indicated they had *much to a great deal* of learning about poultry keeping at school before the study; two students (1.43%) in the counterfactual group and one (0.72%) in the treatment group did not respond (see Table 8).

A majority of students (57.14%) in the counterfactual group indicated that they had previously or were currently enrolled in entrepreneurship as a subject; 41.43% of the student participants indicated they had not previously enrolled in entrepreneurship as subject; and two students (1.43%) did not respond (see Table 8). Slightly more than seven-in-ten (70.71%) in the treatment group had not previously enrolled or were not currently enrolled in entrepreneurship as a subject; almost three-in-ten (28.57%) were previously or currently enrolled in entrepreneurship as a subject at the time of the study; only one student (0.72%) did not respond.

Almost an equal number of student participants in the counterfactual (60.72%) and treatment groups (59.28%) indicated they had *little, very little, or none* in regard to knowledge or understanding about agriprenurship; 21.43% of the counterfactual group and 16.43% of treatment group indicated that they had *much to a great deal* of knowledge or understanding of agriprenurship (see Table 8). In addition, 17.86% of the student participants in the counterfactual group and 24.29% in the treatment group did not respond to this item (see Table 8).



Table 8

*Personal Characteristics of the Study's Student Participants by Group*

Personal Characteristics	Group					
	Counterfactual Group			Treatment group		
	<i>f</i>	%	( <i>X</i> )	<i>f</i>	%	( <i>X</i> )
<b>Sex</b>						
Male	70	50.00		70	50.00	
Female	70	50.00		70	50.00	
<b>Age</b>						
12	0	0.00		12	0.71	
13	9	6.43		29	20.71	
14	57	40.71		56	40.00	
15	36	25.71		26	18.57	
16	17	12.14		19	13.57	
17	9	6.43		3	2.14	
18	2	1.43		2	1.43	
19	1	0.71		0	0.00	
20	1	0.71		0	0.00	
No response	8	5.71		4	2.86	
Average age			14.81			14.37
<b>Home location</b>						
(environment)						
Town	66	47.14		36	25.71	

Personal Characteristics	Group					
	Counterfactual Group			Treatment group		
	<i>f</i>	%	(X)	<i>f</i>	%	(X)
Mixed/peri-urban (near town)	44	31.43		59	42.14	
Rural	28	20.00		44	31.43	
No response	2	1.43		1	.72	
Currently keep poultry at home						
Yes	108	77.14		108	77.14	
No	31	22.14		28	20.00	
No response	1	0.72		4	2.86	
Reared poultry for commercial purposes						
Yes	79	56.43		56	40.00	
No	59	42.14		83	59.29	
No response	2	1.43		1	0.71	
Learned previously about poultry keeping in school						
None	17	12.14		23	16.43	
Very little	42	30.00		40	28.57	
Little	43	30.71		47	33.57	

Personal Characteristics	Group					
	Counterfactual Group			Treatment group		
	<i>f</i>	%	(X)	<i>f</i>	%	(X)
Much	20	14.29		17	12.14	
A great deal	16	11.43		12	8.57	
No response	2	1.43		1	0.72	
Enrolled in						
entrepreneurship						
as a subject						
Yes	80	57.14		40	28.57	
No	58	41.43		99	70.71	
No response	2	1.43		1	0.72	
Knowledge about						
agricultural						
entrepreneurship						
(agripreneurship)						
None	21	15.00		42	30.00	
Very little	37	26.43		24	17.14	
Little	27	19.29		17	12.14	
Much	20	14.29		17	12.14	
A great deal	10	7.14		6	4.29	
No response	25	17.86		34	24.29	

## Findings for Objective Two

### **A comparative analysis of students' poultry science knowledge depending on the instructional approach used: A project-based learning approach featuring agripreneurship versus traditional classroom instruction.**

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment); sex (male, female); covariate: pretest] was conducted to compare students' poultry science knowledge depending on the instructional approach used: A project-based learning approach featuring agripreneurship versus traditional classroom instruction. A one-way Analysis of variance (ANOVA) indicated that the pretest scores on poultry science knowledge between groups were statistically significantly different at  $p < .01$  with a small effect size [ $F(1, 278) = 14.02, p < .001, \eta^2 = .048$ ]; see Table 9. Levene's test ( $p = .631$ ) was not statistically significant at  $p < .05$ . The mean for the treatment group ( $M = 10.99, SD = 2.78$ ) was significantly higher than for the counterfactual group ( $M = 9.76, SD = 2.68$ ; see Table 10). A statistically significant positive and low correlation existed between the pretest and posttest scores for students' poultry science knowledge ( $r = .25, p < .001$ ).

Table 9

*One-way ANOVA Table: Pretest Mean Score Difference between Groups for Poultry Science Knowledge*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	104.432	1	104.432	14.017	.000**	.048
Within Groups	2071.193	278	7.450			
Total	2175.625	279				

*Note.* \*\*Statistically significant difference at  $p < .01$

Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 10

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on Poultry Science Knowledge*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	140	9.76	2.68	2.00	17.00
Treatment	140	10.99	2.78	6.00	19.00
Total	280	10.38	2.79	2.00	19.00

Due to the statistically significant differences between the group means, and the positive correlation between the groups' pretest and posttest scores, the pretest scores were used as a covariate. Dimitrov and Rumrill (2003) posited "ANCOVA is used to adjust the posttest means for pretest differences among intact groups" (p. 164). The covariate, pretest scores of participants' poultry science knowledge were not statistically significantly related at  $p < .05$  to the students' posttest scores of poultry science

knowledge [ $F(1, 275) = 3.70, p = .056, \eta_p^2 = .013$ ]; see Table 11. Of note, however, the  $p$  value of .056 for the pretest scores of participants' poultry science knowledge was very close to being statistically significant at  $p < .05$

After controlling for the covariate, a statistically significant interaction ( $p < .01$ ) was found between students' group and sex with a medium effect size [ $F(1, 275) = 35.48, p < .001, \eta_p^2 = .114$ ]; see Table 11 and Appendix J. Therefore, the null hypothesis was rejected. This finding implied that males and females were affected differently based on their group. It was noted that males in the counterfactual group had higher adjusted marginal and observed mean scores ( $Adj. M = 16.01, SE = .47; M = 15.99, SD = 3.95$ ; see Table 12) on poultry science knowledge than females in the same group ( $Adj. M = 11.76, SE = .34; M = 11.60, SD = 2.88$ ; see Table 12). However, females in the treatment group had higher adjusted marginal and observed mean scores ( $Adj. M = 18.23, SE = .32; M = 18.44, SD = 2.66$ ; see Table 12) on the posttest of poultry science knowledge than did males in the same group ( $Adj. M = 17.29, SE = .53; M = 17.26, SD = 4.46$ ; see Table 12).

A statistically significant main effect with a large effect size was found between group and students' posttest scores on poultry science knowledge [ $F(1, 275) = 78.96, p < .001, \eta_p^2 = .223$ ]; see Table 11. Based on this finding, the null hypothesis was rejected. In addition, a statistically significant main effect with a medium effect size was found for students' posttest scores on poultry science knowledge depending on their sex [ $F(1, 275) = 15.17, p < .001, \eta_p^2 = .052$ ]; see Table 11. Therefore, the null hypothesis was rejected.

Table 11

*ANCOVA Results for Students' Posttest Scores of Poultry Science Knowledge Depending on the Instructional Approach Used*

Source	SS	df	MS	F	p	Partial Eta Squared ( $\eta_p^2$ )
Pretest poultry science knowledge scores	46.559	1	46.559	3.696	.056	.013
Group	994.527	1	994.527	78.956	.000**	.223
Sex	191.106	1	191.106	15.172	.000**	.052
Group * Sex	446.951	1	446.951	35.484	.000**	.114
Error	3463.870	275	12.596			

*Note.* R Squared = .357 (Adjusted R Squared = .347)

\*\* Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ):

Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011)

Table 12

*Descriptive Statistics of Students' Posttest Scores of Poultry Science Knowledge Depending on the Instructional Approach Used*

	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
Sex	Adj. M	SE	M	SD	n	Adj. M	SE	M	SD	n
Females	11.76*	.34	11.60	2.88	70	18.23*	.32	18.44	2.66	70
Males	16.01*	.47	15.99	3.95	70	17.29*	.53	17.26	4.46	70
Overall Group Mean Score	13.89*	.35	13.80	4.09		17.75*	.31	17.85	3.71	

*Note.* \*Adjusted means are based on students' pretest scores of poultry science knowledge, mean = 10.375

### **Findings for Objective Three**

**Compare students' perceived agripreneurship competencies (skills) depending on the instructional approach received**

*A comparison of students' perceived agripreneurship competence regarding the construct of innovativeness and opportunity recognition in agriculture.*

Six items made up the construct for innovativeness and opportunity recognition. Statements comprising this construct included: (a) I am able to recognize business opportunities in agriculture; (b) I am able to evaluate an agricultural opportunity and determine if it is viable; (c) I seek advice and information about the agriculture project I want to implement before its actual implementation; (d) I can find creative ways to develop agricultural projects for income generation; (e) I can develop innovative and creative ways to ensure success of agricultural projects; and (f) I am able to develop mental models (plans) on how to turn an agriculture opportunity into a business (see Appendix B).

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' perceived agripreneurship competence of innovativeness and opportunity recognition. A one-way ANOVA indicated that the pretest mean scores for agripreneurship competence regarding innovativeness and opportunity recognition between groups were statistically significantly different at  $p < .05$  with a small effect size [ $F(1, 278) = 6.25, p = .01, \eta_p^2 = .022$ ]; see Table 13 . The mean for the counterfactual



group ( $M = 22.61$ ,  $SD = 4.69$ ) was significantly higher than for the treatment group ( $M = 21.23$ ,  $SD = 4.53$ ); see Table 14. Levene's test ( $p = .52$ ) was not statistically significant at  $p < .05$ . Further, a statistically significant positive and low correlation existed between the pretest and posttest scores for innovativeness and opportunity recognition ( $r = .26$ ,  $p < .001$ ).

Table 13

*One-way ANOVA Table: Pretest Mean Score Difference between Groups for Students' Perceived Agripreneurship Competence regarding Innovativeness and Opportunity Recognition for Agricultural Ventures*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	133.032	1	133.032	6.251	.013*	.022
Within Groups	5916.079	278	21.281			
Total	6049.111	279				

*Note.* \*Statistically significant difference at  $p < .05$

Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 14

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct of Innovativeness and Opportunity Recognition for Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	140	22.61	4.69	6.00	30.00
Treatment	140	21.23	4.53	6.00	30.00
Total	280	21.92	4.66	6.00	30.00

As a result of the statistically significant mean differences between the groups, and a positive correlation between the groups' pretest and posttest scores, the pretest scores for innovativeness and opportunity recognition were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest score of students' perceived agripreneurship competence regarding innovativeness and opportunity recognition was statistically significantly related to their posttest innovativeness and opportunity recognition scores [ $F(1, 275) = 31.47, p < .001, \eta_p^2 = .103$ ]; see Table 15.

After controlling for the covariate pretest scores, the interaction between group and sex was not statistically significant at  $p < .05$  [ $F(1, 275) = .28, p = .59, \eta_p^2 = .001$ ]; see Table 15, which supported the null hypothesis. No statistically significant main effect of students' sex on their perceived competence regarding innovativeness and opportunity recognition was found at  $p < .05$  [ $F(1, 275) = .04, p = .84, \eta_p^2 < .001$ ] (see Table 15), which supported the null hypothesis.

A statistically significant main effect with a large effect size was found at  $p < .01$  between group and students' posttest mean scores regarding their perceived competence for innovativeness and opportunity recognition [ $F(1, 275) = 61.08, p < .001, \eta_p^2 = .18$ ] (see Table 15), which did not support the null hypothesis. Students in the treatment group had higher adjusted marginal and observed means for their perceived agripreneurship competence regarding innovativeness and opportunity recognition (*Adj. M* = 26.92, *SE* = .19; *M* = 26.79, *SD* = 2.28; see Table 16) than those in the counterfactual group (*Adj. M* = 24.54, *SE* = .26; *M* = 24.64, *SD* = 3.08; see Table 16).

Table 15

*ANCOVA Results for Students' Posttest Scores regarding Innovativeness and Opportunity Recognition for Agricultural Ventures depending on the Instructional Approach Used*

Source	SS	df	MS	F	p	Partial Eta Squared( $\eta_p^2$ )
Innovativeness and Opportunity Recognition Pretest Scores	205.857	1	205.857	31.468	.000**	.103
Group	399.584	1	399.584	61.081	.000**	.182
Sex	.286	1	.286	.044	.835	.000
Group * Sex	1.859	1	1.859	.284	.594	.001
Error	1799.014	275	6.542			
Corrected Total	2359.568	279				

*Note.* R Squared = .238 (Adjusted R Squared = .226)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 16

*Descriptive Statistics of Students' Posttest Scores of Innovativeness and Opportunity Recognition for Agricultural Ventures depending on the Instructional Approach Used*

	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
Sex	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	24.52*	.39	24.64	3.25	70	27.04*	.27	27.26	2.24	70
Males	24.55*	.35	24.63	2.92	70	26.80*	.27	26.31	2.23	70
Overall Group Mean Score	24.54*	.26	24.64	3.08		26.92*	.19	26.79	2.28	

*Note.* \*Adjustments based on students' pretest scores of innovativeness and opportunity recognition, mean = 21.92

***A comparison of students' perceived agripreneurship competence regarding the construct for endurance and risk-taking propensity associated with agricultural ventures.***

The construct for endurance and risk taking propensity consisted of six Likert-type items. Items included: (a) I do not fear taking calculated risks on new agricultural ventures; (b) I often take calculated risks on new ventures (business ideas); (c) I am able to bear the uncertainties in my agricultural project(s); (d) I often identify risks before or during implementation of a new entrepreneurial project; (e) I am able to overcome failures resulting from agricultural projects and start all over again; and (f) I do not easily give up when faced with challenges involving my idea(s)/project(s).

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to

compare students' perceived agripreneurship competence for endurance and risk-taking propensity. A one-way ANOVA indicated that the pretest mean score for perceived agripreneurship competence regarding endurance and risk-taking propensity between the counterfactual and treatment groups was statistically significantly different at  $p < .05$  with a small effect size [ $F(1, 278) = 5.95, p = .015, \eta_p^2 = .02$ ]; see Table 17. The mean score for the counterfactual group ( $M = 19.49, SD = 4.91$ ) was significantly higher than for the treatment group ( $M = 18.09, SD = 4.70$ ); see Table 18. Levene's test ( $p = .45$ ) was not statistically significant at  $p < .05$ . Further, a statistically significant positive and low correlation existed between the pretest and posttest scores for endurance and risk-taking propensity ( $r = .19, p = .002$ ).

Table 17

*One-way ANOVA Table: Pretest Mean Score Difference between Groups for Students' Perceived Agripreneurship Competence regarding Endurance and Risk-Taking Propensity for Agricultural Ventures*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	137.200	1	137.200	5.948	.015*	.021
Within Groups	6412.786	278	23.068			
Total	6549.986	279				

*Note.* \*Statistically significant difference at  $p < .05$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 18

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct of Endurance and Risk-Taking Propensity for Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	140	19.49	4.91	8.00	30.00
Treatment	140	18.09	4.70	3.00	30.00
Total	280	18.79	4.85	3.00	30.00

Because of the statistically significant difference between the groups, and a positive correlation between the groups' pretest and posttest scores, the pretest scores for students' perceived endurance and risk-taking propensity were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest scores of students' perceived agripreneurship competence regarding endurance and risk-taking propensity was statistically significantly related at  $p < .01$  to their posttest endurance and risk-taking propensity scores [ $F(1, 275) = 20.34, p < .001, \eta_p^2 = .069$ ]. After controlling for the pretest scores, the interaction between group and sex was not statistically significant [ $F(1, 275) = .92, p = .34, \eta_p^2 = .003$ ]; see Table 19, which supported the null hypothesis. No statistically significant main effect of students' sex on the competence regarding endurance and risk-taking propensity was found at  $p < .05$  [ $F(1, 275) = 2.68, p = .10, \eta_p^2 = .01$ ]; see Table 19, which supported the null hypothesis. However, a statistically significant main effect with a large effect size was found at  $p < .01$  between the students' group and their competence regarding endurance and risk-taking propensity [ $F(1, 275) = 90.42, p < .001, \eta_p^2 = .25$ ] see Table 19, which did not support the null hypothesis. Moreover, students in the treatment group had higher

adjusted marginal and observed means on the agripreneurship competence regarding endurance and risk-taking propensity (*Adj. M* = 25.18, *SE* = .26; *M* = 25.03, *SD* = .3.10) than those in the counterfactual group (*Adj. M* = 21.08, *SE* = .36; *M* = 21.22, *SD* = 4.26) [see Table 20].

Table 19

*ANCOVA Results for Students' Posttest Scores regarding Endurance and Risk-Taking Propensity for Agricultural Ventures depending on the Instructional Approach Used*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Endurance and Risk Taking Propensity Pretest	258.539	1	258.539	20.339	.000**	.069
Group	1149.333	1	1149.333	90.419	.000**	.247
Sex	34.092	1	34.092	2.682	.103	.010
Group * Sex	11.726	1	11.726	.922	.338	.003
Error	3495.590	275	12.711			
Corrected Total	4874.625	279				

*Note.* R Squared = .283 (Adjusted R Squared = .272)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 20

*Descriptive Statistics of Students' Posttest Scores of Endurance and Risk-Taking Propensity for Agricultural Ventures depending on the Instructional Approach Used*

	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
Sex	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	21.64*	.54	21.94	4.54	70	25.34*	.31	25.51	2.57	70
Males	20.51*	.46	20.50	3.87	70	25.02*	.42	24.54	3.50	70
Overall Group Mean Score	21.08*	.36	21.22	4.26		25.18*	.26	25.03	3.10	

*Note.* \*Adjustments based on students' pretest scores for endurance and risk-taking propensity, mean = 18.79

***A comparison of students' perceived agripreneurship competence regarding the construct of leadership and management of agricultural ventures.***

Eight items comprised the construct for leadership and management of agricultural ventures. Items included: (a) I can transform my mental models (plans) into action; (b) I am able to successfully implement my agricultural project(s); (c) I always plan and schedule activities for my agricultural project(s); (d) I can manage an agricultural project to attain its intended goals/objectives; (e) I feel comfortable working with others on agricultural projects; (f) I like to influence others to achieve the goals of my agricultural project(s); (g) If the need arises, I am able to make independent decisions for the success of my agricultural project(s); and (h) I consult with other individuals who are knowledgeable about the agricultural project(s) I am pursuing.



A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' perceived agripreneurship competence for leadership and management of agricultural ventures. A one-way ANOVA indicated that the perceived agripreneurship competence regarding leadership and management of agricultural ventures between the counterfactual and treatment groups was statistically significantly different at  $p < .01$  with a small effect size [ $F(1, 278) = 11.77, p = .001, \eta_p^2 = .04$ ]; see Table 21. The mean score for the counterfactual group ( $M = 30.24, SD = 6.48$ ) was significantly higher than for the treatment group ( $M = 27.63, SD = 6.23$ ); see Table 22. Levene's test ( $p = .56$ ) was not statistically significant at  $p < .05$ . Further, a statistically significant positive and low correlation existed between groups for students' pretest and posttest scores regarding leadership and management of agricultural ventures ( $r = .15, p = .015$ ).

Table 21

*One-way ANOVA Table: Pretest Mean Score Difference between Groups for Students' Perceived Agripreneurship Competence regarding Leadership and Management of Agricultural Ventures*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	475.804	1	475.804	11.774	.001**	.041
Within Groups	11233.907	278	40.410			
Total	11709.711	279				

*Note.* \*\*Statistically significant difference at  $p < .01$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 22

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct for Leadership and Management of Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	140	30.24	6.48	11.00	40.00
Treatment	140	27.63	6.23	8.00	40.00
Total	280	28.93	6.48	8.00	40.00

Due to a statistically significant difference between the groups, and a positive correlation between the groups' pretest and posttest scores for leadership and management of agricultural ventures, the pretest scores were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest score of students' perceived agripreneurship competence regarding leadership and management of agricultural ventures was statistically significantly related to their posttest scores for leadership and management of agricultural ventures [ $F(1, 275) = 16.85, p < .001, \eta_p^2 = .058$ ]; see Table 23. After controlling for the pretest scores, the interaction between group and sex was not statistically significant at  $p < .05$  [ $F(1, 275) = .91, p = .34, \eta_p^2 = .003$ ], which supported the null hypothesis.

Further, no statistically significant main effect of students' sex on their perceived competence regarding the construct of leadership and management of agricultural ventures was found at  $p < .05$  [ $F(1, 275) = .002, p = .97, \eta_p^2 < .001$ ] (see Table 23), which supported the null hypothesis. A statistically significant main effect with a large effect size was found at  $p < .01$  between the students' group and their perceived

competence regarding leadership and management of agricultural ventures [ $F(1, 275) = 56.74, p < .001, \eta_p^2 = .17$ ] (see Table 23), which did not support the null hypothesis. Students in the treatment group had higher adjusted marginal and observed means for their perceived agripreneurship competence regarding leadership and management of agricultural ventures ( $Adj. M = 35.53, SE = .24; M = 35.34, SD = 2.85$ ) than those in the counterfactual group ( $Adj. M = 32.32, SE = .35; M = 32.50, SD = 4.18$ ); see Table 24.

Table 23

*ANCOVA Results for Students' Posttest Scores regarding Leadership and Management of Agricultural Ventures depending on the Instructional Approach Used*

Source	SS	df	MS	F	p	Partial Eta Squared ( $\eta_p^2$ )
Leadership and Management Pretest	204.639	1	204.639	16.854	.000**	.058
Group	688.917	1	688.917	56.739	.000**	.171
Sex	.021	1	.021	.002	.967	.000
Group * Sex	11.025	1	11.025	.908	.341	.003
Error	3338.990	275	12.142			
Corrected Total	4124.271	279				

*Note.* R Squared = .190 (Adjusted R Squared = .179)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 24

*Descriptive Statistics of Students' Posttest Scores for Leadership and Management of Agricultural Ventures depending on the Instructional Approach Used*

Sex	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	32.53*	.52	32.80	4.39	70	35.33*	.32	35.47	2.70	70
Males	32.11*	.47	32.20	3.97	70	37.72*	.36	35.21	3.00	70
Overall Group Mean Score	32.32*	.35	32.50	4.18		35.53*	.24	35.34	2.85	

*Note.* \*Adjustments based on students' pretest scores for leadership and management of agricultural ventures, mean = 28.93

*A comparison of students' perceived agripreneurship competence regarding the construct of need for autonomy and control of agricultural ventures.*

Five items comprised the construct need for autonomy and control of agricultural ventures. Items included: (a) I take challenges as learning opportunities; (b) I blame others if my project(s) fail (negatively worded); (c) I am always confident that my agricultural projects will be successful; (d) I take responsibility for any outcome of the agricultural venture(s) or project(s) I do; and (e) I like being in control of my agricultural project(s).

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' perceived agripreneurship competence of need for autonomy and control of agricultural ventures. A one-way ANOVA indicated that students' perceived agripreneurship competence regarding need for autonomy and control of agricultural

ventures was statistically significantly different at  $p < .01$  with a small effect size [ $F(1, 276) = 10.23, p = .002, \eta_p^2 = .04$ ]; see Table 25. The mean score for the counterfactual group ( $M = 19.13, SD = 4.25$ ) was statistically significantly higher than for the treatment group ( $M = 17.53, SD = 4.11$ ); see Table 26. Levene's test ( $p = .75$ ) was not statistically significant at  $p < .05$ . Further, a statistically significant positive and low correlation existed between the pretest and posttest scores for autonomy and control of agricultural ventures ( $r = .14, p = .02$ ).

Table 25

*One-way ANOVA Tables: Pretest Mean Score Difference between Groups for Students' Perceived Agripreneurship Competence regarding Autonomy and Control of Agricultural Ventures*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	178.881	1	178.881	10.234	.002**	.036
Within Groups	4824.331	276	17.479			
Total	5003.212	277				

*Note.* \*\*Statistically significant difference at  $p < .01$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 26

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct for Autonomy and Control of Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	139	19.13	4.25	4.00	25.00
Treatment	139	17.53	4.11	4.00	25.00
Total	278	18.33	4.25	4.00	25.00

Because of the statistically significant difference between the groups, and a positive correlation between the groups' pretest and posttest scores, the pretest scores for students' perceived need for autonomy and control of agricultural ventures were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest scores of students' agripreneurship competence regarding perceived need for autonomy and control of agricultural ventures were statistically significantly related to their posttest scores regarding need for autonomy and control of agricultural ventures [ $F(1, 273) = 7.70, p = .006, \eta_p^2 = .027$ ].

After controlling for the pretest scores, no statistically significant interaction was found at  $p < .05$  between group and sex [ $F(1, 273) < .001, p = .99, \eta_p^2 < .001$ ] (see Table 27), which supported the null hypothesis. Further, no statistically significant main effect of students' sex on their perceived competence regarding need for autonomy and control of agricultural ventures existed at  $p < .05$  [ $F(1, 273) = .12, p = .73, \eta_p^2 < .001$ ] (see Table 27), which supported the null hypothesis. A statistically significant main effect with a medium effect size was found at  $p < .01$  between students' group and their perceived competence regarding need for autonomy and control of agricultural ventures [ $F(1, 273)$

= 16.97,  $p < .001$ ,  $\eta_p^2 = .059$ ]; see Table 27. Because of this statistically significant main effect, the null hypothesis was rejected. Students in the treatment group had higher adjusted marginal and observed means for the agripreneurship competence regarding need for autonomy and control of agricultural ventures (*Adj. M* = 22.20, *SE* = .20; *M* = 22.11, *SD* = 2.41) than those in the counterfactual group (*Adj. M* = 20.90, *SE* = .24; *M* = 20.99, *SD* = 2.78) [ see Table 28].

Table 27

*ANCOVA Results for Students' Posttest Scores regarding Autonomy and Control of Agricultural Ventures depending on the Instructional Approach Used*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared( $\eta_p^2$ )
Autonomy and Control Pretest	50.791	1	50.791	7.693	.006**	.027
Group	112.028	1	112.028	16.968	.000**	.059
Sex	.803	1	.803	.122	.728	.000
Group * Sex	.002	1	.002	.000	.986	.000
Error	1802.442	273	6.602			
Corrected Total	1952.892	277				

*Note.* R Squared = .077 (Adjusted R Squared = .064)

\*\* Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 28

*Descriptive Statistics of Students' Posttest Scores for Autonomy and Control of Agricultural Ventures depending on the Instructional Approach Used*

Sex	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	20.95	.34	21.12	2.82	69	22.25	.26	22.37	2.21	70
Males	20.85	.33	20.86	2.76	70	22.14	.31	21.84	2.58	69
Overall Group Mean Score	20.90	.24	20.99	2.78		22.20	.20	22.11	2.41	

*Note.* \*Adjustments based on students' pretest scores for autonomy and control of agricultural ventures, mean = 18.33

***A comparison of students' perceived agripreneurship competence regarding the construct for marketing and communication of agricultural ventures.***

Five items comprised the construct for marketing and communication of agricultural ventures. Items included: (a) I am able to look for ways to market my agricultural product(s); (b) I am able to brand and set the right price(s) for my agricultural product(s); (c) I am able to determine the type of agricultural product(s) that my customers want; (d) I can convince others to buy my agricultural product(s); and (e) I have the skills required to convince someone to fund my agricultural entrepreneurship idea(s)/project(s)

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' perceived agripreneurship competence for marketing and



communication of agricultural ventures. A one-way ANOVA indicated that the students' perceived agripreneurship competence regarding marketing and communication of agricultural ventures was statistically significant at  $p < .01$  with a medium effect size [ $F(1, 274) = 15.37, p < .001, \eta_p^2 = .053$ ]; see Table 29. The mean for the counterfactual group ( $M = 18.70, SD = 4.62$ ) was significantly higher than for the treatment group ( $M = 16.59, SD = 4.31$ ); see Table 30. Levene's test ( $p = .52$ ) was not statistically significant at  $p < .05$ . No statistically significant correlation existed at  $p < .05$  between the pretest and posttest scores for marketing and communication regarding agricultural ventures ( $r = .11, p = .07$ ).

Table 29

*One-way ANOVA Table: Pretest Mean Score Difference between Groups for Students' Perceived Agripreneurship Competence regarding Marketing and Communication of Agricultural Ventures*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	306.815	1	306.815	15.374	.000**	.053
Within Groups	5468.094	274	19.957			
Total	5774.909	275				

*Note.* \*\*Statistically significant difference at  $p < .01$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 30

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct for Marketing and Communication of Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	138	18.70	4.62	5.00	25.00
Treatment	138	16.59	4.31	5.00	25.00
Total	276	17.65	4.58	5.00	25.00

Because of the statistically significant difference between the two groups on pretest scores for marketing and communication of agricultural ventures, the pretest scores were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest scores of students' perceived agripreneurship competence regarding marketing and communication of agricultural ventures were statistically significantly related to their posttest scores for marketing and communication of agricultural ventures [ $F(1, 270) = 8.91, p = .003, \eta_p^2 = .032$ ]; see Table 31.

After controlling for the pretest scores, the interaction between group and sex was not statistically significant at  $p < .05$  [ $F(1, 270) = 3.59, p = .06, \eta_p^2 < .01$ ] (see Table 31), which supported the null hypothesis. No statistically significant main effect of students' sex on their perceived competence regarding marketing and communication of agricultural ventures existed [ $F(1, 270) = .80, p = .37, \eta_p^2 = .003$ ] ( see Table 31) at  $p < .05$ , which supported the null hypothesis. A statistically significant main effect with a medium effect size was found at  $p < .01$  between students' group and their perceived competence regarding marketing and communication of agricultural ventures [ $F(1, 270)$

= 26.23,  $p < .001$ ,  $\eta_p^2 = .089$ ]; see Table 31. Because of this statistically significant main effect, the null hypothesis was rejected. Students in the treatment group had higher adjusted marginal and observed means for the agripreneurship competence regarding marketing and communication of agricultural ventures (*Adj. M* = 21.86, *SE* = .20; *M* = 21.73, *SD* = 2.32) than those in the counterfactual group (*Adj. M* = 20.07, *SE* = .28; *M* = 20.20, *SD* = 3.33) [see Table 32].

Table 31

*ANCOVA Results for Students' Posttest Scores regarding Marketing and Communication of Agricultural Ventures depending on the Instructional Approach Used*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Marketing and Communication Pretest	70.378	1	70.378	8.905	.003**	.032
Group	207.295	1	207.295	26.230	.000**	.089
Sex	6.293	1	6.293	.796	.373	.003
Group * Sex	28.365	1	28.365	3.589	.059	.013
Error	2133.795	270	7.903			
Corrected Total	2402.705	274				

*Note.* R Squared = .112 (Adjusted R Squared = .099)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 32

*Descriptive Statistics of Students' Posttest Scores for Marketing and Communication of Agricultural Ventures depending on the Instructional Approach Used*

Sex	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	20.55	.39	20.73	3.25	70	21.69	.27	21.77	2.25	70
Males	19.58	.41	19.66	3.35	67	22.03	.29	21.68	2.40	68
Overall Group Mean Score	20.07	.28	20.20	3.33		21.86	.20	21.73	2.32	

*Note.* \*Adjustments based on students' pretest scores for marketing and communication of agricultural ventures, mean = 17.68

***A comparison of students' perceived agripreneurship competence regarding the construct of being visionary and futuristic oriented about agricultural ventures.***

Three items comprised the agripreneurship construct of being visionary and futuristic oriented about agricultural ventures. These items included: (a) Strive to ensure sustainability of my agricultural venture(s)/project(s); (b) I make rational decisions which align with the future goals of my project(s); and (c) when working on an agricultural venture, I plan and think about the future.

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' perceived agripreneurship competence for being visionary and futuristic oriented about agricultural ventures. A one-way ANOVA indicated that the students' perceived agripreneurship competence regarding being visionary and futuristic

oriented about agricultural ventures was statistically significant at  $p < .05$  with a small effect size [ $F(1, 274) = 5.24, p = .023, \eta_p^2 = .019$ ]; see Table 33. The mean for the counterfactual group ( $M = 10.99, SD = 2.91$ ) was significantly higher than for the treatment group ( $M = 10.21, SD = 2.77$ ); see Table 34. Levene's test ( $p = .51$ ) was not statistically significant at  $p < .05$ . A statistically significant positive and low correlation existed between the pretest and posttest scores regarding being visionary and futuristic oriented about agricultural ventures ( $r = .21, p = .001$ ).

Table 33

*One-way ANOVA Table: Pretest Mean Score Differences between Groups for Agripreneurship Competence regarding being Visionary and Futuristic Oriented about Agricultural Ventures*

	SS	df	MS	F	p	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	42.261	1	42.261	5.235	.023*	.019
Within Groups	2211.899	274	8.073			
Total	2254.159	275				

*Note.* \*Statistically significant difference at  $p < .05$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 34

*Descriptive Statistics of Students' Pretest Scores between Counterfactual and Treatment Groups on the Construct for being Visionary and Futuristic Oriented about Agricultural Ventures*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	138	10.99	2.91	3.00	15.00
Treatment	138	10.21	2.77	2.00	15.00
Total	276	10.60	2.86	2.00	15.00

Due to the statistically significant difference between the groups, and a positive correlation between the groups' pretest and posttest scores, their pretest scores for being visionary and futuristic oriented regarding agricultural ventures were used as a covariate to adjust for the posttest group mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest scores of students' perceived agripreneurship competence regarding being visionary and futuristic oriented about agricultural ventures were statistically significantly related to their posttest scores for being visionary and futuristic oriented [ $F(1, 271) = 22.04, p < .001, \eta_p^2 = .075$ ] (see Table 35). After controlling for the pretest scores, no statistically significant interaction existed at  $p < .05$  between group and sex [ $F(1, 271) = .069, p = .79, \eta_p^2 < .001$ ] (see Table 35), which supported the null hypothesis. No statistically significant ( $p < .05$ ) main effect of students' sex on their perceived competence of being visionary and futuristic oriented regarding agricultural ventures was found [ $F(1, 271) = 1.55, p = .21, \eta_p^2 = .006$ ] (see Table 35), which supported the null hypothesis.

A statistically significant main effect with a large effect size was found at  $p < .01$  between students' groups regarding the perceived competence of being visionary and futuristic oriented about agricultural ventures [ $F(1, 271) = 43.15, p < .001, \eta_p^2 = .137$ ] (see Table 35). Because of this statistically significant main effect, the null hypothesis was rejected. Students in the treatment group had higher adjusted marginal and observed means on the agripreneurship competence of being visionary and futuristic oriented about agricultural ventures (*Adj. M* = 13.40, *SE* = .12; *M* = 13.32, *SD* = 1.46) than those in the counterfactual group (*Adj. M* = 11.86, *SE* = .21; *M* = 11.93, *SD* = 2.43) [see Table 36].

Table 35

*ANCOVA Results for Students' Posttest Scores regarding Being Visionary and Futuristic Oriented about Agricultural Ventures depending on the Instructional Approach Used*

Source	SS	df	MS	F	p	Partial Eta Squared ( $\eta_p^2$ )
Being Visionary and Futuristic Oriented Pretest	82.673	1	82.673	22.036	.000**	.075
Group	161.902	1	161.902	43.153	.000**	.137
Sex	5.821	1	5.821	1.552	.214	.006
Group * Sex	.258	1	.258	.069	.793	.000
Error	1016.738	271	3.752			
Corrected Total	1234.812	275				

*Note.* R Squared = .177 (Adjusted R Squared = .164)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 36

*Descriptive Statistics of Students' Posttest Scores regarding Being Visionary and Futuristic Oriented about Agricultural Ventures depending on the Instructional Approach Used*

Sex	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>Adj. M</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Females	11.74*	.32	11.81	2.70	70	13.22*	.19	13.33	1.56	70
Males	11.97*	.26	12.04	2.13	68	13.58*	.16	13.31	1.36	68
Overall Group Mean Score	11.86*	.21	11.93	2.43		13.40*	.12	13.32	1.46	

*Note.* \*Adjustments based on students' pretest scores for being visionary and futuristic oriented about agricultural ventures, mean = 10.60

#### **Findings for Objective Four**

##### **Comparative analysis of students' perceptions regarding their Likelihood of becoming agricultural entrepreneurs (*agripreneurs*) in future.**

A Two-Way-Analysis of Covariance [between-subjects factor: group (counterfactual, treatment), sex (male, female); covariate: pretest] was conducted to compare students' likelihood of becoming agricultural entrepreneurs (*agripreneurs*) in future: A one-way ANOVA indicated that the pretest scores for students' likelihood of becoming *agripreneurs* were statistically significantly different at  $p < .01$  with a small effect size [ $F(1, 268) = 8.98, p = .003, \eta_p^2 = .03$ ]; see Table 37. The treatment group had a higher mean score ( $M = 3.90, SD = .94$ ) than the counterfactual group ( $M = 3.53, SD = 1.11$ ); see Table 38. Levene's test ( $p = .06$ ) was not statistically significant at  $p < .05$ . A statistically significant positive and moderate correlation existed between pretest and



posttest scores for students' likelihood to become agripreneurs in future ( $r = .38, p < .001$ ).

Table 37

*One-way ANOVA Table: Pretest Mean Score Difference between Counterfactual and Treatment Groups regarding Their Likelihood of becoming Agricultural Entrepreneurs (Agridpreneurs) in the Future*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial Eta Squared ( $\eta_p^2$ )
Between Groups	9.577	1	9.577	8.977	.003**	.032
Within Groups	285.890	268	1.067			
Total	295.467	269				

*Note.* \*\*Statistically significant difference at  $p < .01$   
 Effect sizes for Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 38

*Descriptive Statistics of Students' Pretest Scores by Group regarding Their Likelihood of becoming Agricultural Entrepreneurs (Agridpreneurs) in the Future*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
Counterfactual	137	3.53	1.11	1.00	5.00
Treatment	133	3.90	.94	1.00	5.00
Total	270	3.71	1.05	1.00	5.00

As a result of the statistically significant difference between the groups, and a positive correlation between their pretest and posttest scores, pretest scores for students' likelihood to become agricultural entrepreneurs in the future were used as a covariate to

adjust for the posttest mean differences (Dimitrov & Rumrill, 2003). The covariate, pretest scores of students' likelihood to become agricultural entrepreneurs in the future were statistically significantly related to the posttest scores regarding their likelihood to become agricultural entrepreneurs in the future [ $F(1, 259) = 41.18, p < .001, \eta_p^2 = .137$ ]; see Table 39.

After controlling for the pretest scores, no statistically significant interaction at  $p < .05$  between the group and sex of students was found [ $F(1, 259) = 1.58, p = .21, \eta_p^2 = .006$ ]; see Table 39. Based on this finding, the null hypothesis was accepted. A statistically significant main effect with a small effect size was found at  $p < .01$  between the groups and the students' likelihood to become agricultural entrepreneurs (agripreneurs) in the future [ $F(1, 259) = 9.848, p = .002, \eta_p^2 = .04$ ]; see Table 39.

Therefore, the null hypothesis was rejected. The adjusted marginal and observed means for the treatment group (*Adj. M* = 4.24, *SE* = .07; *M* = 4.30, *SD* = .80) were significantly higher than for the counterfactual group (*Adj. M* = 3.93, *SE* = .08; *M* = 3.89, *SD* = .88); see Table 40. In addition, a statistically significant main effect with a small effect size at  $p < .01$  existed for students' sex and their likelihood to become agricultural entrepreneurs (agripreneurs) in the future [ $F(1, 259) = 11.29, p = .001, \eta_p^2 = .04$ ]; see Table 39.

Therefore, the null hypothesis was rejected. The adjusted marginal and observed mean scores for males were higher in both the counterfactual group (*Adj. M* = 4.15, *SE* = .09; *M* = 4.08, *SD* = .73) and the treatment group (*Adj. M* = 4.34, *SE* = .11; *M* = 4.37, *SD* = .90) than for females in both groups, i.e., counterfactual (*Adj. M* = 3.71, *SE* = .12; *M* = 3.69, *SD* = .97) and treatment (*Adj. M* = 4.14, *SE* = .09; *M* = 4.22, *SD* = .69) [see Table 40].

Table 39

*ANCOVA Results for Students' Posttest Scores regarding Their Likelihood to become Agricultural Entrepreneurs (Agripreneurs) in the Future*

Source	SS	df	MS	F	p	Partial Eta Squared( $\eta_p^2$ )
Likelihood to become Agricultural Entrepreneur Pretest	24.601	1	24.601	41.179	.000**	.137
Group	5.883	1	5.883	9.848	.002**	.037
Sex	6.745	1	6.745	11.290	.001**	.042
Group * Sex	.942	1	.942	1.576	.210	.006
Error	154.732	259	.597			
Corrected Total	196.167	263				

Note. R Squared = .211 (Adjusted R Squared = .199)

\*\*Statistically significant difference at  $p < .01$ . Effect sizes Partial Eta Squared ( $\eta_p^2$ ): Small effect size = .0099; medium effect size = .0588; large effect size = .1379 (Cohen as cited in Richardson, 2011).

Table 40

*Descriptive Statistics of Students' Posttest Scores regarding Their Likelihood to become Agricultural Entrepreneurs (Agripreneurs) in the Future depending on Instructional Approach Used*

Sex	Instructional Approach									
	Counterfactual Group (Traditional Classroom Instruction)					Treatment Group (Project-based Learning Approach featuring Agripreneurship)				
	Adj. M	SE	M	SD	n	Adj. M	SE	M	SD	n
Females	3.71*	.12	3.69	.97	67	4.14*	.09	4.22	.69	63
Males	4.15*	.09	4.08	.73	66	4.34*	.11	4.37	.90	68
Overall Group Mean Score	3.93*	.08	3.89	.88		4.24*	.07	4.30	.80	

*Note.* \*Adjustments based on students' pretest scores on students' likelihood to become agricultural entrepreneurs (agripreneurs) in the future, mean = 3.71

## **Findings for Objective Five**

### **Analyses of associations between selected student characteristics**

Research objective five examined associations between selected students' characteristics. To that end, appropriate bivariate analyses were used to describe the associations. According to Bryman (2004), "[b]ivariate analysis is concerned with the analysis of two variables at a time in order to uncover whether the two variables are related" (p. 230). The bivariate analyses included: (a) Cramer's  $V$  to examine associations between nominal variables and between nominal and ordinal variables; (b) Phi to measure associations between dichotomous variables; (c) point-biserial correlation coefficient to measure associations between dichotomous and continuous variables; and (d) Spearman's rho correlation coefficient to examine associations between ordinal variables (Bryman, 2004; Field, 2013).

No statistically significant association was found at  $p < .05$  between students who indicated raising (rearing) poultry for commercial purposes and their knowledge of agricultural entrepreneurship before the study (Cramer's  $V = .140$ , sig. = .365; see Table 41). A majority of students regardless of whether they had raised (reared) poultry indicated they had *none*, *very little*, or *little* knowledge about agricultural entrepreneurship (*agripreneurship*), i.e., 86 (*Yes*) and 82 (*No*), respectively (see Table 41).

Table 41

*Association between Students who raised (reared) Poultry for Commercial Purposes and Their Perceived Knowledge of Agricultural Entrepreneurship (Agripreneurship) before the Study*

		How much do you know about agricultural entrepreneurship					Total	Cramer's <i>V</i> Sig.
		None	Very little	Little	Much	A great deal		
Have you ever raised (reared) poultry for commercial purposes	Yes	27	32	27	21	9	116	
	No	36	29	17	15	7	104	
Total		63	61	44	36	16	220	.140 .365

*Note.* No statistically significant correlation at  $p < .05$ . Cramer's *V* ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students who indicated raising commercial poultry and their intent to become agripreneurs in the future before the study (Cramer's  $V = .165$ ,  $Sig. = .122$ ; see Table 42). Most students regardless of whether they had reared poultry for commercial purposes indicated they were *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future, i.e., 88 (*Yes*) and 75 (*No*), respectively (see Table 42).

Table 42

*Association between Students Who raised (reared) Poultry for Commercial Purposes and Their Intent to become Agricultural Entrepreneurs (Agripreneurs) in the Future before the Study*

		How likely are you to become an agricultural entrepreneur (Agripreneur) in the future?					Cramer's <i>V</i>	
		Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely	Total	<i>Sig.</i>
Have you ever raised (reared) poultry for commercial purposes	Yes	6	2	35	50	38	131	
	No	8	9	44	47	28	136	
Total		14	11	79	97	66	267	<u>.165</u> .122

*Note.* No statistically significant correlation at  $p < .05$ . Cramer's *V* ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students who indicated keeping poultry at home and their learning about poultry keeping at school before the study (Cramer's  $V = .173$ , *Sig.* = .084; see Table 43). A majority of students ( $n = 216$ ) indicated they kept poultry at home irrespective of how much poultry keeping they had learned in school (see Table 43).

Table 43

*Association between Students Who raised (reared) Poultry at Home and the Amount of Learning about Poultry Keeping They had received at School before the Study*

		How much learning about poultry keeping have you had previously in school					Total	Cramer's <i>V</i> Sig.
		None	Very little	Little	Much	A great deal		
Do you currently keep poultry at home	Yes	24	65	71	33	23	216	
	No	14	17	18	4	5	58	
Total		38	82	89	37	28	274	.173 .084

*Note.* No statistically significant correlation at  $p < .05$ . Cramer's *V* ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students' sex and their knowledge of agricultural entrepreneurship before participating in the study (Cramer's  $V = .086$ , *Sig.* = .805; see Table 44). A majority of students, 80 males and 88 females, indicated they had *none*, *very little*, or *little* knowledge about agricultural entrepreneurship (agripreneurship) before the study (see Table 44).

Table 44

*Association between Students' Sex and Their Perceived Knowledge of Agricultural Entrepreneurship (Agripreneurship) before the Study*

		How much do you know about agricultural entrepreneurship (agripreneurship)					Total	Cramer's <i>V</i> <i>Sig.</i>
		None	Very little	Little	Much	A great deal		
Sex of participants	Male	33	27	20	15	8	103	
	Female	30	34	24	22	8	118	
Total		63	61	44	37	16	221	<u>.086</u> .805

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ .

Cramer's *V* ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's *V* = .10 (small effect size); Cramer's *V* = .30 (medium effect size); Cramer's *V* = .50 (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association existed at  $p < .05$  between students' sex and their learning about poultry keeping at school before the study (Cramer's *V* = .150, *Sig.* = .184; see Table 45). A majority of students regardless of sex, i.e., 110 males and 102 females, indicated they had *none*, *very little*, or *little* learning about poultry keeping at school before the study (see Table 45).



Table 45

*Association between Students' Sex and Their Perceived Learning about Poultry Keeping at School before the Study*

		How much learning about poultry keeping have you had previously in school					Total	Cramer's <i>V</i> Sig.
		None	Very little	Little	Much	A great deal		
Sex of Students	Male	23	48	39	15	14	139	
	Female	17	34	51	22	14	138	
Total		40	82	90	37	28	277	.150 .184

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Cramer's *V* ranges in value from -1 to +1. Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students' sex and their intent to become agricultural entrepreneurs in the future before the study (Cramer's  $V = .112$ , *Sig.* = .494; see Table 46). A majority of students regardless of sex, 75 males and 89 females, indicated they were either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future before the study. More female students than males held this view about their prospects for becoming agripreneurs in the future before the study. Moreover, almost equal numbers of students regardless of their sex (male,  $n = 42$ ; females,  $n = 39$ ) were *not sure/undecided* about their likelihood of becoming agricultural entrepreneurs before the study (see Table 46).

Table 46

*Association between Students' Sex and Their Intent to become Agricultural Entrepreneurs (Agripreneurs) in the Future before the Study*

		How likely are you to become an agricultural entrepreneur in the future?					Total	Cramer's <i>V</i> Sig.
		Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely		
Sex of participants	Male	9	7	42	43	32	133	
	Female	5	4	39	54	35	137	
Total		14	11	81	97	67	270	.112 .494

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Cramer's *V* ranges in value from -1 to +1. Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's *V* = .10 (small effect size); Cramer's *V* = .30 (medium effect size); Cramer's *V* = .50 (large effect size) [Green, Salkind, & Akey, 1997].

Further, when students were split by group, i.e., counterfactual group versus treatment group, no statistically significant association was found at  $p < .05$  for either group between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future before the study, i.e., Cramer's *V* = .116, *Sig.* = .767 for the counterfactual group and Cramer's *V* = .213, *Sig.* = .197 for the treatment group respectively (see Table 47). Almost an equal number of males ( $n = 36$ ) and females ( $n = 37$ ) in the counterfactual group indicated being either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future before the study (see Table 47). However, more females ( $n = 52$ ) than males ( $n = 39$ ) in the treatment group indicated being either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future before the study (see Table 47).

Table 47

*Association between Students' Sex and Their Intent to become Agricultural Entrepreneurs (Agripreneurs) in the Future before the Study by Group*

		How likely are you to become an agricultural entrepreneur in the future?													
		Counterfactual Group (Traditional Classroom Instruction)						Treatment Group (Project-based Learning Approach featuring Agripreneurship)							
Sex of Students		Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely	Total	Cramer's V Sig.	Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely	Total	Cramer's V* Sig.
		Males	7	3	23	24	12	69		2	4	19	19	20	64
Females	5	1	25	22	15	68		0	3	14	32	20	69		
Total		12	4	48	46	27	137	<u>.116</u> .767	2	7	33	51	40	133	<u>.213</u> .197

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Cramer's V ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's V = .10 (small effect size); Cramer's V = .30 (medium effect size); Cramer's V = .50 (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students' sex and their intent to become agricultural entrepreneurs in the future after the study (Cramer's  $V = .166$ ,  $Sig. = .111$ ; see Table 48). A majority of students regardless of sex, 110 males and 101 females, indicated being either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future after the study. Moreover, almost equal numbers of students regardless of their sex (male,  $n = 23$ ; female,  $n = 29$ ) were *not sure/ undecided* about their likelihood of becoming agricultural entrepreneurs after the study (see Table 48).

Table 48

*Association between Students' Sex and Their Intent to become Agricultural Entrepreneurs (Agripreneurs) in the Future after the Study*

		How likely are you to become an agricultural entrepreneur in the future?					Total	Cramer's $V$ $Sig.$
		Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely		
Sex of Students	Male	1	2	23	52	58	136	
	Female	2	5	29	63	38	137	
Total		3	7	52	115	96	273	<u>.166</u> .111

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Cramer's  $V$  ranges in value from -1 to +1. Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

However, when students were divided by group, i.e., treatment group versus counterfactual group, a statistically significant association with a small effect size was found at  $p < .05$  between students' sex and their intent to become agricultural

entrepreneurs (agripreneurs) in the future after the study for the treatment group (Cramer's  $V = .284$ ,  $Sig. = .026$ ; see Table 49). More female students ( $n = 60$ ) than males ( $n = 56$ ) in the treatment group indicated being either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future after the study (see Table 49). Moreover, the number of females ( $n = 7$ ) who were *not sure/undecided* about their likelihood of becoming agripreneurs in the future was approximately six-tenths of that of the males ( $n = 11$ ); see Table 49.

No statistically significant association was found at  $p < .05$  between students' sex and their intent to become agricultural entrepreneurs in the future after the study for the students in counterfactual group (Cramer's  $V = .251$ ,  $Sig. = .073$ ; see Table 49). However, more male students ( $n = 54$ ) than female ( $n = 41$ ) indicated being either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future after the study (see Table 49). Further, about one-half of the male students ( $n = 12$ ) compared to the female students ( $n = 22$ ) populating the counterfactual group were *not sure/undecided* about their likelihood of becoming agricultural entrepreneurs after the study (see Table 49).

Table 49

*Association between Students' Sex and Their Intent to become Agricultural Entrepreneurs in the Future after the Study by Group*

		How likely are you to become an agricultural entrepreneur in the future?													
		Counterfactual Group (Traditional Classroom Instruction)						Treatment Group (Project-based Learning Approach Featuring Agriprenurship)							
		Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely	Total	<u>Cramer's V</u> <i>Sig.</i>	Not likely at all	Unlikely	Not sure/ Undecided	Likely	Highly likely	Total	<u>Cramer's V*</u> <i>Sig.</i>
Sex of Students	Males	0	1	12	34	20	67		1	1	11	18	38	69	
	Females	2	4	22	27	14	69		0	1	7	36	24	68	
	Total	2	5	34	61	34	136	<u>.251</u> .073	1	2	18	54	62	137	<u>.284</u> .026

*Note.* Male was coded 1 and female 2. \*Statistically significant correlation at  $p < .05$ . Cramer's  $V$  ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

A statistically significant association with a small effect size was found at  $p < .05$  between students' home location (environment) and their keeping poultry for commercial purposes before the study (Cramer's  $V = .176$ ,  $Sig. = .014$ ; see Table 50). More students had not raised poultry for commercial purposes than indicated they had done such (see Table 50). Further, a majority of students who lived in *town* indicated they did not keep poultry for commercial purposes ( $n = 62$ ; see Table 50) but were fewer than those students who lived in *mixed/peri-urban* settings. A higher number of students who lived in *rural* areas indicated they had raised poultry for commercial purposes ( $n = 44$ ; see Table 50). An almost equal number of students who lived in *mixed/peri-urban* settings indicated that they raised poultry for commercial purposes ( $n = 51$ ) as had not ( $n = 52$ ) (see Table 50).

Table 50

*Association between Students' Home Location Environment and Their having raised (reared) Poultry for Commercial Purposes before the Study*

		Have you ever reared poultry for commercial purposes			Cramer's $V^*$ <i>Sig.</i>
		Yes	No	Total	
Which of the following best describes your home location (environment)	Town	39	62	101	
	Rural	44	28	72	
	Mixed/Peri-urban (near town)	51	52	103	
Total		134	142	276	<u>.176</u> .014

*Note.*\*Statistically significant correlation at  $p < .05$ . Cramer's  $V$  ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

No statistically significant association was found at  $p < .05$  between students' home location (environment) and their keeping poultry at home before the study (Cramer's  $V = .120$ ,  $Sig. = .141$ ; see Table 51). A majority of students, irrespective of their home locations, indicated that they kept poultry at home, i.e., *town* ( $n = 72$ ), *rural* ( $n = 58$ ), and *mixed/peri-urban* ( $n = 85$ ) residents (see Table 51).

Table 51

*Association between Students' Home Location and Keeping Poultry at Home before the Study*

		Do you currently keep poultry at home			Cramer's $V$ $Sig.$
		Yes	No	Total	
Which of the following best describes your home location (environment)	Town	72	28	100	
	Rural	58	13	71	
	Mixed/Peri-urban (near town)	85	18	103	
Total		215	59	274	.120 .141

*Note.* No statistically significant correlation at  $p < .05$ . Cramer's  $V$  ranges in value from -1 to +1.

Values near 0 indicate a very weak relationship, and values near 1 indicate a very strong relationship. Cramer's  $V = .10$  (small effect size); Cramer's  $V = .30$  (medium effect size); Cramer's  $V = .50$  (large effect size) [Green, Salkind, & Akey, 1997].

A *Phi* correlation coefficient analysis revealed a statistically significant negative and low association ( $Phi = -.251$ ,  $p < .001$ ) between students' sex and their enrollment in entrepreneurship as a subject at  $p < .01$  before the study. More females ( $n = 77$ ) than males ( $n = 43$ ) indicated they had previously taken or were currently enrolled in entrepreneurship as a subject before the study (see Table 52).



Table 52

*Association between Students' Sex and Their Enrollment in Entrepreneurship as a Subject before the Study*

		Have you previously/or are you currently enrolled in entrepreneurship as a subject			<i>Phi**</i> <i>Sig.</i>
		Yes	No	Total	
Sex of Students	Male	43	96	139	
	Female	77	61	138	
Total		120	157	277	<u>-.251</u> .000

*Note.* Male was coded 1 and female 2. \*\*Statistically significant correlation at  $p < .01$ . Correlation coefficient were used as a measure of effect size, and ranged from -1 to +1 (Field, 2013). Effect sizes of 0 indicate a very weak association, and those close to 1 indicate a very strong association (Field, 2013):  $\pm .01$  to  $\pm .09$  = *negligible*,  $\pm .10$  to  $.29$  = *low*,  $\pm .30$  to  $.49$  = *moderate*,  $\pm .50$  to  $.69$  = *substantial*,  $\pm .70$  to  $\pm .99$  = *very high*, and  $\pm 1.0$  = *perfect* (Davis as cited in Miller, 1994).

No statistically significant association at  $p < .05$  was found between students' sex and their commercial poultry keeping before the study ( $Phi = -.083$ ,  $p = .167$ ; see Table 53). However, more female ( $n = 73$ ) than male ( $n = 62$ ) students indicated they had raised poultry for commercial purposes (see Table 53).

Table 53

*Association between Students' Sex and Their Commercial Poultry Keeping before the Study*

		Have you ever raised (reared) poultry for commercial purposes			<i>Phi**</i>
		Yes	No	Total	<i>Sig.</i>
Sex of Students	Male	62	77	139	
	Female	73	65	138	
Total		135	142	277	<u>-.083</u> .167

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Correlation coefficient were used as a measure of effect size, and ranged from -1 to +1 (Field, 2013). Effect sizes of 0 indicate a very weak association, and those close to 1 indicate a very strong association (Field, 2013):  $\pm .01$  to  $\pm .09$  = *negligible*,  $\pm .10$  to  $\pm .29$  = *low*,  $\pm .30$  to  $\pm .49$  = *moderate*,  $\pm .50$  to  $\pm .69$  = *substantial*,  $\pm .70$  to  $\pm .99$  = *very high*, and  $\pm 1.0$  = *perfect* (Davis as cited in Miller, 1994).

No statistically significant association at  $p < .05$  was found between students' sex and their poultry keeping at home before the study ( $Phi = -.103$ ,  $p = .087$ ; see Table 54). However, more female ( $n = 115$ ) than male ( $n = 101$ ) students indicated they kept poultry at home (see Table 54).

Table 54

*Association between Students' Sex and Their Poultry Keeping at Home before the Study*

		Do you currently keep poultry at home			<i>Phi**</i>
		Yes	No	Total	<i>Sig..</i>
Sex of participants	Male	101	35	136	
	Female	115	24	139	
Total		216	59	275	<u>-.103</u> .087

*Note.* Male was coded 1 and female 2. No statistically significant correlation at  $p < .05$ . Correlation coefficient were used as a measure of effect size, and ranged from -1 to +1 (Field, 2013). Effect sizes of 0 indicate a very weak association, and those close to 1 indicate a very strong association (Field, 2013):  $\pm .01$  to  $\pm .09$  = *negligible*,  $\pm .10$  to  $\pm .29$  = *low*,  $\pm .30$  to  $\pm .49$  = *moderate*,  $\pm .50$  to  $\pm .69$  = *substantial*,  $\pm .70$  to  $\pm .99$  = *very high*, and  $\pm 1.0$  = *perfect* (Davis as cited in Miller, 1994).

Point-biserial correlation coefficients were calculated to examine relationships between students' ages and their sex; between students' sexes and poultry science knowledge scores (pretest and posttest); and between students' poultry science knowledge and their keeping poultry at home. A statistically significant negative and low correlation at  $p < .01$  was found between students' sexes and ages ( $r_{pb} = -.273$ ,  $p < .001$ ; see Table 55). The older the student, the more likely to be a male. No statistically significant correlation existed at  $p < .05$  between students' sexes and pretest poultry science knowledge scores ( $r_{pb} = .065$ ,  $p = .276$ ; see Table 55). Regarding the students' posttest poultry science scores, a statistically significant negative and low correlation at  $p < .01$  was found between students' sexes and their posttest scores for poultry science knowledge ( $r_{pb} = -.182$ ,  $p = .002$ ; see Table 55). The higher the students' post-test scores for poultry science knowledge, the more likely they were males.

Table 55

*Point-biserial Correlation Coefficients between Students' Selected Personal Characteristics*

Characteristics	Correlation Coefficients	Sig.
Association between students' sexes and ages	-.273**	.000
Association between students' sexes and their pretest poultry science knowledge scores	.065	.276
Association between students' sexes and their posttest poultry science knowledge scores	-.182**	.002

*Note.* Male was coded 1 and female 2. \*\*Correlation is statistically significant at  $p < .01$  (2-tailed). Correlation coefficients were used as measures of effect sizes, and ranged from -1 to +1 (Field, 2013). Effect sizes of 0 indicate a very weak association, and those close to 1 indicate a very strong association (Field, 2013):  $\pm .01$  to  $\pm .09$  = *negligible*,  $\pm .10$  to  $.29$  = *low*,  $\pm .30$  to  $.49$  = *moderate*,  $\pm .50$  to  $.69$  = *substantial*,  $\pm .70$  to  $\pm .99$  = *very high*, and  $\pm 1.0$  = *perfect* (Davis as cited in Miller, 1994).

Spearman's rho correlation coefficient was used to examine relationships between students' knowledge of agripreneurship and their likelihood of becoming agripreneurs in the future before the study. It was revealed that no statistically significant relationship ( $r_s = .109$ ,  $p = .115$ ; see Table 56) existed at  $p < .05$  between students' knowledge about agripreneurship and their likelihood to become agripreneurs in the future before. However, a statistically significant low and positive relationship was found at  $p < .01$  between students' perceptions of learning about poultry keeping in school and their agripreneurship knowledge before the study ( $r_s = .200$ ,  $p = .003$ ; see Table 56). Based on this finding, the null hypothesis was rejected. Students who indicated learning more about poultry science in school perceived they knew more about agripreneurship. In addition, a statistically significant low and positive relationship was found between students' perceptions of learning about poultry in school and their likelihood of becoming

agripreneurs in the future before the study ( $r_s = .217, p < .01$ ; see Table 56). The more learning students perceived to have about poultry keeping, as acquired in school, the more likely they were to become agripreneurs in the future before the study.

Table 56

*Spearman's rho Correlation Coefficients between Students' Selected Personal Characteristics*

Characteristics	Correlation Coefficients	Sig.
Association between students' perceptions of agripreneurship knowledge and their likelihood to become agripreneurs in the future before the study	.109	.115
Association between students' learning about poultry keeping in school and their perceived knowledge of agripreneurship before the study	.200**	.003
Association between students' perceptions of learning about poultry keeping in school and their likelihood of becoming agripreneurs in the future before the study	.217**	.000

*Note.* \*\*Correlation is statistically significant at  $p < .01$  (2-tailed). Correlation coefficients were used as a measure of effect size, and ranged from -1 to +1 (Field, 2013). Effect sizes of 0 indicate a very weak association, and those close to 1 indicate a very strong association (Field, 2013):  $\pm .01$  to  $\pm .09 = negligible$ ,  $\pm .10$  to  $.29 = low$ ,  $\pm .30$  to  $.49 = moderate$ ,  $\pm .50$  to  $.69 = substantial$ ,  $\pm .70$  to  $\pm .99 = very high$ , and  $\pm 1.0 = perfect$  (Davis as cited in Miller, 1994).

All the null hypotheses for objective two were rejected because a statistically significant interaction ( $p < .01$ ) was found between students' group and sex, and also statistically significant main effects ( $p < .01$ ) existed between group and students' posttest scores for poultry science knowledge, as well as for students' posttest scores on poultry science knowledge depending on their sex. In the case of objective three, a statistically significant main effect ( $p < .01$ ) was found between groups for students'

perceived agripreneurship competencies depending on the instructional approach received; therefore, the null hypothesis was rejected. However, no statistically significant interaction ( $p < .05$ ) was revealed between group and sex or statistically significant differences existed between sexes for students' perceived agripreneurship competencies depending on the instructional approach used, which supported the null hypothesis.

Regarding objective four, no statistically significant interaction at  $p < .05$  was found between group and sex for students' intentions regarding their likelihood to become agripreneurs in the future depending on the instructional approach used, which supported the null hypothesis. However, statistically significant main differences at  $p < .01$  were revealed between groups and the students' likelihood to become agricultural entrepreneurs (agripreneurs) in the future, and for students' sexes and their likelihood to become agricultural entrepreneurs (agripreneurs) in the future, which led to rejecting the two related null hypotheses.

Moreover, in the case of objective five, the null hypothesis was rejected because statistically significant differences were found at  $p < .05$  between (a) students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future after the study in regard to the treatment group; (b) students' home location (environment) and their keeping poultry for commercial purposes before the study; (c) students' sex and their enrollment in entrepreneurship as a subject; (d) students' sexes and ages; (e) students' sexes and their posttest scores for poultry science knowledge; (f) students' learning about poultry keeping in school and their agripreneurship knowledge; and (g) learning about poultry in school and students' likelihood of becoming agripreneurs in the future before the study.

## **Section Two**

### **Findings from the Study's Qualitative Data**

**Findings for Objective Six: Description of participants' (students' and adults') experiences in regard to school-based, agripreneurial projects (SAPs), including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills**

The findings for this objective are presented in two subsections: The first subsection provides findings from the treatment group students' focus group interviews, as well as a content analysis of their agripreneurship word puzzles (see Appendix I), journal entries, posters, training materials, visual images, and video recordings. In the second subsection, findings are presented from personal interviews with the study's adult facilitators regarding their experiences mentoring the student participants.

#### **Subsection One: Findings from the treatment group students' qualitative data**

A total of 22 students in the treatment group participated in the focus group interviews, i.e., 10 boys in the first focus group and 12 girls in the second, from Kiira College Butiki and Iganga Girls' Secondary School, respectively. The participants in the focus group interviews were all Senior Two students, and their ages ranged from 14 to 16 years. In addition, the researcher analyzed content from 73 journal entries, including 58 from Iganga Girls' Secondary School and 25 from Kiira College Butiki, 16 agripreneurship puzzles, 10 student-made posters, training materials, related visual images, and video recordings. The coding process gave rise to seven themes containing

23 subthemes from which the researcher derived the *essence* of the participants' experiences. Husserl (1989) described an *essence* as a "common or universal condition or quality without which a thing would not be what it is" (p. 43). In reporting participants' experiences about a phenomenon, Lester (1999) urged researchers, whenever possible, to provide direct quotes from the participants to better describe the themes and subthemes. He added: "The findings can be reported robustly, and my usual preference is to include direct quotes - both 'soundbites' and more extensive quotes - from participants to illustrate points" (p. 3). Of note, the names associated with the quotes used to support emergent themes and related subthemes are pseudonyms to protect the anonymity of the participants. All female names in the quotations are associated with participants from Iganga Girls Secondary School, and the male names are associated with participants from Kiira College Butiki. Focus group interviewees are reported as *participant(s)* in such.

Though the findings of this qualitative analysis are not generalizable beyond the participants who provided the data (Lincoln & Guba, 1985), such could be transferable to other individuals who may have similar experiences (Lincoln & Guba, 1985). Tracy (2010) posited: "*Transferability* is achieved when readers feel as though the story of the research overlaps with their own situation and they intuitively transfer the research to their own action" (p. 845). The findings from the qualitative data were used with the quantitative results to triangulate the phenomenon under study to understand it better and explain the participants' experiences (Creswell, 2012, 2014).



***Theme #1: Understanding poultry science and related management practices.***

All student participants in the focus group interviews indicated that they had acquired knowledge, skills, and better understanding with respect to poultry keeping, through their hands-on activities and classroom instruction. The student participants explained that in the process of raising their broilers, they were able to learn and conduct a number of management practices; three are highlighted.

*Brooding.* The student participants acquired knowledge and skills on how to prepare to receive and manage one-day old chicks through the brooding period. This training included activities such as cleaning and fumigation of the brooder; covering litter to prevent the newly received chicks from eating the litter; counting and weighing chicks on arrival to the brooder; providing chicks with water mixed with glucose during the first few hours after arrival; setting and monitoring the temperature in the brooder; isolating and caring for the weak and sick chicks; among other activities. For example, during the focus group interviews, one student participant stated:

We have learnt to care for one-day old chicks like the first day when we received chicks, our teacher informed us that when a chick has just been received, we had to give them glucose mixed with water in order to open up their digestive system. The glucose also gives them energy because some of them are being transported, so they lack energy. They gain energy out of that glucose. We have learnt how to prepare brooders for the chicks, we have learnt that these chicks that are in the brooding stage need warmth. So we have to provide heat for them. We have also learnt that we should cut off corners from the brooders because the chicks are too young. When they go into these corners, they may suffocate and die. We have

also learnt that we should reduce the amount of heat when it is so hot and as they grow, because this heat can make them suffocate when it is excess. We have also learnt that very cold conditions can make the chicks to chill, so they can die.

*Hygiene and disease prevention in the flock.* The student participants stated in their journal entries, and also indicated during the focus group interviews, they became aware that to raise a viable flock, ensuring proper hygiene, proper feeding, and vaccination were necessary to prevent infection in the flock which could cause mortality and increase the costs of production. During the focus group interviews, one student participant shared:

We learnt that having a good and clean poultry house the birds grow healthy . . . .  
And I observed that in order to have good yields you must be clean, provide enough space for birds, vaccinate, and avoid other birds around, which are on free range which can spread diseases.

Further, another student through a focus group interview added: “We should not feed chicks on food mixed with dropping[s], we need to provide fresh food and water all the time and no putting food on the floor.” Moreover, Vicky wrote in her journal: “We cleaned the drinkers, put food and fresh water; we also vaccinated the chicks against Newcastle disease since the chicks were seven days old.” Vicky’s journal entry was supported by another student during the focus group interviews when she said:

We have learnt vaccination skills, like for me I did not know that vaccinating is done on the eyes. I thought that vaccinating is only for injections but when I came here, I learnt that vaccination of birds is done via different routes other than injections.

Another student in a focus group interview added: “I learnt to vaccinate the birds. I did not know that you put a drop on eye, so they told us to draw vaccine in the syringe and put a single drop on the eyes which was quite interesting.” To prevent infections, a student in a focus group interview observed that they placed water containing a disinfectant in the foot bath at the entrance to the poultry house, and all project members were to dip their feet in that water before entering the poultry unit.

*Proper feeding and record keeping.* The student participants indicated in their journal entries that they received their broiler chicks on March 2, 2016, and on arrival the chicks were weighed and the weights recorded. Grace indicated in his journal entry that the broiler chicks were fed on crumbles instead of mash because “the chicks could easily digest the crumbles compared to mash and also it helped reduce on food wastage.” The average weight of the one-day old broiler chicks was 28 grams on the first day and 75 grams on the second day. The students continued to monitor the weight gain of the chicks through the course of their projects and when the birds were about six weeks of age, they had an average weight of 1500 grams. At six weeks, the students started to sell their broilers.

***Theme #2: Awareness about agripreneurship and entrepreneurship in general, including opportunity recognition and idea generation relating to agriculture, as well as the role of agripreneurship in community development.***

Based on the content analysis of the students’ journal entries, feedback on the agripreneurship game puzzle, video recordings, training materials, as well as focus group interviews, the researcher noted an increased understanding of the concepts of agripreneurship and entrepreneurship. Moreover, from the agripreneurship puzzle, the

students were able to put forth their own understandings and descriptions of agripreneurship, entrepreneurship, and what was meant by the term *agripreneur*. Further, the students also shared what they thought could be the role of agripreneurship in community development, including challenges associated with that. The students' increased understanding of agripreneurship and entrepreneurship in general is described through four subthemes.

*Descriptions of entrepreneurship, agripreneurship, and agripreneurs.* Students described entrepreneurship as a practice of starting and running a business with the intention of making a profit. Joe wrote in his journal entry: "Entrepreneurship is a practice of identifying a business opportunity, mobilizing resources required and taking the initiative to exploit the opportunity while bearing risks and uncertainties." Students' views differentiated between entrepreneurship and agripreneurship in that whereas the former focuses on exploitation of any business opportunities, the latter is associated with exploitation of opportunities specific to the agricultural sector. Further, from their agripreneurship game puzzles, the students described an agripreneur as a man or woman who identifies and exploits opportunities related to agriculture with the aim of making a profit. During the training, students were divided up into groups by the facilitators, and each group had to develop a description of an agripreneur using words from the agripreneurship puzzle. For example, students in one group described an agripreneur as "a man [or woman] who identifies an agricultural business opportunity, [and] takes the role to create ideas that bear profit in the market." Another group of students described an agripreneur as "a man/woman who runs an agriculture business, is innovative, creative,

takes risks, bears losses, has a goal and vision, can identify an opportunity, aims at making profits, and markets his/her goods at a friendly pocket [affordable] price.”

*Personal characteristics and roles played by entrepreneurs/agripreneurs.* The students outlined in their journals a number of characteristics associated with an entrepreneur/agripreneur, including the ability to adapt to change; commitment to the venture they are pursuing; creativity; knowledgeable about the venture they are undertaking; seeking information; innovative; persistence and perseverance; persuasiveness; people-oriented; result-oriented; take calculated risks; self-confidence; self-discipline; visionary and forward thinking with regard to their venture; among other traits. For example, John listed in his journal entry 10 personal characteristics of entrepreneurs:

- (a) Must have self-confidence;
- (b) [m]ust be disciplined;
- (c) [m]ust be opportunity seeking;
- (d) [m]ust be courageous at taking risks;
- (e) [s]hould seek information;
- (f) [m]ust have commitment;
- (g) [m]ust be good at setting goals;
- (h) [m]ust be persistent;
- (i) [s]hould be persuasive; and
- (j) [m]ust have planning and monitoring skills.

In addition, Jackie journaled that “entrepreneurs are confident, they are creative . . . people oriented . . . result oriented . . . visionary . . . risk takers (take calculated risks), [and] flexible (they adapt to change).” Jackie’s and John’s views also were echoed by other students in their journal entries.

Further, the students indicated a number of roles or tasks undertaken by agripreneurs, including generation of capital for their businesses, implementation and management of their ventures, customer care, recruitment and paying employees’

salaries, and pricing and marketing of their products, among others. For example, Julie wrote in her journal entry various responsibilities of agripreneurs such as “search for markets for the goods, keeping records . . . market research, [and] customer care.” Julie’s journal entry was supported by other students who made similar entries in their journals.

*Role of agripreneurship in community development.* Agripreneurship plays various roles in community development, as indicated by the students in their journal entries. For example, the creation of employment opportunities for community members through the establishment of agro-processing units and other value-chain-related enterprises, including marketing and rural electrification. In addition, the students identified that agripreneurship creates opportunities for relationship building, collaboration, and networking among community members, which promotes peaceful co-existence and civic engagement. In addition, it promotes diversification in the communities, which helps communities become self-reliant and more resilient when experiencing catastrophes; it brings about increased return-on-investment through price stabilization during times of plenty, especially through processing and value-addition of products produced, which reduces wastage and prolongs shelf life. Further, it promotes development and improves livelihoods by increasing incomes among the populace making the community attractive for other business enterprises and social amenities, such as hospitals, school, and recreation facilities. In support, Joseph listed various benefits of agripreneurship in a journal entry, including “source of employment, . . . source of income, . . . leads to development, . . . unites farmers, provides food, promotes working together, . . . [and a] source of raw materials.” This also was echoed by Carol who added: “. . . it leads to self-reliance, leads to diversification and industrial development, rural electrification, [and]

promotes unity through trade.” Moreover, other students also made related journal entries supporting the roles of agripreneurs in their communities.

*Challenges and hindrances to agripreneurship.* The students outlined a number of challenges impacting agripreneurship development in their communities. These challenges included: bad weather; drought; climate change; disease; insecurity; lack of capital and/or collateral to secure loans; high initial capital investment for startups; lack of ready market for their products; lack of skills; lack of mentors; lack of appropriate and effective mechanisms to ensure quality control; poor government policies, such as high taxes and costly business registration that do not favor new business startup; poor quality seeds; post-harvest losses; and price fluctuations, especially at the time of harvest. Joel wrote in his journal about several challenges faced by agripreneurs: “Limited funds[;] shortage of able bodied young people in rural areas[;] price fluctuation[;] limited land[;] long process to register a business[;] high taxes[;] . . . [and] poor transport service.” To this point, Ann also listed other hindrances to agripreneurship in her journal: “Diseases[;] poor storage facilities[;] insecurity[;] poor quality seeds[;] taxation of agricultural inputs[;]. . . lack of mentors, [and] poor planning.” These challenges and hindrances were also outlined by other students who submitted their journals for analysis.

***Theme #3: Acquisition of technical skills related to business development and management.***

All of the students who submitted their journals and those who participated in focus group interviews indicated that they acquired technical skills and opportunities to implement such in a real-world environment through their poultry projects. They acquired skills on how to recognize opportunities and generate ideas supporting the

exploitation of such. Other skills they acquired involved writing business plans, including related content such as selecting a suitable name for a business; developing goals, objectives, mission, and vision statements for businesses; as well as creating marketing and financial plans. For example, in the case of Kiira College Butiki, their business name was “Kiira Poultries Limited.” The students’ goal, according to Joshua’s journal entry, was “to increase the number of birds by 40% in two years.” Their mission statement was “to provide quality poultry products using modern methods to citizens of Uganda at affordable prices,” as stated by Elijah in his journal entry. Michael wrote in a journal entry that Butiki’s vision statement was “to be the leading producers and suppliers of poultry products in Uganda.”

In the case of Iganga Secondary School, the name of their business was “IGA Broilers Project,” as noted by Sarah: And according to Resty’s journal entry, their business’ mission was “to provide quality broilers to the public at pocket friendly [[affordable] prices.” And Iganga’s vision, as stated by Abby, was “to be the leading broiler producers in Uganda.” Three subthemes emerged under this theme:

*Identifying a good idea.* An idea was defined by the students as “the response of a person to the needs/problems of society.” They outlined various qualities of a good idea as being beneficial and able to generate other business opportunities; earns the farmer extra income; must be legal; and the products generated from implementation of the idea must have demand and be acceptable to society. The students followed these guidelines to develop and manage their broiler projects.

*Steps taken in preparing a business plan.* These steps included identifying a feasible business opportunity which must be acceptable to the community; conducting a market



survey; collecting information about a selected business opportunity; drafting a business plan to be discussed with knowledgeable people (i.e., mentors); preparing a business plan; finalizing the business plan and developing a course of action; and creating a business name. To this, Denis stated in his journal that “a good business name should be attractive and meaningful.”

*Risk mitigation in agripreneurship.* The students indicated they had learned various ways to guard against risks and uncertainties that impact agricultural ventures. They identified some of the risks likely to impact their projects such as accidents, disease, theft, and fire outbreaks, among others, and developed strategies to ensure their projects were protected. These strategies included proper feeding, proper sanitation procedures, adequate housing, vaccination, keeping stray birds away from the poultry units, and also ensuring they ordered chicks from a reputable farm free from disease. Further, after losing a few broiler chicks that had jumped into the heat source, the students put in place barriers that restricted other chicks from getting too close to the heat source. For example, Stecia wrote about an experience in her journal that one morning they went to the poultry unit and found a dead chick burning which had jumped into a clay pot with hot charcoal flames. She described it and their actions:

Its feathers were burnt up, we had to bury it and later put bricks around pots to act as barriers so that other chicks do not jump in [the pot]. From that day we never got any accident of a chick dying in the fire.

Further, during a focus group interview a student shared: “I have learnt how to take care of business risks and losses and persevere in times of crisis.” This student’s view also was supported by Tina, who journaled about her related experience: “I have

learnt a lot that when you are having a project, you don't need to lose hope when you are caring for your birds and experience some losses. It is part and parcel of doing business.”

*Budgeting and record keeping.* The students also were engaged in the budgeting process for their projects. For example, Allan's journal entry defined a budget as “a statement which shows the expected expenditure and revenue projections for a given financial year.” The students outlined in their journal entries various reasons why it is essential for agripreneurs to budget for their business ventures, including being able to use budgets for loan approvals. Budgeting also shows how finances will be distributed to the various activities to achieve the set objectives for a given financial year, and helps to motivate the members of the organization or enterprise to stay focused on achieving their predetermined goals. Further, the students indicated that they kept a variety of documentation records for their projects such as feeding records, financial records, labor records, farm inventories, and records about their marketing plans.

*Marketing, sharing profits, and re-investment of their capital.* The students indicated that they were able to find good and ready markets for their broilers. They sold their broilers to both their school cafeterias and in surrounding communities. Part of the profits from the sale of their broilers was shared among the project participants and they re-invested their capital in more chicks. At the time of the focus group interviews, students from Iganga Girls' Secondary School had restocked their poultry unit with 250 broilers while Kiira College Butiki participants were in the process of booking new broiler chicks.

***Theme #4: Acquisition of life skills.***

The students shared acquiring a variety of life skills, including making new friends that they hoped would make them better citizens in their communities. Moreover,

they planned to use the skills acquired to improve their livelihoods. The skills included agripreneurship, better communication, conflict resolution, consultation, financial management, leadership, mobilization, teamwork, networking, as well as socializing and working with others. Some of these skills are evinced in the following subthemes.

*Budgeting, financial management, and marketing skills.* For example, during the focus group interviews, a student shared that “we have learnt budgeting skills; we would come up with a list of items needed for daily use on the project and [calculate] how much money was required for each and we would budget appropriately.” This was confirmed by another student in the focus group interviews who added: “We have learnt how to budget for our projects, and this involved estimating how much feed we would need for the whole project.” This individual explained further that the students had acquired skills in the marketing and pricing of their products because they had to convince potential customers to buy the broilers: “We have also learnt the marketing skills. This is where we had to go out and tell people about our products and convince them how good they are so they buy from us.” Another student participant in the focus group interviews elaborated further: “For me, as a treasurer for our project, I have learnt how to manage and account for finances. I had to be frugal with [the] project’s money to ensure that we had enough money for feeds and drugs.” To this point, another student during a focus group interview added:

We have learnt that we have to save. When we had any money that we have got from the birds we have sold, we had to take it to the teacher and he banks it for us . . . . Good entrepreneurs always have to save [and] invest so that they can get more profits.

*Ongoing application of the acquired agripreneurship skills to develop projects.* The students indicated that they would apply the acquired agripreneurship skills to continue their projects and also start their own enterprises at home. For example, Joy stated in her journal: “I have benefitted from this project in that I can take care of my own birds; I know how to mix feeds and how to give medicine and vaccination to birds at different stages.” And Joseph wrote in his journal:

I have seen that agriculture is a business and at the same time a source of employment, in my vacation I can’t suffer, at least I have gained some knowledge and skills where I can start up my own project and take care of it well.

Joseph’s view also was echoed by a student in the focus group interviews who revealed that, initially, she hated agriculture but after participation in the project, her attitude toward agriculture changed. This student said:

I really hated it [agriculture] because I found it tiresome but right now I really love it. In holidays, I told mum that in my vacation, I will have to carry out my own agricultural projects and she agreed to support me.

Further, another student in the focus group interviews shared her initial experience with the first broiler project, as funded by the study, before she and other schoolmates re-invested their capital:

For the previous project which we had, the best moment which I experienced . . . it was the first when I saw young chicks which I had never seen before. It gave me motivation and inspiration . . . to convince my mother to start a poultry project. We had never kept broilers because she didn’t know how they [would] perform, but when I went home for holidays, I managed to convince her to start

her project and also helped her calculate how much income she will get at [the] end of the project. I learnt how to look for market for the birds, take care of them and how to prepare the deep litter system of the birds . . . I have learnt a lot that when you are having a project, you don't need to lose hope when you are caring for your birds and some die.

Another student in during a focus group interview added:

Like for me, when we went back home for this first term holiday, I told some of my friends about the project, and they were convinced and in third term holidays we are ready to start up one and we also have our own projects.

*Development of leadership, teamwork, socialization, and conflict resolution skills, among other competencies.* The students explained that they were able to participate in the election of leaders for their projects, and this included various positions such as chairperson, treasurer, secretary, project manager, and duty roster manager, among other roles. Moreover, the students worked together to ensure success of their projects through teamwork. During the focus group interviews, a student said that “when you work in a group as a team, your work is done easily and in a short time, also you get to learn new ideas through listening and sharing.” In addition, through socializing, the students made friends. To this point, Tana wrote in his journal: “I also learnt that when you have your project, it is good to socialize with other people. Because somebody can't think of managing it on his/her own. We need the help of other people.” A focus group participant elaborated further:

I have learnt many skills from this project, one of them is associating with others. Like if you don't have the skills to associate with others . . . [and] you don't know

how to relate with others it will be hard for you to consult and yet in the training they taught us how to consult when you're an entrepreneur, you can consult from those that are higher than you. I have also learnt that when you get skills, you don't remain alone but get a network of friends. [Moreover,] you can go out and teach other people, share with them and you tell them the profits you have got, the benefits and they will also learn what to do.

***Theme #5: Community engagement and outreach.***

The students acknowledged participating in community outreach, including interaction with farmers who were working in various entrepreneurship ventures. They visited and interacted with entrepreneurial farmers keeping poultry in their communities, and both parties learned about one another's ventures. The following subthemes emerged from the students' community outreach and engagement.

*Inspiration and networking with farmers, including meeting role models.* The students indicated being inspired when they visited farmers who were doing well with their ventures. Some of the students established contacts with these farmers and followed up with them during their school holidays. One such female farmer who inspired the students was from Mafubira, Jinja district, and she kept more than 7,000 layers in a battery cage system that was highly automated. From the students' descriptions, it was secured with cameras and fencing. The students were inspired by the output of that particular farm and many of the female students indicated that they viewed her as their role model. To this point, one student in the focus group interviews said: "I made friends with the people we met at these farms, for example, the woman we met at the Mafubira

farm, she became a role model to me and inspired me to go into agripreneurship.” In addition, another student from a focus group interview explained:

When we went out of school to some farm, the entrepreneurial lady explained to us that at first, even her, she began with a small enterprise using a deep litter system and when she realized that she had to get more profits, she increased on the number of birds. She changed to another system which was battery cage system. Of course, we had to see how the battery cage system works, and she explained to us how she feeds the birds . . . it was my first time to see such a system. I learned that with this system, you can . . . [raise] more birds than deep litter. I learnt that it was good for layers because there are things [nests] where layers lay eggs. These eggs pass down there [on to the egg conveyer belts] and are easy to pick . . . . Even cleaning is easy because the droplets just fall down and one has to just sweep them. These droppings can also be used as fertilizers in the garden.

*Advisory services to other farmers.* The students indicated learning from the farmers’ experiences regarding management of their projects and also gave farmers advice on how to overcome some of the challenges they were experiencing, such as diseases and poor growth rates. For example, a focus group participant explained:

When we visited Njeru, we met a gentleman called Peter who had 600 layers and 400 broilers but some were affected by coccidiosis, the hygiene was poor, feeds were mixed with bird droppings on the feeders, and some of the food was spread all over the coffee litter husks. We told him to treat the birds with coccidiostats and improve on the hygiene in the poultry unit.

This student's experience was also shared by Sharon who addressed it in her journal:

When we visited farmers in Iganga and Njeru, their broilers were sick and passed out brownish diarrhea, we realized that this could be coccidiosis because we had seen it in our birds and the doctor told us to treat and improve hygiene in the poultry house. We advised the farmers to do the same to reduce losses and costs of treatment.

In addition, the students indicated that they had seen differences in growth rates and weight gain between their birds and those of a farmer they visited in Iganga. Whereas the farmer's broilers were the same age as those of the students, they looked emaciated and stunted. They asked the farmer where he had bought the chicks and what he was feeding them. The participants realized that the birds were of poor quality and the farmer was not properly mixing the feed. He was trying to save money by putting fewer ingredients in the feed which was affecting the birds' rates of growth. The students told the farmer to improve the feeding regimen, where they bought feed, and the source of their chicks. Further, they connected the farmer to the extension agent who helped them get their birds and was assisting with their projects.

*Ongoing knowledge sharing about their projects.* Even though the students' broiler projects ended before their holiday periods began, some students indicated that, when returning home, they shared with their peers from other schools in their communities, as well as told family members about their projects. Moreover, it was indicated in reports by the schools to the students' parents about the ongoing broiler projects. For example, a student shared during the focus group interviews that, when he went back home, he told his family and friends about his experience and they planned on starting their own



projects. “I told my friends about it [broiler project] and they got interested and we are having an idea of starting up our own, I even told my parents about it.” This students’ experience was also shared by another participant in the focus group interview who added: “When I went home, I shared with my parents what we did and I urged them to start a poultry project. My parents were very impressed about what I am learning.”

***Theme #6: Challenges related to implementation of their business ventures.***

The students shared that they experienced a number of challenges while implementing their projects. These challenges are described in the following three subthemes.

*Loss of chicks in the brooder house.* The students indicated they lost some broiler chicks during the brooding period, which was heartbreaking. Some of the chicks died when they jumped into the heat source and were burnt to death. Other chicks died due to coccidiosis infection in the brooder but they were able to contain and treat the outbreak. However, this experience taught the students that risks are a part of agripreneurship and appropriate measures have to be taken to guard against them. To this point, a student during the focus group interviews said:

I remember one morning we went to the farm and saw smoke coming from the pot [heat source]; when we checked, it was a chick burning. We were so scared but later got the courage to pick it out. It was already dead. I was very sad but I realized that taking risks is part of the process.

This was also confirmed by another student during the focus group interview who added:

Sometimes there were deaths of birds which led to losses . . . so far our project has faced such problems of death of birds but, as entrepreneurs, we learn to endure all problems and hardships and we try our best to see that others don't die.

*Lack of cooperation from some participants.* Some of the projects' student leaders shared during the focus group interviews that they experienced the challenge of mobilizing other students to do the work allocated to them based on their duty rosters. Some students were not enthusiastic about feeding the birds or doing other work at the farm but were eager to get on the bus to visit the farmers. For example, a student leader described her experience:

As a chairperson for the project, I had the responsibility to ensure members attend to their work at the farm on the days they were allocated on the duty roster but surprisingly, when it came to going out to visit the farmers, they were the first to go board the bus.

*Balancing time for classwork and their projects.* The students indicated that, at times, they had a challenge balancing other school activities, including classwork with their projects' activities. For example, a student shared during the focus group interview: "At times, it was hard to attend to the birds when you are needed by teachers to go to assembly." This sentiment was also shared by another student during a focus group interview who said: "Sometimes, the teachers would want us to do other activities on the weekends and yet we were expected to attend the training by the facilitators. We had to always explain to them before they would excuse us."

***Theme #7: Advice on how to engage young people in agripreneurship.***

The students discussed various initiatives that could be undertaken to engage more youth in agripreneurship. Their recommendations are described through two subthemes.

*Curriculum reform involving integration of entrepreneurship and agriculture:* The students indicated the need to reform existing agricultural curriculum, which is more theory-based, to engage learners better by applying what they have learned. Further, they urged for the Government of Uganda to integrate entrepreneurship in the teaching of agriculture so that students are able to relate developing business ventures and agriculture. In support of this, during a focus group interview a student said: “There is need to make young people aware that agriculture is a business worthy pursuing and this can be done by helping students start their own projects in schools such as keeping birds or growing maize which they can sell.” This sentiment also was echoed by another student in a focus group interview who explained: “Young people love working on projects that will bring them income . . . when such opportunities are explained to students during teaching and they implement projects, they start to like the subject.”

Another focus group participant added: “Instead of giving us a lot of notes in class, it’s better we do things practically. It helps us not forget rather than cram notes.”

*Field trips, exposure to agricultural enterprise opportunities, and role models.* The students in the focus group interviews shared that one way to inspire youth to engage in agripreneurship is by taking them on field trips to see how adult entrepreneurs are working with their ventures. Further, another focus group participant said: “When I saw that farmer in Mafubira who has a master’s [degree] engaged in agriculture, and how

much she was earning, she inspired me to go into farming.” This also was echoed by another student during a focus group interview who shared: “When I went and visited farmers, I saw there was money in agriculture. Such opportunities to visit farmers would open our eyes and see that there is money in agriculture and agriculture was a business.” In addition, during a focus group interview a student revealed that “more exposure of young people to opportunities in agriculture will inspire and change their attitude toward agriculture.” This point also was stressed by another focus group participant who mentioned: “When we earned [money] from our selling our birds, I felt good to start my projects at home . . . [during] vacation . . . . I think this is one way to motivate them [youth].” These views were supported by other student during the two focus group interviews, including one who added: “Sensitize youths about the agriprenurship and then include it on every school time table, so that all schools in the country teach it . . . and also the schools should provide [a] market for students’ products and stable prices.”

## **Subsection Two**

### **Findings from personal interviews of the project’s adult facilitators regarding their experiences with the project.**

Eight adult facilitators participated in personal interviews and shared their experiences in regard to the school-based, agriprenurial projects (SAPs), including the potential of such to improve agricultural practices and livelihoods in their communities, and students’ acquisition of agriprenurship, leadership, communication, and teamwork skills. They included two agricultural teachers and two entrepreneurship teachers, one from each of the treatment group’s school, as well as two extension educators and two farmers. They are described below.

*Participant #1 (Moses):* At the time of the interview, Moses was 40 years old and had more than 13 years of experience teaching agriculture. He holds associate's and bachelor's degrees in agricultural education. He was one of the project's coordinators and oversaw the students' training and implementation at one of the schools. *Participant #2 (Peter):* Peter was 46 years old with more than 20 years of agricultural teaching experience. He also holds associate's and bachelor's degrees in agricultural education. He oversaw the implementation of the students' project at his school and also participated in training the students. *Participant #3 (Abu):* Abu was 32 years old with nine years of teaching experience in entrepreneurship and business education. He holds a bachelor's degree in business education and a master's degree in entrepreneurship. He was one of the agripreneurship trainers for the students during the study. *Participant #4 (Julius):* Julius was 45 years old and had more than 22 years of business teaching experience. He holds an associate's degree in business education, a bachelor's degree in business studies, and a master's degree in commerce. He also was one of the agripreneurship trainers for students during the course of the study.

*Participant #5 (Noah):* Noah was 33 years old with more than 10 years of experience related to business development and advisory services to communities at the local and international levels. He holds a bachelor's degree in entrepreneurship and small business management, a postgraduate diploma in project planning and management, and, at the time of the study, he was pursuing a master's degree in project planning. Noah was one of the project's coordinators and involved in the training and facilitation of the students regarding agripreneurship. *Participant #6 (Daniel):* Daniel was 46 years of age, with more than 25 years of experience providing extension/advisory services, including

working with poultry farmers. He holds an associate's degree in animal husbandry and several professional development certificates. He helped facilitate the interactions between farmers and students and was involved with the training of students and follow up on their projects at both treatment group schools to ensure proper management practices were implemented.

*Participant #7 (Patience):* Patience was 52 years old and a retired agricultural officer. Patience is an entrepreneurial farmer with more than 30 years of experience in poultry production. At the time of the study, she operated a battery cage system for layers and a deep litter operation for broilers. She holds an associate's degree in education, a bachelor's degree in agriculture, and a master's degree in gender and women studies. Patience taught agriculture for 15 years before venturing into poultry production and was one of the entrepreneurial farmers who interacted with the students. *Participant #8 (Shawn):* Shawn was 35 years old with more than 15 years of experience in poultry production. He holds a bachelor's degree in social sciences and a master's degree in human resource management. Shawn was one of the entrepreneurial farmers who interacted with the treatment group students in this study. Based on analysis of the adult participants' interviews, eight themes and seven subthemes emerged, as described below.

***Theme #1. Improved understanding and interest in agripreneurship and related opportunities for both the students and the facilitators.***

All the facilitators observed that the students' understanding and knowledge of agripreneurship had improved by the project's end. According to the facilitators, this observation was based on the kind of questions posed by the students to the facilitators about agripreneurship, and also due to the answers students gave when the facilitators

asked them follow-up questions. Further, the students' actions involving developing business plans, planning and budgeting, marketing of their products, managing the broiler projects successfully, and later re-investing capital to continue with the projects showed they understood the value of agripreneurship projects, and, therefore, the need to continue with such. Moreover, in the case of the female students, they mobilized their own funds to expand on the re-investment opportunity.

According to Julius, in the beginning, students could not relate agriculture with entrepreneurship to imply agripreneurship. They even wondered what an entrepreneurship teacher was doing in an agricultural project, but Julius explained:

I brought it out that if you incorporate business ideas in agriculture, then you are likely to earn more profits which you can use to expand on your production. . . . I taught them the idea of marketing, marketing plan and strategies, which they used in the marketing of their broilers.

Julius' observation also was noted by Noah who said: "Most of the students knew about entrepreneurship but combining agriculture and entrepreneurship was a total surprise to them. Most had no idea what agripreneurship meant but when we explained [it] to them, they were astonished." Noah explained that students could not connect entrepreneurship and agriculture initially, but during the training were able to relate the two concepts and showed more interest and wanted to learn more about how to identify opportunities, including business plan development and how they could get capital to start their own businesses. "The students were very interested and liked the idea of merging the two subjects [entrepreneurship and agriculture] . . . . Actually, most of them

indicated they would like to start their agricultural businesses to help them pay their tuition at university,” said Noah. This perception also was echoed by Abu who shared:

The students were very excited to see that what has been taught in class can be applied outside practically in [the] form of agripreneurship. Meaning that the theory being taught in class was transferrable into practice; helping them transform [classroom] knowledge to the business environment, instead of them learning things in class and [later] forget all about them.

Moreover, some of the students, after seeing how profitable their projects were, convinced their parents to start related projects at home while others told their facilitators that they intended to begin agripreneurship ventures during their school vacations. In addition, two of the facilitators acknowledged they also had gained more insight about agripreneurship and used the knowledge from the entrepreneurship and extension educators to start their own projects. To this point, Moses shared:

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

Further, Peter added: “Visiting farmers who were doing well and working with the students helped me get new ideas to revisit some of the projects I was working on. I plan to integrate more agripreneurship in my teaching.” Peter’s and Moses’ views also



were supported by Abu who indicated: “To me as a facilitator, this whole project experience helped me learn new ideas in agriculture that I could use in my business classes.”

***Theme #2: Increased understanding of poultry science knowledge and its implementation outside of the classroom.***

The agricultural teachers observed that students who were part of the poultry projects were more active in class than other students. They would respond to questions in class during discussion with practical examples of their projects using what they had seen or experienced. For example, signs of coccidiosis in infected birds. Patience, one of the entrepreneurial farmers, was impressed by how the students were able to match their practice with theory, i.e., classroom learning, when they visited her farm. Moreover, the teachers noted an increased interest in their subjects and this made their work easier, as explained by Moses:

It was a good learning experience. Before that, we were approaching poultry in a theoretical way and it was very hard for us to convince the girls that things can actually happen. But when it came to this training and the real practical sense with hands-on [experience], it simplified our work . . . . Girls loved the subject more because they saw agriculture as something they can benefit from and also help their community.

Moses’ statement was supported by Peter who elaborated:

If we gave another test today, you will find that members who were still in the project would do better . . . . Those who were in the project had more contribution in class than those who did not have hands-on [experience] with the project,

especially when we were handling [teaching] the topic of poultry. The other ones who were in the project had practical knowledge; they would tell you most of the things [answers] than those who did not have [the] hands-on [learning opportunities]. There is a very big change/difference between the two groups.

***Theme #3: Student acquisition of life skills.***

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

I have seen they have learnt leadership skills. They know how to mobilize themselves and they know how to budget. I have witnessed this with the new birds they bought. They budget for that little money they saved from the first project and account for whatever they are doing which means they have learnt saving. Now they work as a team and you rarely get to solve any serious issues [conflicts] because they handle it themselves. They have learnt perfectly on how to manage the broiler project which they are doing very well than previously where I had to be there all the time.

To this outcome, Julius added:

We taught them how to develop an organization plan for their project. They learnt that they needed to be organized with their project. We developed an organizational plan and identified the people to work with the project and we

established a reporting matrix within the project in an orderly way to avoid conflicts and duplication of duties.

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

Teachers acknowledged that as a result of the broiler raising project, they came to know some of the students better outside of the classroom, including some of their parents. Actually, according to Moses, one of the students talked her parents into buying all the chickens from the project. Further, some parents who were told about the project by their children made telephone calls to some of the facilitators and inquired about the project and how they could support it. This observation also was echoed by Abu who shared:

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

In addition, relationships were developed between the various facilitators and with some students, who they said have stayed in contact. For example, Patience indicated that some of the students called and inquired about starting individual poultry

projects. “During the holiday, students called me and made an appointment to visit my farm with their parents,” said Patience. In support, Shawn reported:

Those students from well to do families [financially stable] followed up with me and they wanted help to talking to their parents or visit their homes and advise them how they can also start the same kind of business I do but because of the tight schedule that I have not been able to . . . . I hope to get in touch with them soon.

***Theme# 5: Mutual exchange of ideas and continued interaction between the facilitators, students, and school administrators.***

The facilitators indicated that the students enjoyed interacting and learning from the farmers they visited. The students were able to compare the performance of the farms visited and gave advice where appropriate. They saw well-managed and profitable farms, such as Patience, who kept birds under a battery cage system, and those who were struggling. They also had the opportunity to make comparisons to their own school projects and evaluate how they were performing. The students realized that their projects were doing better than some of the farmers visited, and they offered advice on improving. A facilitator, Moses, shared:

When we went to Iganga to visit one broiler farmer, the birds were really in a bad shape and looked emaciated. The students asked the farmer where he bought his chicks and feed, and they realized the feed was the problem and the birds were not from a reputable source. They told the farmer where they bought their chicks . . . . They asked the farmer to change his source of feeds and ensure the birds were

given enough water and that feeding was ad libitum because he was trying to ration the feeding to save money which was affecting their growth.

Further, according to Julius, the schools' administrators also were interested in learning about the students' projects and experiences from the field trips. "The head teacher and other administrators were always following what we were doing with the students and they actually included it in the report to parents about what the students were doing," said Julius.

***Theme #6: Benefits of students working on projects with members of their communities.***

All adult participants acknowledged that the idea of students working with community members around mutual projects was good. It helped the farmers to understand what the schools were teaching their children, and they learned new things when interacting with the students. The teachers who facilitated the project explained that it made their teaching easier because the students were able to understand better and implement what they were learning. According to Julius, "they [students] saw and experienced how they could apply the knowledge and content being covered in class to solve problems outside the class." In support, Peter said: "Students realized that it was not about getting good marks in class but how to apply the knowledge to earn a living and impact your community." Further, Moses explained:

I have loved this kind of teaching using a project approach. It is practical compared to the theoretical way we continue to do it because of our curriculum . . . . This practical sense of curriculum, the agripreneurship, leaving alone the theoretical agriculture, this brings in the aspect of budgeting, aspect of planning

for the project, marketing, risk taking, endurance, and teamwork which are very good skills for improving livelihoods of our students when they create employment jobs.

Abu added: “The skills development in agripreneurship is helpful for our learners and community to become self-reliant. That is if the students use the skills to create jobs and employ others.” This point also was echoed by Noah who said: “When students engage with communities, they are able to see opportunities to apply their skills which are not available in a closed school environment.” Shawn further explained that in the 1970s and 1980s, schools such as Wairaka College had school farms that were managed by students and the local communities would go and learn from these farms and even buy their products. This helped promote better cooperation with the communities and if a farmer could not access immediate help from the extension educators, they would visit and interact with people at these school farms, including the teachers. Shawn added:

School farms were a resource center for the communities and at times they had better breeds of cattle that communities would access to improve their herds . . . but now look that these schools we regard as modern much as they are teaching knowledge, the practical aspect is not there and they don't have any single farm. How can you teach agriculture theoretically without practice? It is called principles and practices of agriculture!

Further, Patience shared:

This initiative is long overdue. Schools should work with communities and not [stay] in isolation because, at the end of the day, there is need for better cooperation and, as we all know, these students will return to their communities

when they graduate and will be expected to solve emerging problems. But how can they do it if they are not given the opportunity to interact with us early on so we all learn from each other?

And Patience elaborated further:

What I know is that some schools, like where I was teaching agriculture, students had nothing to relate to and I tried to ask the head teacher if we can put up a farm for students to learn better skills because it would make my teaching easier and [learning] for students. So these farms visits are good because some students don't continue with their education due to unavoidable circumstances . . . but this gives them an opportunity to learn practical skills and they can start something and grow big slowly by slowly . . . . Also, farming is now profitable and when they see a farmer like me who is highly educated making a living out of it, they can be inspired . . . . It is not like in our days where farming was taken as a low grade activity and subsistence . . . . As you know, agriculture is a key income earner for our country . . . . It improves the knowledge in the communities as they interact and share with different farmers. I think it's a good venture.

***Theme #7: Challenges experienced by facilitators during implementation of the project.***

Although the facilitators realized a number of benefits working with the project, many outlined challenges they experienced. These challenges related to seven subthemes.

*Limited time and schedule conflicts with established school programs:* All the adult participants indicated that the time allocated for the training and interaction of farmers with students, including the facilitators, was limited. This was because the projects were

implemented during school time, and teachers had to balance their official duties with the project work. Moreover, most of the training and the students' field trips had to be conducted on weekends which was difficult to accommodate along with other school programs. To this point, Daniel stated: "The time was limited and the school calendar was not favorable at times where the students were expected to attend classes or do weekly tests at the time when they are scheduled to visit farmers." He added that "it was also difficult to align the school's program with the farmers' schedule[s] . . . and yet farmers want students to go to their farms when they are around." This point was also supported by Abu who stated that when it came to training, it was difficult to find enough time to complete certain modules that they intended to address because the students were required to attend to other school activities or assignments. Moses also shared:

It was hard for students and teachers to balance time between school activities and project work, especially when the chicks were still young . . . . Students were required to attend to the chicks when at the same time they were needed in class.

Shawn also expounded about this constraint: "Time was a challenge; I saw that students were willing to learn more but their teachers were calling them to enter the bus that time is over."

*Large number of students.* The farmers had a big challenge of accommodating the number of students who visited their farms. This limited their ability to provide quality time for each student and respond to their questions. However, some of the students who were really interested took the farmers' contact information and followed up with them during the school holiday periods.



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

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

*Fear of transmitting infection from one farm to another.* Some farmers and extension educators were worried that the visiting students could spread disease from one farm to another. This discouraged some farmers from hosting students on their farms.

*Expensive cost of feeds.* Though the cost of production for the students' initial broiler projects was provided, the facilitators indicated that when the students decided to restock their projects, the cost of feed was very high and students, at times, had to contribute additional funds to conduct the second project.

*Lack of cooperation and time management from the students.* Some of the facilitators indicated that a portion of the students were less interested in the project and this caused challenges with organizing them. Moses elaborated: "Some of the students were from posh [wealthy] families and they thought it was a dirty project. So to bring them on board, I had to convince them about the importance of them participating in the project."

This issue also was shared by Peter who said: "Though the majority of students loved

working with the project, some wanted to give up because it required extra time to work on the project and yet they were required to prepare for tests.”

*Financial constraints.* The facilitators explained that the resources available to implement the project were limited compared to its magnitude. Julius stated: “I observed that the resources available for the project were small and thus students had to operate on a small scale which made the unit cost of production per bird high, leading to less profits.”

***Theme #8: Suggested solutions to overcome the challenges experienced by the facilitators.***

The facilitators suggested a number of ways that could help address some of the challenges they experienced during implementation of the project, as described below.

The facilitators indicated that a need existed to harmonize school programs so that students have enough time to engage in extracurricular activities. Patience explained: “Focusing on teaching only the theory with no opportunities for students to experiment what they have learned limits skills development among students and promotes cram work.”

Further, most of the facilitators recommended a need existed for more appropriate arrangements to involve farmers, schools, and other stakeholders so they understand their roles in and the importance of engaging students with their communities. This would lower the ratio of students to farmer during site visits and students would have more time to interact and share with a wider variety of farmers. In addition, Noah stated: “Schools should connect their students with farmers close to their schools so they can work together as partners. Such programs should be sustained through communications and mutual understanding.” This point also was shared by Peter who noted that having stable

relationships with neighboring farmers ensures ongoing collaboration and reduces travel time for moving to places where farmers are willing to host students. In addition, Moses expressed the need to have all school administrators onboard to support new initiatives in their schools.

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

*Triangulation of the Study's Findings*

Theme	Findings from the Quantitative Data	Findings from the Treatment Group Students' Qualitative Data	Findings from the Adult Facilitators' Qualitative Data
Poultry science knowledge	Analysis of the results indicated that an overall improvement of students' posttest scores on poultry science knowledge irrespective of their group occurred. However, the treatment group students had a much larger increase in their poultry science knowledge scores than did the students in the counterfactual group.	Analysis of qualitative data from student participants indicated that they had acquired knowledge, skills and better understanding with respect to poultry keeping through their hands-on activities and classroom instruction. Such skills included brooding, identification of sick birds, vaccination, feeding, and record keeping, among others.	Most of the facilitators, especially the agriculture teachers and the entrepreneurial farmers, noted that the students' poultry science knowledge had improved. Moreover, some of the teacher facilitators indicated that they had observed increased participation in class from students who were taking part in the broiler project than their peers who were not, including sharing knowledge with and advising the farmers they visited.
Agripreneurship competencies and general knowledge related to agripreneurship	Analysis of results indicated that, although an overall increase in the students' agripreneurship competence occurred for both groups, the students in the treatment group expressed higher adjusted mean scores for the agripreneurship competencies than students in the counterfactual group.	Students shared that their understanding and awareness about agripreneurship and entrepreneurship in general had improved. Moreover, opportunity recognition and idea generation relating to agriculture was one of the themes that emerged. Students indicated that they had acquired competencies in agripreneurship, including	All the adult facilitators shared that they had observed an increased understanding and awareness regarding agripreneurship and entrepreneurship in general among students based on their actions and the follow up questions they asked. The adults indicated that students acquired skills in developing business plans,

		<p>risk-taking and mitigation, perseverance, communication, marketing, and opportunity recognition, among others.</p>	<p>budgeting and financial management, marketing and communication, as well as managing risks. Further, the adult facilitators indicated that students were actively involved in the leadership and provided decision making regarding the future of their projects.</p>
<p>Students' intentions to become agripreneurs in the future</p>	<p>Analysis of results for students' likelihood to become agripreneurs in the future indicated that, although an overall increase in likelihood was recorded for both groups, the students in the treatment group had higher adjusted mean scores regarding their likelihood of becoming agripreneurs in the future than students in the counterfactual group.</p>	<p>Data from student participants indicated that they had continued to apply the agripreneurship skills acquired from the project through re-investment of their capital to continue with broiler raising projects. Further, many of the students indicated they had intentions to start their own agripreneurship projects, including convincing their parents as well as peers to collaborate and/or start enterprises.</p>	<p>Some of the facilitators indicated that students were interested in developing their own projects at home and they wanted to also engage their parents. Further, some students who visited the entrepreneurial farmers were motivated and inspired to become agripreneurs after realizing that many viable opportunities existed in the agriculture sector. Moreover, some saw these entrepreneurial farmers as role models and were motivated accordingly.</p>

## CHAPTER V

### SUMMARY OF THE STUDY, CONCLUSIONS & IMPLICATIONS, RECOMMENDATIONS, AND DISCUSSION

This chapter is divided into four key sections with several subsections: a summary of the study, including a review of literature, the investigation's methodology, and its major findings; conclusions and related implications; recommendations for practice and future research; and discussion. The first section includes the study's purpose, research objectives and hypotheses, problem statement and significance, as well as a summary of the review of literature, research methods, and major findings. Section two provides conclusions and related implications based on the study's major findings. Section three includes recommendations for future practice and recommendations for future research emanating from the investigation. And section four is a discussion based on the study's findings.

## **Section I**

### **Purpose of the Study**

The primary purpose of this study was to assess how a project-based learning (PBL) approach involving agripreneurship could be used to enhance students' understanding and application of selected agricultural knowledge and concepts (i.e., poultry science and related entrepreneurial competencies) learned in school to real-world settings. In addition, the study sought to describe participants' experiences in regard to school-based, agripreneurial projects (SAPs) and their potential for improving agricultural practices and related livelihood opportunities in local communities.

### **Objectives of the Study**

Six objectives and 10 null hypotheses guided this study:

- 1) describe selected personal and professional characteristics of the participants (students and adults);
- 2) compare students' poultry science knowledge based on the instructional approach used, i.e., project-based learning featuring agripreneurship versus traditional classroom instruction;
  - Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for poultry science knowledge based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for poultry science knowledge based on the instructional approach used.

- Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for poultry science knowledge based on the instructional approach used.
- 3) compare students' perceived agripreneurship competencies (skills) based on the instructional approach used;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceived agripreneurship competencies based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceived agripreneurship competencies based on the instructional approach used.
- 4) compare students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future;
- Ho: No statistically significant interaction ( $p < .05$ ) existed between group and sex for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
  - Ho: No statistically significant differences ( $p < .05$ ) existed between groups for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.



- Ho: No statistically significant differences ( $p < .05$ ) existed between sexes for students' perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future based on the instructional approach used.
- 5) describe relationships between students' characteristics and other selected variables;
- Ho: No statistically significant relationships ( $p < .05$ ) existed between students' characteristics and other selected variables.
- 6) describe participants' (students' and adults') experiences in regard to school-based, agripreneurial projects, including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills.

### **Problem Statement**

The Government of Uganda is interested in transforming its agricultural sector from subsistence to commercial agriculture to ensure food security and empower its populace for self-reliance and job creation, as outlined in Uganda's Vision 2040 (NPA, 2013). A number of approaches and resources have been dedicated toward this aim. Such includes the Entadikwa scheme (i.e., startup capital), National Agricultural Advisory Services (NAADS), Plan for Modernization of Agriculture (PMA), Poverty Eradication Action Plan (PEAP), Prosperity for All, and Uganda Vision 2040 (International Monetary Fund, 2003; Joughin & Kjaer, 2010; Ministry of Finance, Planning & Economic Development, 2004; NPA, 2013; The World Bank, 2001).

None of these interventions, unfortunately, have achieved their intended

objectives due to mismanagement, corruption, and politics (Joughin & Kjaer, 2010; Mukembo & Edwards, 2015a). Moreover, in Uganda, as may be the case in other countries, agriculture, especially gardening, was used customarily to punish misbehavior by students (Food and Agriculture Organization, Technical Centre for Agricultural and Rural Cooperation, & International Fund for Agricultural Development, 2014; Mukembo, 2013; Waithera, 2013). This practice among other factors may have created negative perceptions about agriculture and related careers among Uganda's youth. Therefore, building human capital to ensure food security for improved livelihoods remains a big challenge, especially with rapid population growth. Further, a discrepancy exists between Uganda's population growth and its agricultural sector. Whereas the country's population is growing at a rate of 3.03% per annum (Uganda Bureau of Statistics, 2014), its agricultural sector is increasing at a slower rate of 2.6% to 2.9% per annum (Feed the Future, n.d.; Ministry of Agriculture, Animal Industry, & Fisheries, 2010).

In Uganda, more than one-half of the population is below the age of 15 (The State of Uganda Population Report, 2013) and dependent on proportionally fewer working adults for their survival. Uganda is among the countries with the highest youth-to-adult dependence ratio in the world (Central Intelligence Agency [CIA], 2016; The World Bank, 2016b). A majority of the nation's youth, 62% to 83% depending on the report, between the ages of 16 to 35 years, are unemployed or underemployed (AAU, DRT, & UNNGOF, 2012; Mwesigwa, 2014; Soucat et al., 2013; The World Bank, 2013).

In addition, more than 75% of all college graduates produced annually in Uganda remain unemployed (Arinaitwe, 2014; NCDC, 2014). The World Bank (2013) estimates that by 2020 more than 10 million Ugandans will be in search of employment if strategies

are not developed and implemented to address the jobs challenge. This phenomenon is partly attributed to the school curriculum being too theoretical or *subject-centered/centric* and out of touch with current employer and enterprise development needs (Liang, 2002; Lujemwa, 2014; Namuli-Tamale, 2014; NCDC, 2013; Semboja, 2007; The Economic Intelligence Unit, 2014). According to the NCDC (2013), the current curriculum used in Uganda's secondary schools was "initially designed for an elite minority of learners bound for positions within the public service [sectors]" (p. 24). According to Booker T. Washington, education needs to equip individuals with knowledge and skills to solve challenges encountered in real-world situations (as cited in Gordon, 2008), including self-employment and job creation. Therefore, with an increasing population and few job opportunities in Uganda's public service sector, the need exists to find alternative ways to equip students with practical skills for self-employment and job creation. Studies should determine how students can transfer the knowledge and skills acquired in the classroom to solve challenges they encounter in their daily lives, including reliable and sustained employment. To that end, this study sought to assess how a project-based learning approach could be used to enhance students' understanding and application of concepts learned in school to real-world situations with implications for economic development and empowerment, especially in regard to agripreneurship.

### **Significance of the Study**

The Government of Uganda is interested in ensuring graduates of secondary schools, both at the Ordinary and Advanced Levels, acquire knowledge and skills through *hands-on, minds-on* learning experiences enabling them to be *self-reliant* and empowered

to *create jobs* for the economy (MoES, 2011, NCDC, 2013, 2014; NPA, 2013). This is evidenced in the Government's efforts to reform the existing school curriculum to make it more learner-centered/-centric, and also by reducing the number of subjects at the Ordinary Level from 18 subjects to eight learning areas (Musoke, 2014, NCDC, 2013). To achieve this, existing subjects such as agriculture and entrepreneurship are being merged/integrated into one learning area, i.e., Technology and Enterprise (NCDC, 2013). The findings of this study, therefore, will provide stakeholders, including teachers, as well as Uganda's Government and its development partners, with policy recommendations for the proposed curriculum reforms being undertaken by the NCDC, especially in regard to the integration of agricultural and entrepreneurship education.

Further, Uganda's Government is concerned with developing and transforming its agricultural sector from subsistence to commercial farming for improved livelihoods and community development as outlined in its Vision 2040 initiative (NCDC, 2013; NPA, 2013). Unfortunately, the decline of youth engagement in agriculture amidst an aging population of farmers is of great concern to Uganda's Government officials, as it is for many world leaders. More than 70% of Uganda's population is below 30 years of age, and yet the average age of a Ugandan farmer exceeds 50 years (Lunghabo, 2016; Natukunda, 2013; The State of Uganda Population Report, 2013), which has created a high youth-to-adult dependence ratio (CIA, 2016; The World Bank, 2016b). Therefore, using a project-based learning approach to integrate agricultural and entrepreneurship education in schools may be a way for students to learn that agriculture is a viable business enterprise with multiple employment opportunities at the farm level and in the value addition stream (Mukembo et al., 2014, 2015). This approach may help attract

more young people to the agricultural sector, thus contributing to its human capital and reducing the sector's youth-to-adult dependency ratio in Uganda.

In addition, the results of this study may provide valuable feedback to stakeholders in Uganda and elsewhere interested in developing their agricultural sectors, including the promotion of such to youth as a viable livelihood alternative, while improving food security and food sovereignty for the respective populations. The findings also may provide insights on how to improve students' experiences and perceptions with regard to learning about agriculture, including its career opportunities. Such a change in students' views could lead to increased enrollment in agricultural programs of study and to more agriculturists in the future.

### **Summary of the Review of Literature Undergirding the Study**

Entrepreneurs have existed for a longtime and gave rise to the discipline of entrepreneurship (Neergaard & Ulhøi, 2007), which is now part of the formal and non-formal curriculum in many schools and universities across the globe. Though many definitions of entrepreneurship exist in the literature (Amo, 2014; Brockhaus, 1980; Volkmann et al., 2010), a universally accepted definition remains elusive (Baumol, 1968; Crant, 1996; Gartner, 1988).

Entrepreneurship as a scholarly discipline is grounded in the works of Schumpeter and Kirzner who posited two divergent perspectives, i.e., creation of opportunities versus discovery of opportunities, respectively (Dutta & Crossan, 2005; Oner & Kunday, 2016; Post, 2014). Entrepreneurship education is multidisciplinary (Low & Macmillan, 1988; Shapero & Sokol, 1982), and is now taught outside schools of business by other faculties to their students (Blenker et al., 2014; Morris et al., 2013a). The main cross-cutting

feature in the curriculum for entrepreneurship is the development of business plans (Gartner & Vesper, 1994), but some scholars have divergent views about their efficacy in equipping students with entrepreneurial skills because business ventures are organic (Bell & Bell, 2016; Ronstadt, 1985). Students acquire entrepreneurial competencies mainly through hands-on, minds-on experiential learning opportunities (Kolb, 1984) in real-world environments, including apprenticeships and working on problems and issues, i.e., through project-based learning activities. These competencies include creativity, endurance, leadership, opportunity recognition and evaluation, persistence, risk taking, and systematic planning, among others (Bird, 1995; Liberal, 2007; Morris et al., 2013a).

Entrepreneurial competencies are reflected in the behaviors of individual entrepreneurs, and can be acquired through formal and informal educational settings (Clouse, 1990; Hattab, 2014), through an experiential learning cycle, as espoused by Kolb (1984). Kolb's model consists of four learning phases that are interrelated and successive (Baker et al., 2012; Corbett, 2005; Holman et al., 1997; Kolb, 1984, 2014). Effective entrepreneurs experience all four phases as they encounter and comprehend the entrepreneurial process and seek to establish business ventures (Garavan & O'Connell, 1994). Starting a business venture or exploiting an entrepreneurial opportunity are behaviors actualized by entrepreneurs that stem from their intentions (Krueger & Carsrud, 1993; Krueger et al., 2000), as influenced by three sources or conditions, including attitudes, subjective norms, and perceived behavior control (Ajzen, 1987, 1991; Ajzen & Madden, 1986). Therefore, entrepreneurship is more about the behaviors exhibited by individuals than their personality traits (Davidsson, 2005; Gartner, 1988).

Moreover, intentions (Ajzen, 1991) can be used to predict behaviors, including acts of entrepreneurship (see Figures 5 and 6).

Many entrepreneurial ventures evolved in the context of agriculture, i.e., *agripreneurship* (Alsos et al., 2011; Singh & Krishna, 1994). Agripreneurship has the potential to help reduce unemployment among the youth and improve their livelihoods (International Labor Organization [ILO], 2014), especially in Africa. Equipping youth with agripreneurship skills (Roberts et al., 2016) may be achieved through Y-APs (Akiva & Petrokubi, 2016; Zeldin et al., 2013; Zeldin & Petrokubi, 2008) in the form of community-based projects such as SEPs involving the integration of agriculture and entrepreneurship. Integration of the agricultural and entrepreneurship education curriculum, as has been proposed in Uganda (Musoke, 2014; NCDC, 2013), is likely to improve students' understanding of various concepts and the applicability of such to real-world situations to solve existing or emerging challenges in local communities, such as youth unemployment, poverty, and food insecurity (ILO, 2014). Moreover, such an approach may improve students' self-efficacy (Bandura, 1977, 1986) regarding opportunity recognition and venture creation (Baron et al., 2016; Barrick et al., 1992), which are essential to entrepreneurial success.

Based on this review of literature, the researcher established a knowledge gap regarding agripreneurship and skills development among the youth of Uganda, which has likely contributed to increased unemployment and food insecurity in their communities. This study, therefore, aimed to fill that void by investigating how the integration of agriculture and entrepreneurship, using a project-based learning approach, could enhance students' application of agricultural knowledge and concepts (i.e., poultry science),

agripreneurship, and select life skills in real-world settings, as facilitated by teachers and other adults.

### **Summary of the Study's Methodology**

A quasi-experimental design involving a nonequivalent control group was used in this study (Campbell & Stanley, 1966; Cook & Campbell, 1979). This type of research design is employed frequently in educational settings where it may not be possible to assign participants to treatment or counterfactual groups due to a variety of reasons (Ary et al., 1996, 2006; Campbell & Stanley, 1966). The study's survey instrument was developed by the researcher and reviewed by a panel of experts from OSU's Department of Agricultural Education, Communications, and Leadership and School of Entrepreneurship, as well as by four agricultural and entrepreneurship teachers from Uganda, for content and face validity. A field test of the instrument was conducted among students similar to the participants in the final study. And based on feedback from the study's field test, modifications were made, as appropriate, to improve the instrument's readability and to calculate the reliability estimates of its constructs (see Table 5).

Two research assistants were involved with the study, and both had prior experience conducting social science research. The assistants were informed about the procedural and ethical guidelines that must be followed when conducting research involving human subjects, including ensuring confidentiality and voluntary participation. Preparatory meetings, discussions, and follow-up communication were made via electronic mail messages, Facebook messages, telephone calls, and WhatsApp messages.



Further, the researcher and his assistants formed a WhatsApp group platform on which they shared information and communicated.

Four schools participated in the final study, i.e., two boys' schools and two girls' schools. These schools included Busoga College Mwiri and Wanyange Girls Secondary School which comprised the study's counterfactual group, and Kiira College Butiki and Iganga Girls' Secondary School served as the treatment group. The schools were purposely selected because of their locations, i.e., eastern Uganda. Participants from these schools were Senior Two students. A stratified sampling technique was employed to select participants for the study (Ary et al., 1996, 2006; Borg & Gall, 1983; Creswell, 2012; see Table 6 and Figure 9). The sample for this study included 320 students who were divided equally among the treatment and counterfactual groups; each group had 160 participants (see Figure 9). The 160 participants in each group were further sub-divided among the respective schools to obtain an equal number of participants, i.e., 80 boys and 80 girls, in the sample by group (see Figure 9). Two-hundred and eighty students provided usable responses for quantitative data analysis.

The students in the counterfactual group received traditional instruction on poultry science from their agricultural teachers, as stipulated in the Ordinary Level agricultural course teaching syllabus provided by the NCDC (2008). On the other hand, in addition to receiving traditional instruction on poultry science from their agriculture teachers, the treatment group students were provided funding to implement what they had learned about poultry in their classrooms to real-world settings as broiler raising projects, i.e., *Student Agripreneurship Projects (SAPs)* [see Figure 10]. Further, the treatment group students interacted with poultry farmers in their communities whereby the students

and adults shared knowledge, experiences, and learned about their respective poultry enterprises (see Figure 10).

The study's fidelity of treatment was ensured through training of the facilitators and research assistants who delivered and managed the intervention. The researcher worked with the teachers and facilitators to develop the training modules for agripreneurship (see Appendix D). Further, the students learned poultry science from the agriculture teachers of their respective schools. Students in the treatment group received agripreneurship training from the same facilitators which ensured they were given similar content. In addition, they journaled about their training experiences, their broiler projects, and regarding their interactions with adult poultry growers and entrepreneurs. Further, the research assistants took visual images and recorded videos about the training that were sent to the researcher for analysis and to assess the study's fidelity of treatment.

A mixed methods approach, an embedded design in particular, was used to collect the data (Creswell, 2012; Creswell & Plano Clark, 2011; Messer et al., 1999). Using an embedded design to gather data provides researchers with multiple sources of findings that answer various questions and enables triangulation (Creswell & Plano Clark, 2011). Moreover, it offers a holistic approach to research which is useful in addressing shortcomings associated with using only qualitative or quantitative procedures to investigate a phenomenon (Johnson & Onwuegbuzie, 2004).

The study's quantitative data were collected using a survey instrument developed by the researcher (see Appendices B & C). A pretest and a posttest were administered to students in both groups (Campbell & Stanley, 1966). For the posttest, the researcher employed alternate form questions to measure the students' poultry science knowledge.

The use of alternate form tests is useful in reducing practice effects which may make participants perform better on a test due to previous exposure to the same measure (Beglinger et al., 2005; Benedict & Zgaljardic, 1998; Duff et al., 2001). Qualitative data were collected from both students and adult participants by conducting focus group and personal interviews (Bailey, 2012; Creswell & Plano Clark, 2011; Onwuegbuzie et al., 2009) via Skype (Deakin & Wakefield, 2014). Further, additional data were obtained by analyzing students' journal entries, training materials, videos, and visual images (Charmaz, 2014; George et al., 2014; Hsieh & Shannon, 2005). Quantitative data were coded and analyzed using SPSS software version 21, and the qualitative data were analyzed using NVivo 11 analysis software (QSR International, 2013, 2016).

In the case of the quantitative data, descriptive statistics, including means, modes, frequencies, and percentages, were calculated and reported. In addition, ANCOVA and tests of relationships between selected variables were conducted. The qualitative data were analyzed, coded, and categorized to determine emerging themes and triangulation with the study's quantitative findings.

### **Summary of the Study's Major Quantitative Findings**

All the null hypotheses for objective two were rejected because a statistically significant interaction ( $p < .01$ ) was found between students' group and sex, and also statistically significant main effects ( $p < .01$ ) existed between group and students' posttest scores for poultry science knowledge, as well as for students' posttest scores on poultry science knowledge depending on their sex. In the case of objective three, a statistically significant main effect ( $p < .01$ ) was found between groups for students' perceived agripreneurship competencies depending on the instructional approach used;

therefore, the null hypothesis was rejected. However, no statistically significant interaction ( $p < .05$ ) was revealed between group and sex nor did statistically significant differences exist between sexes for students' perceived agripreneurship competencies depending on the instructional approach used, which supported the null hypothesis.

Regarding objective four, no statistically significant interaction at  $p < .05$  was found between group and sex for students' intentions regarding their likelihood to become agripreneurs in the future depending on the instructional approach used, which supported the null hypothesis. However, statistically significant main differences at  $p < .01$  were revealed between groups and the students' likelihood to become agricultural entrepreneurs (agripreneurs) in the future, and for students' sexes and their likelihood to become agricultural entrepreneurs (agripreneurs) in the future, which led to rejecting the two related null hypotheses.

Moreover, in the case of objective five, the null hypothesis was rejected because statistically significant differences were found at  $p < .05$  between (a) students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future after the study, i.e., in regard to the treatment group; (b) students' home location (environment) and their keeping poultry for commercial purposes before the study; (c) students' sex and their enrollment in entrepreneurship as a subject; (d) students' sexes and ages; (e) students' sexes and their posttest scores for poultry science knowledge; (f) students' learning about poultry keeping in school and their agripreneurship knowledge; and (g) learning about poultry in school and students' likelihood of becoming agripreneurs in the future before the study.

The themes emanating from the students' and adult facilitators' experiences with the project indicated that an improvement occurred regarding students' poultry science knowledge, including their understanding of concepts related to agripreneurship and entrepreneurship in general. The students were able to successfully implement their broiler projects, and in the case of students from Iganga Secondary school, at the time of the focus group interviews, they had restocked their poultry enterprise. All participants benefited from the mutual exchange of information during the student-adult interactions, which led to better management of the students' projects and some of the adult farmers' enterprises. And, in the case of teachers, they got to know some of their students better outside the classroom.

Further, the students acquired a variety of technical and life skills such as budgeting, communication, conflict resolution, idea generation, leadership, marketing, opportunity recognition, teamwork, and writing business plans, among others. Moreover, many of the students indicated being inspired by the farmers with whom they interacted to pursue agripreneurship opportunities in the future.

## **SECTION II**

### **Conclusions and Related Implications**

The conclusions and implications of this investigation are presented by the study's objectives and research hypotheses.

**Research objective #1: Describe selected personal and professional characteristics of the participants (students and adults)**

**Personal characteristics of the student participants in the quantitative portion of the study**

Based on the quantitative findings, all student participants in this study were Senior Two students, an equivalent to ninth grade in the U.S. education system in four boarding secondary schools in Uganda. An equal number of students participated in both the treatment and the counterfactual groups, i.e., 140 student participants in each group, and their sexes were split evenly between the groups, i.e., 50.00% male and 50.00% female (see Table 7). The students' overall ages ranged from 12 to 20 years, with the modal age being 14 years, and their average age was 14.59 years (see Table 7). However, between groups, the ages for student participants in the counterfactual group varied from 13 years to 20 years, with the modal age being 14 years, and their average age was 14.81 years (see Table 8); the treatment group students' ages ranged from 12 to 18 years, with the modal age being 14 years, and their average age was 14.37 years (see Table 8). Though participants in both groups were within the same age range, with a modal age of 14 years for each, on average, students in the counterfactual group were slightly older.

Regarding home location (environment), a majority of students in this study, regardless of their grouping (counterfactual – 78.57%; treatment – 67.85%; see Table 8) lived near a town (*mixed/peri-urban*) or in a *town* setting. A large majority of students (77.14%; see Table 8) from both groups kept poultry at home. A slight majority of students had not kept poultry for commercial purposes (50.71%; see Table 7); however, more students in the counterfactual group (56.43%; see Table 8) had reared poultry for commercial purposes than those in the treatment group (40.00%; see Table 8). Therefore, more students in the counterfactual group than in the treatment group had prior experiences in regard to commercial poultry production. Further, though many of the

participants in both groups indicated that they kept poultry at home, it was mainly for home consumption (subsistence) and not necessarily for sale.

A large number of the students (75.72%; see Table 7) in this study, irrespective of their group, had *little, very little, or none* in regard to learning about poultry keeping at school, implying that the agriculture teachers in the participating schools had not taught much about poultry production before the study. Regarding enrollment in entrepreneurship as a subject of study, overall, most students (56.07%; see Table 7) in both groups had not previously enrolled to study entrepreneurship, however, by group, more students in the counterfactual group (57.14%; see Table 8) than in the treatment group (28.57%; see Table 8) had studied it therefore, fewer students in the treatment group had learned about entrepreneurship before the study than had members of the counterfactual group. In addition, most participants in both groups, i.e., 60.72% in the counterfactual group and 59.28% in the treatment group (see Table 8), had *little, very little, or none* in regard to knowledge or understanding about agricultural entrepreneurship (agripreneurship). This implied that students were not aware or knowledgeable about agricultural entrepreneurship, and were likely to not associate their agripreneurial activities, such as commercial poultry production, with being a form of agripreneurship, even though a majority of students in the counterfactual group (56.43%; see Table 8) indicated they kept poultry for commercial purposes. This lack of awareness, knowledge, understanding about agricultural entrepreneurship (agripreneurship) may have been a reason why slightly more than one-in-five students did not respond to this question (see Table 7).

### **Personal characteristics of the adult facilitators/participants in the qualitative interviews**

Regarding the adult facilitators, seven males and one female took part in the personal interviews. They included two agricultural teachers and two entrepreneurship teachers, one from each of the treatment groups' schools; and two extension educators and two farmers. Their ages ranged from 32 to 52 years, with the average age being 41.13 years. The facilitators had a wide range of working experience in their respective fields, ranging from nine years to more than 30. Their professional qualifications varied from associate's degrees to masters' degrees in their respective fields. A majority (five of eight) had postgraduate qualifications.

### **Research objective #2: Compare students' poultry science knowledge depending on the instructional approach used, i.e., a project-based learning approach featuring agripreneurship versus traditional classroom instruction**

All the null hypotheses for objective two were rejected because a statistically significant interaction with a medium effect size was found at  $p < .01$  between students' group and sex; a statistically significant main effect with a large effect size existed at  $p < .01$  between group and students' posttest scores on poultry science knowledge; and, a statistically significant main effect with a medium effect size existed at  $p < .01$  between sexes for students' posttest scores on poultry science knowledge depending on the instructional approach used. However, because the statistically significant interaction [see Appendix J] (Bailey, 2008; Kirk, 2013) could not be disentangled based on the statistical analyses performed, this finding implied that males and females were affected differently depending on their group.



**Research objective #3: Compare students' perceived agripreneurship competencies (skills) depending on the instructional approach used**

No statistically significant interaction existed at  $p < .05$  between group and sex, and no statistically significant differences existed at  $p < .05$  between sexes for students' perceived agripreneurship competencies depending on the instructional approach used. Therefore, because the interaction was not statistically significant, and no statistically significant differences existed between the two sexes, the two related null hypotheses were accepted.

A statistically significant main effect existed at  $p < .01$  between groups for students' perceived agripreneurship competencies depending on the instructional approach used; hence, the related null hypothesis was rejected. Statistically significant differences were revealed for the students' posttest agripreneurship competencies depending on the instructional approach used, i.e., project-based learning featuring agripreneurship versus traditional instruction. Students in the treatment group had higher adjusted marginal mean scores than their peers in the counterfactual group (see Tables, 16, 20, 24, 28, 32, & 36).

The higher adjusted means for students in the treatment group implied that these students benefited from the study's intervention (project-based learning featuring agripreneurship). This finding supports the work of Heinonen and Poikkijoki (2006), Morris et al. (2013a), and Sherman et al. (2008) who argued that entrepreneurial competencies and entrepreneurship in general, similar to other skills, could be honed through practice and education. In this case, the treatment group students had the opportunity to implement what they had learned in the form of a broiler project

enterprises, i.e., experiential learning (Kolb, 1984) occurred, which likely increased their perceived agripreneurship competence, as reflected in the findings. In addition, according to Lackeus (2013) and O'Connor (2013), real-world experiences provide learners with direct entrepreneurial learning opportunities, i.e., *learning through entrepreneurship*. Further, Alsos et al. (2011) posited: “Although some individuals may appear to have strong innate skills, the majority acquire entrepreneurial skills through practice” (p. 15).

**Research objective #4: Compare students’ perceptions regarding their likelihood of becoming agricultural entrepreneurs (agripreneurs) in the future**

No statistically significant interaction at  $p < .05$  between the group and sex of participants was found; therefore, the related null hypothesis was accepted. However, a statistically significant main effect with a small effect size was found at  $p < .01$  between the groups regarding the students’ likelihood to become agricultural entrepreneurs (agripreneurs) in the future, therefore, the related null hypothesis was rejected. Students in the treatment group had higher adjusted marginal mean scores than their peers in the counterfactual group. This finding implied that the students in the treatment group were more likely to become agripreneurs in the future than those in the counterfactual group.

The increased likelihood of students in the treatment group to become agripreneurs is supported by findings reported by various authors (Bird, 1988; Honig, 2004; Peterman & Kennedy, 2003) who argued that exposure to entrepreneurial activities at an early age, including entrepreneurial role models, can influence individuals having more positive attitudes toward entrepreneurship and the likelihood of starting their own ventures in the future. Moreover, “[i]ntentions are the single best predictor of any planned behavior, including entrepreneurship” (Krueger et al., 2000, p. 412). Souitaris et al.

(2007) added that “the best predictor of planned [behavior], particularly when that [behavior] is rare, hard to observe, or involves unpredictable time lags” (p. 568) are an individual’s intentions. An individual’s intentions are central to actualizing a given behavior, as espoused by Ajzen in the theory of planned behavior (Ajzen, 1987, 1991, 2002, 2006; Ajzen & Madden, 1986).

A statistically significant main effect with a small effect size at  $p < .01$  existed for students’ sex and their likelihood to become agricultural entrepreneurs (agripreneurs) in the future, which led to rejection of the related null hypothesis. The adjusted mean scores for males in both the counterfactual and treatment groups were higher than for females in either group. This implied males, irrespective of the group to which they belonged, were more likely to become entrepreneurs than females. This discrepancy in sexes’ likelihood to pursue agripreneurship opportunities has been reported by several researchers who found that males were more likely than females to pursue entrepreneurship opportunities (Adema et al., 2014; Amo, 2014; Chen et al., 1998; Coleman & Robb, 2017; Crant, 1996; Koellinger et al. 2008; Kourilsky & Walstad, 1998; Marlino & Wilson, 2003; Miller, 2017). This was attributed to the fact that women tend to have much lower entrepreneurial self-efficacy, which impacts their entrepreneurial intentions (Kirkwood, 2009; Koellinger, Minniti, & Schade, 2008; Kourilsky & Walstad, 1998; Sweida & Reichard, 2013). Moreover, according to Kickul et al. (2008), “there is some evidence to suggest that girls appear more aware of deficiencies in their skills as potential entrepreneurs than boys” (p. 324).

In addition, fewer women compared to men are likely to prefer being self-employed (Adema et al., 2014) “largely because they don’t see other women

entrepreneurs as role models” (Miller, 2017, para. 5). Souitaris et al. (2007) reported a statistically significant and positive correlation between an individual’s attitude toward and ability for self-employment, including society’s subjective norms regarding such, and the person’s intention to become self-employed. Bandura (1992) and Bandura et al. (2001) affirmed that perceived lower self-efficacy was more likely to impact women’s career aspirations than men, especially in areas that have traditionally been associated with male dominance, including entrepreneurship (Wilson et al., 2007).

**Research objective #5: Describe relationships between students’ characteristics and other selected variables**

This research objective was guided by one null hypotheses. Ho: No statistically significant relationships ( $p < .05$ ) existed between students’ characteristics and other selected variables. This null hypothesis was rejected because, a statically significant association with a small effect size was found at  $p < .05$  between students’ sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future for the treatment group students (see Table 49). More females than males in the treatment group indicated they were either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future after the study (see Table 49). Moreover, the number of females who were *not sure/undecided* about their likelihood of becoming agripreneurs in the future was almost one-half that of the males (see Table 49). This may imply that females in the treatment group benefited more from the intervention and were motivated by their experience implementing an agripreneurship project, and, perhaps, they saw more agripreneurship opportunities as future livelihood possibilities, which inspired them. Further, through implementation of their project, it is likely that the females’ perceived

self-efficacy regarding entrepreneurship improved. To this point, researchers have reported that an individual's perceived entrepreneurial self-efficacy was found to have much stronger influence for teenage girls to become entrepreneurs than boys (Kickul et al., 2008; Wilson et al., 2007). In addition, Wilson et al. (2007) posited: "For teen girls, it appears that their perceptions that they have the abilities or skills to succeed as entrepreneurs are simply more important in considering future career options than for boys" (p. 388).

A statistically significant association with a small effect size was found at  $p < .05$  between students' home location (environment) and their keeping poultry for commercial purposes before the study (see Table 50). A majority of students who lived in *town* compared to those in *rural* areas indicated they did not keep poultry for commercial purposes (see Table 50). In addition, a statistically significant negative and low association existed at  $p < .01$  between students' sex and their enrollment in entrepreneurship before the study. More females than males had previously taken or were currently enrolled in entrepreneurship as a subject (see Table 52). Further, a statistically significant negative and low correlation at  $p < .01$  was found between students' sexes and ages (see Table 55); the older the student, the more likely to be a male.

Regarding the students' posttest poultry science scores, a statistically significant negative and low correlation at  $p < .01$  was found between students' sexes and their posttest scores for poultry science knowledge (see Table 55); the higher the students' post-test scores for poultry science knowledge, the more likely they were male. A statistically significant low and positive relationship was found at  $p < .01$  between students' learning about poultry keeping in school and their agripreneurship knowledge

before the study (see Table 56). Students who indicated learning more about poultry science in school perceived they knew more about agripreneurship. Moreover, a statistically significant low and positive relationship was found between learning about poultry in school and students' likelihood of becoming agripreneurs in the future before the study (see Table 56). This implied that the more learning students perceived to have about poultry keeping, as acquired in school, the more likely they were to intend to become agripreneurs in the future, and the more they perceived knowing about agripreneurship.

**Research objective #6: Describe participants' (students' and adults') experiences in regard to school-based, agripreneurial projects, including the potential of such to improve agricultural practices and livelihoods in their communities, and students' acquisition of agripreneurship, leadership, communication, and teamwork skills**

The conclusions drawn for research objective six are presented in two parts. The first part includes conclusions, *essence*, and implications emerging from the treatment group students' experiences, and the second part presents such in regard to the adult facilitators' experiences.

**Part I: Conclusions and implications based on the treatment group students' experiences.**

The conclusions drawn from the themes emerging from the treatment group students' experiences include improvements in their poultry science knowledge and ability to apply related management practices to their broiler projects. Further, during their training, the students were able to better understand concepts related to agripreneurship and entrepreneurship in general. Moreover, they underwent concrete

experiences, which led to reflecting on, observing, and introspectively examining such to derive meaning and understanding (Corbett, 2007; Holman et al., 1997; Kolb, 1981, 1984, 2014; Kolb & Kolb, 2005, 2009; Mars & Hoskinson, 2009). To this point, Neck and Greene (2011) postulated:

Reflection is particularly important for perplexing experiences, working under conditions of high uncertainty, and problem-solving. As a result, it should not be a surprise that reflection is an integral component of entrepreneurship education and also a way of practicing entrepreneurship. (p. 65)

The training and classroom teaching about agripreneurship and poultry science provided the students in the treatment group opportunities for abstract conceptualization and related comprehension (Kolb, 1981, 1984, 2014; Kolb & Kolb, 2005, 2009) in regard to the theoretical concepts undergirding the two subjects. This, in turn, led to additional active experimentation with and application of their *classroom acquired* knowledge and understanding, i.e., abstract concepts, to a real world-environment (Corbett, 2005, 2007; Mars & Hoskinson, 2009; Morris et al., 2013a; Politis, 2005) in the form of their broiler projects. They wrote business plans for their projects, including market research (Mars & Hoskinson, 2009). Further, the students re-invested their funds from the initial broiler projects funded by the study, which meant continuance of the experiential learning cycle (Kolb, 1984, 2014). Moreover, many of the students indicated they had intentions to develop agripreneurship projects during their school vacations, and encouraged friends in their communities to do the same. The students' intentions to start their own agripreneurship projects is the best predictor that they are likely to become agripreneurs. To this point, several other researchers have affirmed that because entrepreneurship is a

*planned behavior*, the intent of one to become an entrepreneur can be predicted to some extent by assessing an individual's perceived intentions and attitudes toward a venture (Bagozzi, Baumgartner, & Yi, 1989; Buli & Yesuf, 2015; Davidsson, 1995; Kautonen, Gelderen, & Tornikoski, 2013; Şeşen & Pruett, 2014). Although intentions are likely the best predictors of behaviors in the future, not all intentions actually lead to establishing entrepreneurial ventures (Heinonen & Poikkijoki, 2006).

In addition, the student participants acquired technical and other life skills such as improved communication, conflict resolution, consultation, financial management, leadership, mobilization, teamwork, networking, as well as socializing and working with others. The acquisition of life skills by the students in the treatment group during the course of implementing their SAPs is supported by other researchers (Bell & Bell, 2016; Honig, 2004; Hynes & Richardson, 2007; Oosterbeek et al., 2010). Further, project-based learning helps students to acquire problem solving skills in real-life situations, promotes the development of inter-personal communication skills, leadership skills, and also foments high-order thinking, reasoning skills, and teamwork (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000). These skills are likely to be retained and used by students later in life, which may not be the case with some traditional methods of teaching, such as lecturing, that encourage rote memorization with little chance to apply the learned content (Thomas, 2000).

Further, the student participants were engaged in their communities by interacting with other entrepreneurial farmers, including mutual exchange of information to better their respective projects, through networking activities. From this experience, many of the students indicated being inspired by the entrepreneurial farmers, and considered them



their role models. Both the farmers and students learned from each other, and were able to build relationships that continued even when the project ended. According to Bell and Bell (2016), as well as Hynes and Richardson (2007), engaging students with entrepreneurial role models in real-world environments helps them to network; gain practical experience; acquire leadership, report writing, problem solving, crisis management, and decision making skills; and also stands to improve relationships between schools and communities.

Student participants in the treatment group encountered a number of challenges, as outlined in the findings, some of which became learning experiences; for example, when they lost some chicks that jumped into the heat source. According to some students, these challenges helped them to learn to endure and persevere, including how to mitigate risks often associated with agripreneurship, which are important competencies for achieving entrepreneurial success (Bird, 1995; Mitchelmore & Rowley, 2010). Moreover, they also learned management and leadership skills to engage students who seemed less interested and uncooperative during the process of implementing their broiler projects.

The student participants shared a number of recommendations to engage other youth in agripreneurship, including curriculum reform to integrate agriculture and entrepreneurship, as well as exposure to agripreneurship opportunities and role models. These recommendations by the students from the treatment group also have been echoed by various researchers, including Ralph W. Tyler (1949) who urged for the need to focus on the horizontal relationship among subjects in a school's curriculum (as cited in Oliva, 1982 & Taba, 1962). Moreover, curriculum integration promotes unification of learning by merging related themes in the curriculum into a unitary relationship to help students

understand connections between content areas, thereby, increasing the capacity to transfer and apply their understanding to real-life situations (Beane, 1995, 1996; Shoemaker, 1989; Tanner & Tanner, 1980; Vars, 1991, 2001; Wiles, 2005). Further, the idea of engaging students with roles models at an early age also has been supported by other scholars (Bird, 1988; Honig, 2004; Peterman & Kennedy, 2003) who argued that such initiatives are likely to foment positive attitudes among young people toward entrepreneurship, and increase the likelihood of them starting ventures in the future.

Based on these conclusions, the *essence* distilled from analyzing the qualitative findings derived from students who experienced project-based learning involving the raising of broilers is *learning by doing*, as espoused by John Dewey (1951), among many other scholars and teachers. Dewey (1930), in his book *Democracy and Education: An Introduction to the Philosophy of Education*, wrote “. . . give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results” (p. 181). Moreover, Greek philosopher and scientist Aristotle asserted: “For the things we have to learn before we can do them, we learn by doing them” (as cited in Broadie, 1991, p. 140). To this point, a Chinese teacher, philosopher, and politician, Kong Qiu, also known as Confucius or Kung Fu Tzu posited: “*Tell me and I’ll forget; show me and I may remember; involve me and I’ll understand* [emphasis in original]” (as cited in Agon, 2016, p. 147).

## **Part II: Conclusions and implications based on the project’s adult facilitators’ experiences working with the students.**

Based on the themes that emerged from the adult facilitators' experiences working with the students, it was concluded that the students' knowledge and understanding of concepts related to agripreneurship and poultry science improved during the course of the study. Students had hands-on learning experiences developing business plans and implementing their broiler projects. Moreover, students seemed to have understood and retained concepts related to poultry science better than their peers, as noted in one adult facilitator's observation. On this point, Peter elaborated:

If we gave another test today, you will find that members who were still in the project would do better . . . . Those who were in the project had more contribution in class than those who did not have hands-on [experience] with the project, especially when we were handling [teaching] the topic of poultry. The other ones who were in the project had practical knowledge; they would tell you most of the things [answers] than those who did not have [the] hands-on [learning opportunities]. There is a very big change/difference between the two groups.

Peter's observation is supported by findings from other researchers (Mills & Treagust, 2003; Nilson, 2010; Thomas, 2000). They noted the use of active learning approaches that are learner-centered/-centric and permit direct as well as active experimentation by the learners in real-world environments, such as project-based learning, are useful in overcoming many of the shortcomings of the lecture method. According to Blumenfeld et al. (1991), project-based learning promotes in-depth understanding of the subject matter and its applicability to real-world situations. Some of the limitations of the lecture method include limited engagement of the students in the learning process, lack of higher-order thinking, inability to equip learners with behavioral

skills, and lack of direct and active learning experiences in real-world environments (Bligh, 2000; Nilson, 2010).

In the course of working on their projects and interacting with the adult facilitators, the students also learned about various life skills such as budgeting, communication, financial management, leadership, mobilization, networking, organizational planning, and socialization, among others. Moreover, due to a mutual exchange of information, all participants – students and adults – learned from each other, including the teachers who indicated learning about agripreneurship skills and competencies. In addition, some students were able to meet mentors who inspired them, and, as a result, many of the study’s participants, including teachers indicated that they intended to start agripreneurship projects. The adult facilitators as well as community members benefited from interactions with the students, including learning from the students and in the case of the teachers, getting to know the students better outside the classroom, which made their teaching easier. These findings speak to the positive outcomes that can be associated with Youth-Adult partnerships (Y-APs), including their potential to contribute to community development and improve livelihoods (Akiva & Petrokubi, 2016; Camino, 2005; Weybright et al., 2016; Zeldin & Petrokubi, 2008). For example, several authors reported that Y-APs accord young people opportunities to learn a variety of life skills from adults, such as conflict resolution, decision making, effective communication practices, policy formulation, and teamwork, among others (Akiva & Petrokubi, 2016; Camino, 2005; Weybright et al., 2016; Zeldin & Petrokubi, 2008). Moreover, through interactions and the exchange of ideas, fresh insights are developed on

a variety of issues, which are likely to lead to the development of new knowledge to solve existing or emerging challenges faced by communities (Mitra, 2008).

The adult facilitators also indicated they experienced some challenges during the course of working with the students, including limited time and schedule conflicts with established school programs, large numbers of students, financial constraints, and lack of cooperation from some farmers, among others. Some of these challenges also were reported by Blumenfeld et al. (1991) and Nilson (2010) who found that even though project-based learning requires a substantial amount of time and resources to implement, the benefits arising from it may be enormous. However, the adult participants suggested that these challenges could be overcome by harmonizing school programs so that students have enough time to engage in extracurricular activities; making appropriate arrangements to involve farmers, schools, and other stakeholders so they understand their roles in and the importance of engaging students with their communities; and urging the government of Uganda to commit more resources to schools so they are in a better position to fund students' projects.

The *essence* distilled by analyzing the qualitative findings derived from the adult facilitators' experiences working with the students was *the power of partnerships in promoting learning and skill acquisition by youth such that the adult partners themselves are also positively impacted while lifting their communities*. Partnerships between youth and adults are mutually beneficial, and both parties learn from one another (Camino, 2000; Zeldin et al., 2013; Zeldin & Petrokubi, 2008), which was experienced by the adult facilitators in this study. Moreover, such partnerships have been instrumental in helping youth engage in community initiatives and in bridging the gap between youth, adults, and

other stakeholders (Libby, Rosen, & Sedanaen, 2005), including providing platforms for young people to express themselves on issues that concern them, while adults with mutual interests provide support and guidance (Zeldin et al., 2015). To this point, a Greek-Roman philosopher Plutarch also known as Lucius Mestrius Plutarchus posited: “The mind is not a vessel to be filled, but a fire to be kindled” (as cited in Nowlan, 2017, p. 45); therefore, the need exists for adults to work with young people through mentor-mentee relationships. To this aim, the Greek philosopher Plato added:

Do not train a child to learn by force or harshness; but direct them to it by what amuses their minds, so that you may be better able to discover with accuracy the peculiar bent of the genius of each. (as cited in Cleveland, 2004, p. 91)

### **Section III**

#### **Recommendations for Future Practice**

Based on the findings of this study, the following recommendations are offered for future practice.

Though curriculum reforms are being undertaken by the Ministry of Education and Sports in Uganda, through the National Curriculum Development Centre [NCDC], the findings of this study support and reinforce the need to ensure such reforms are undertaken expeditiously. The focus of these reforms should be to integrate related or potentially complementary subjects, such as agriculture and entrepreneurship, with a focus on skills development and practical application of subject matter, including students using acquired skills to address Uganda’s current unemployment crisis. The World Bank (2013) predicts the number of jobless youth to reach 10 million in Uganda by 2020.

The lack of enough time to work on their projects and also interact with farmers was one of the challenges identified by participants in this study. Therefore, curriculum integration at the Ordinary Level could help reduce duplication of efforts and ensure more time is devoted by teachers to engage and mentor students as they work on their SAPs, which would stand to also improve the students' self-efficacy (Bandura, 1977, 1986, 1988; Wood & Bandura, 1989) regarding agripreneurship.

In addition, engaging students in project-based learning approaches has the potential to promote students' acquisition of life skills such as communication, leadership, problem solving, and teamwork, among others, as was the case in this study. Therefore, teachers should consider integrating such approaches in their teaching to increase the likelihood of students' better understanding agricultural and entrepreneurial concepts and apply such to solve challenges they are likely to encounter in their communities. This may be achieved by designing projects around problems that students are likely to face in the future (Blumenfeld et al., 1991), including the need for employment and livelihood provision.

Further, as the NCDC works to reform and integrate the existing curriculum in Uganda, professional development opportunities should be provided to teachers to ensure they understand the benefits and challenges that could arise from such integration (Banks & Stave, 1998; Mukembo & Edwards, 2015; Pearson et al., 2010). Further, other adult stakeholders, including parents, should be involved to learn their views and to provide input during development of the new curriculum.

As was noted by several of the adult facilitators, in promoting experiential learning opportunities within schools using approaches such as project-based learning,

the government of Uganda, through its Ministry of Education and Sports, should allocate sufficient funds for students to successfully implement projects, including agripreneurial ventures. Moreover, they need to prepare more human capital to reduce the student–teacher ratio and better ensure proper supervision and timely feedback for the students. In addition, proper arrangements need to be developed, involving farmers, schools, and other stakeholders, so they understand their roles in and the importance of engaging students with their communities, as was suggested by the adult facilitators in this study. The benefits of Y-APs have been described by other researchers (Camino, 2000; Zeldin et al., 2013; Zeldin & Petrokubi, 2008).

The need exists to promote more awareness about agripreneurship and related opportunities to students in schools, as well as communities. To this point, in the words of Steve Jobs “. . . People don't know what they want until you show it to them” (as cited in Isaacson, 2011, p. 567). Therefore, if we are to inspire the youth to pursue agripreneurship and related opportunities to help ensure food security for a global population approaching almost 10 billion people by 2050 (Department of Economic and Social Affairs – United Nations, 2017), students must be exposed to prosperous livelihood opportunities in the agricultural sector. It is after students recognize these opportunities and evaluate them to be worthwhile, that they are likely to pursue such, which may have *spillover effects* in their communities leading to improved livelihoods and enhanced food security.

Further, in the process of classroom instruction, teachers should relate the topics taught with agripreneurial opportunities that could be pursued by students. This may be important especially to those students who have difficulty relating what is taught in their



courses to agripreneurship and the livelihood opportunities it represents, as was the case for some of the students in this study. For example, even though more students indicated to have kept poultry for commercial purposes than not, a majority indicated they had *little, very little, or none* in regard to knowledge or understanding about agripreneurship. This implied they were not associating their keeping birds for commercial purposes with that being an agripreneurial enterprise.

Further, the need exists to provide an enabling environment to promote an agripreneurial culture among students. To this point, Chen et al. (1998) posited:

An environment perceived to be more supportive will increase entrepreneurial self-efficacy because individuals assess their entrepreneurial capacities in reference to perceived resources, opportunities, and obstacles existing in the environment. Personal efficacy is more likely to be developed and sustained in a supportive environment than in an adverse one. A supportive environment is also more likely to breed entrepreneurial success, which in turn further enhances entrepreneurial self-efficacy. (p. 296)

This could be done by establishing idea incubation sites at the schools, or connecting students with adults in their communities who are willing and able to mentor students through Y-APs (Camino, 2000; Zeldin et al., 2013; Zeldin & Petrokubi, 2008). As was the case with the treatment group's students and adult facilitators, such partnerships have the potential to influence students' career aspirations and attitudes toward agripreneurship, as well as provide personal growth and development for the adults.

In trying to equip students with entrepreneurship skills for *job creation*, instead of focusing on graduates of high schools and universities, as has been the case with the

*Skilling Uganda* initiative (MoES, 2011; Namuli-Tamale, 2014), the government of Uganda should focus more on ensuring that, by the time students complete the Ordinary Level, they have the practical skills and related experiences needed to become entrepreneurs. Exposure to entrepreneurial activities at an early age, including entrepreneurial role models, can influence individuals having positive attitudes toward entrepreneurship and increase the likelihood of their starting such ventures (Bird, 1988; Honig, 2004; Peterman & Kennedy, 2003).

Further, though findings from this study showed that males, irrespective of study group, were more likely to become entrepreneurs than their female counterparts, a statistically significant association was also found between students' sex and their intent to become agripreneurs in the future in regard to the treatment group (see Table 49). More female students than males indicated being either *likely* or *highly likely* to become agripreneurs. Moreover, the number of females who were *not sure/undecided* about their likelihood of becoming agripreneurs in the future was fewer when compared to the males (see Table 49). This implied that females more than males had their perceptions toward becoming agripreneurs positively changed as a result of participation in the broiler projects. Therefore, more project-based learning approaches should be used when teaching female students about agripreneurship to increase their perceived self-efficacy and likelihood of becoming agripreneurs. In support, Kickul et al. (2008) and Wilson et al. (2007) found that an individual's perceived entrepreneurial self-efficacy had a much stronger influence on teenage girls than boys in regard to becoming entrepreneurs.

The need also exists to engage more female agripreneurial role models to mentor young girls to improve their perceived self-efficacy in regard to agripreneurship. When

females in this study interacted with one of the female entrepreneurial farmers, they reported being inspired and motivated to follow in her footsteps. Without more female role models to inspire young women to pursue entrepreneurship, a sector traditionally dominated by men, it is likely we will continue to see fewer female entrepreneurs, a phenomenon that Coleman and Robb (2017) attributed to low self-efficacy and cultural barriers. To this point, the researchers reported:

[L]ower levels of self-efficacy and confidence [among women] than men, and that the paucity of female role models is a big problem for would-be entrepreneurs.

While many of the challenges women face are structural in nature, ‘others come in the form of cultural or attitudinal barriers.’ (Coleman & Robb, 2017, para. 6)

The government of Uganda should encourage youth to form cooperatives around common interests to promote agriprenurship. It is through such cooperatives that the government can identify their needs and provide the necessary assistance, including training and grants. Moreover, by working together as a team in these cooperatives, the youth are likely to inspire one another to achieve their goals through collective responsibility and accountability.

The lack of capital and high cost of inputs, especially feed, were challenges experienced by students when re-investing funds to continue raising broilers. Therefore, the government of Uganda should provide grants or loans and subsidize agricultural inputs to youth interested in venturing into agriprenurship. Further, initiatives should be made to provide government-secured loans to such youth who do not have sufficient collateral to receive loans from banks. Moreover, because agriprenurship is considered a high-risk venture many banks tend to not provide loans for agriculture projects and, if

they do, the interest rates are usually considered exorbitant. The provision of government-secured loans could help to mitigate this challenge.

### **Recommendations for Future Research**

Because of a statistically significant interaction between students' group and sex regarding research objective two, the interaction could not be disentangled [see Appendix J] (Bailey, 2008; Kirk, 2013); thus, these results were inconclusive. The findings showed that males and females were affected differently based on their group. Therefore, additional research should be conducted to establish the impact of using various teaching approaches on students' performance by sex in regard to their acquisition of poultry science knowledge. For example, one question researchers could seek to answer is: Do males and females differ on their posttest scores based on one teaching approach compared to another?

Further, although the study's findings showed a statistically significant main effect with a small effect size for students' sex and their likelihood to become agricultural entrepreneurs (agripreneurs) in the future, males, regardless of group, were more likely to become agripreneurs than females (see Tables 39 & 40). But a statistically significant association with a small effect size was also found between students' sex and their intent to become agricultural entrepreneurs (agripreneurs) in the future for the treatment group (see Table 49). More females indicated they were either *likely* or *highly likely* to become agricultural entrepreneurs (agripreneurs) in the future (see Table 49). This implied that females in the treatment group benefited more from the intervention, i.e., a project-based learning approach featuring agripreneurship, than their male peers. This finding warrants additional research to better understand how experiential learning opportunities involving

*hands-on, minds-on* approaches, such as project-based learning, impact females' perceptions in regard to pursuing agripreneurship opportunities. The learning context, i.e., a poultry project and specifically broilers, versus other possibilities, such as goats, gardens, or laying hens, also should be investigated.

Further, this finding left the researcher conjecturing whether the female students' self-efficacy with regard to agripreneurship had improved as a result of the intervention, i.e., project-based learning involving agripreneurship such as the raising of broilers. Additional studies are needed to examine this uncertainty. Kickul et al. (2008) reported that "self-efficacy seemed to have a stronger effect on entrepreneurial interest for girls than for boys, and that having an entrepreneurial mother or father had a significant and positive effect on girls' (but not boys') levels of the entrepreneurial interest" (p. 321).

Similar interventions, i.e., a project-based learning approach featuring agripreneurship, should be conducted with other high school students in Uganda and in other countries in Sub-Saharan Africa to determine the impact of such interventions in promoting agripreneurship among the youth. The International Labor Organization (2014) has suggested that agripreneurship has the potential to reduce youth unemployment, promote food security, and improve livelihoods, while improving the economies of local communities.

The need also exists to conduct longitudinal or follow up studies with students who were participants in this study to determine how many actually became agripreneurs, and also to evaluate how the knowledge and skills they acquired from this experience impacted them and their communities. Such investigations could involve cohort or panel studies (Creswell, 2012).

Findings of this study indicated students in the treatment group had improvements in their poultry science knowledge, as well as their understanding of concepts related to agripreneurship. Moreover, they acquired a variety of technical and life skills, such as conflict resolution, leadership, opportunity recognition, teamwork, and writing business plans, from their project-based learning experiences. Therefore, additional research should be conducted to examine the impact of other high-impact educational practices on transformative learning, especially in regard to students' acquisition of technical and life skills to solve challenges they are likely to encounter in their communities. High-impact educational practices involve student-centered/-centric instruction, including inquiry-guided learning approaches such as case study method, problem-based learning, role-playing, and service-learning, among others (Nilson, 2010).

## **Section IV**

### **Discussion**

Regarding research objective two, a statistically significant interaction was found between students' group and sex with a medium effect size (see Table 11), which could not be disentangled [see Appendix J] (Bailey, 2008; Kirk, 2013) to reach a final conclusion. However, it was noted that males in the counterfactual group had higher adjusted marginal and observed mean scores (see Table 12) on poultry science knowledge than females in the same group (see Table 12). And, females in the treatment group had higher adjusted marginal and observed mean scores (see Table 12) on the posttest of poultry science knowledge than did males in the same group (see Table 12). Therefore, could it be that female students in the treatment group benefitted more from

the intervention than their male peers as indicated by the higher adjusted mean scores? Related literature suggests that may be the case (Boaler, 1997; Kilgore, Atman, Yasuhara, Barker, & Morozov, 2007; Thomas, 2000; Vaz, Quinn, Heinricher, & Rissmiller, 2013). Kilgore et al. (2007) reported that female students understood engineering concepts better than their male peers when taught using a contextualized approach. Moreover, according to Boaler, “girls seem to prefer being taught using methods that stress understanding vs. memorization and learning procedures” (as cited in Thomas, 2000, p. 21). In addition, an evaluation by Vaz et al. (2013) found female engineering students who participated in a project-based learning project reported a much higher long-term positive impact from their experience than their male peers.

A majority of students in this study who lived in town compared to those residing in rural areas indicated they did not keep poultry for commercial purposes (see Table 50). Could it be because they did not have enough space to raise poultry, or was it because ordinances existed that prevented them from keeping birds within their urban living locations?

A statistically significant low and positive relationship was found between students’ learning about poultry keeping in school and their agripreneurship knowledge before the study (see Table 56). Could this mean that in the course of learning about poultry keeping at school, these students were able to more readily associate agripreneurship opportunities with the poultry sector? If the curriculum was the same for all students, were different teacher behaviors demonstrated that accounted for this relationship or might other variables have been responsible?

Further, a statistically significant low and positive relationship was found between learning about poultry in school and students' likelihood of becoming agripreneurs in the future before the study. Does this imply that these students were able to better identify agripreneurship opportunities to pursue in the poultry sector; hence, their greater intended likelihood to become agripreneurs? If yes, what variables created their predispositions?

Based on the journal entries submitted by the students in the treatment group, the female students submitted more journal entries ( $n = 58$ ) compared to their male counterparts ( $n = 25$ ). This discrepancy in journal submissions left the researcher wondering whether the female students were more motivated to implement and journal their experiences than their male peers.

Adult facilitators and student leaders indicated some students were not as enthusiastic about the broiler projects as others. Would other projects give students more preferred choices in which to apply their learning? In addition, was this lack of enthusiasm associated with the use of agriculture as a form of punishment to correct student misbehavior (Mukembo et al., 2014)?

Further, if other high impact, student-centered teaching approaches such as problem-based learning or the case method were used, would the results have been different? More research should examine such approaches.

The adult facilitators in this study were incentivized to monitor and mentor students in the treatment group with their broiler projects, including training in agripreneurship. Would similar results have been found if the adult facilitators had not been incentivized to participate?



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## APPENDICES

APPENDIX A

Institutional Review Board Approval

# Institutional Review Board Approval

**Oklahoma State University Institutional Review Board**

Date: Tuesday, February 09, 2016 Protocol Expires: 10/13/2018

IRB Application No: AG1545

Proposal Title: Project-based learning: Equipping youth with valuable life skills while linking secondary agricultural education to communities for improved livelihoods

Reviewed and Processed as: Exempt  
Modification

Status Recommended by Reviewer(s) Approved

Principal Investigator(s):

Stephen C. Mukembo  
911 Tobacco Road  
Stillwater, OK 74075

Michael Craig Edwards  
456 Ag Hall  
Stillwater, OK 74078

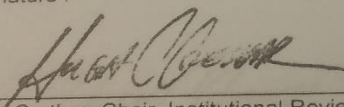
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The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office MUST be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

Modification to ask student working on the poultry project to keep a journal of what they are learning about their projects, including the training received. Increase the study sample to 280.

Signature : 

Hugh Crethar, Chair, Institutional Review Board

Tuesday, February 09, 2016  
Date

Oklahoma State University Institutional Review Board

Date: Wednesday, October 14, 2015  
IRB Application No: AG1545  
Proposal Title: Project-based learning: Equipping youth with valuable life skills while linking secondary agricultural education to communities for improved livelihoods

Reviewed and Processed as: Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 10/13/2018

Principal Investigator(s):  
Stephen C. Mukembo  
911 Tobacco Road  
Stillwater, OK 74075  
Michael Craig Edwards  
456 Ag Hall  
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

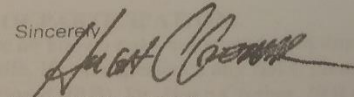
The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Hugh Crethar, Chair  
Institutional Review Board

CONSENT FORM FOR TEACHERS, FARMERS, AND EXTENSION AGENTS  
OKLAHOMA STATE UNIVERSITY

**PROJECT TITLE:** Project-based Learning: Equipping Youth with Valuable Life Skills while Linking Secondary Agricultural Education to Communities for Improved Livelihoods

**INVESTIGATORS:** Stephen C. Mukerbo and Dr. M. Craig Edwards, Oklahoma State University

**PURPOSE:** The primary purpose of the study is to evaluate how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to real-world environments. This could equip students with valuable life skills, such as agripreneurship to enhance self-reliance and improve their livelihoods. A another purpose is to assess students', teachers', extension workers', and farmers' experiences with regard to the use of school-based agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities. To achieve the purpose, eight objectives guide this study:

- a) describe participants personal characteristics;
- b) evaluate how project-based learning can be used to equip students with life skills such as agripreneurship, leadership, communication, and teamwork, while they also learn about the many career opportunities available in agriculture;
- c) compare differences in knowledge acquisition between students who have been taught only in the classroom versus those who experience project-based learning and field trips involving agripreneurship;
- d) evaluate students perceived agripreneurship competencies (skills) before and after implementing an agripreneurship project;
- e) evaluate the likelihood of students to start agricultural entrepreneurship projects when they finish school;
- f) determine the relationship between students' prior agricultural experiences and their self-reported competencies/skills in agripreneurship;
- g) evaluate students' lived experiences with regard to the use of school-based, agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities;
- h) evaluate teachers', farmers', and extension workers' experiences with regard to the use of school-based, agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities.

**PROCEDURES** This interview is semi-structured and will last for about 45 minutes to one hour. By signing the consent form, you agree to participate in the study. You are free to opt out of this study at any time. In the study, your identity will remain confidential and no identifying information will appear anywhere in its report. Please tell us your, name, age, number of years of you have been working on in agriculture. We would like you to share with us your experiences of working with and mentoring students trying to implement a project similar to what you do or assist with either as a teacher or extension agent.

**RISKS OF PARTICIPATION:**

There are no known risks associated with this project, which are greater than those ordinarily encountered in daily life. If you experience any risks, please contact the Oklahoma State University Institutional Review Board (IRB), Dr. Hugh Crethar, IRB Chair, at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu.

10-14-15  
10-13-18  
AG-1545

**BENEFITS OF PARTICIPATION:**

There are no direct benefits to you as a participant in this pilot study. But we hope that the findings of this pilot study will help us to make recommendations to various stakeholders on how project-based learning could be best used to equip youth with entrepreneurial skills in agriculture, preparing them to be job creators not job seekers. This will help reduce the high levels of unemployment among the youth and increase food production to ensure food security for the community. Further, we hope that the results of this study can create awareness on the use of projects to help youth acquire practical skills, and to use what they learn in class in real-world settings while connecting with people in their communities.

**CONFIDENTIALITY:**

Your confidentiality is very important to us. Please be informed that throughout this study, no identifiable information about you will be reported. The records will be kept private and secured on a computer, which is password protected and only accessible to the researchers. Pseudo names will be used in cases where direct quotations are made in reference to your contributions. The stored data will be destroyed after a period of one year as soon as the study is completed.

**COMPENSATION:**

There is no compensation associated with this study. Your participation is voluntary with no direct benefits.

**CONTACTS:**

You may contact any of the researchers at the following addresses and telephone numbers, should you desire to discuss your participation in the study and/or request information about the results of the study: Dr. M. Craig Edwards, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405)-744-8141; craig.edwards@okstate.edu. Or, Stephen C. Mukembo, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405) 589-4378; stephen.mukembo@okstate.edu. If you have questions about your rights as a research volunteer, you may contact Dr. Hugh Crethar, IRB Chair of the Oklahoma State University Institutional Review Board (IRB), at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377; irb@okstate.edu

**PARTICIPANT RIGHTS:**

I understand that my participation is voluntary, there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this study at any time without penalty.

**CONSENT DOCUMENTATION:**

I am aware of what I will be asked to do, including the benefits of my participation. I also understand the following statements:

I agree to be video and audio recorded.

I affirm that I am 18 years of age or older.

I have read and fully understand this consent form.

I voluntarily agree to consent to participate in this study by appending my signature below.

Name of participant \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

10-14-15  
10-13-18  
AG-15-45

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods  
Head Teacher (Principal) Permission Request letter**

Dear Madam,

**Re: Request to conduct a study with students of agriculture at your school**

I am Mukembo Stephen, a teacher of agriculture by profession but currently a doctoral student of agricultural education at Oklahoma State University, USA.

I humbly request you allow me to conduct a study with students of agriculture at your school. This study seeks to evaluate how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to real-world environments. This could equip students with valuable life skills, such as agripreneurship to enhance self-reliance and improve their livelihoods. The students will be asked questions to evaluate how much agricultural content they know about the project before they implement it, and after the projects implementation. Other questions will require students to provide their age and class. The questionnaire will be offered to all students of agriculture who have volunteered to participate in the project at your school.

A research assistant (Mr. Zirintusa Andrew or Mr. Isooba James) will work with your agriculture teachers to ask students to participate in the study, administer the questionnaires, and collect the questionnaires.

A student's identity will remain confidential and the results will be reported in aggregate form. The results of this study will be used only for research purposes and will not in any way affect students' grades. Further, please be advised that all the information collected during this study will be used solely for research and all the questionnaires will be destroyed at the end of the study.

Your students' participation in this research project is voluntary and you can request them to be withdrawn from the research at any time with no penalty.

You may contact any of the researchers at the following addresses and telephone numbers, should you desire to discuss your students' participation in the study and/or request information about the results of the study: Dr. M. Craig Edwards, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405)-744-8141; craig.edwards@okstate.edu. Or, Stephen C. Mukembo, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405) 589-4378; stephen.mukembo@okstate.edu. If you have questions about your rights as a research volunteer, you may contact Dr. Hugh Crethar, IRB Chair of the Oklahoma State University Institutional Review Board (IRB), 223 Scott Hall, Stillwater, OK 74078, 405-744-3377; irb@okstate.edu

If you agree to your students' participation in this research project, my research assistant, Mr. Zirintusa Andrew or Mr. Isooba James, will contact you to arrange a day and time to administer the study's questionnaire.

Sincerely

Stephen Mukembo

PhD. Student, Agricultural Education

10-19-18  
10-13-18  
AG-15-4

Oklahoma State University, USA

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10-13-  
AG-15-



Project-based Learning: Equipping Youth with Valuable Life Skills while Linking Secondary  
Agricultural Education to Communities for Improved Livelihoods  
GUARDIAN (HEADMASTER) PERMISSION FORM

Dear Guardian,

Your agriculture students have been selected to participate in a research study being conducted by researchers from Oklahoma State University, USA. This study seeks to evaluate how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to real-world environments. This could equip students with valuable life skills, such as agripreneurship to enhance self-reliance and improve their livelihoods. Each student will be asked questions to evaluate how much agricultural content they know about the entrepreneurial project they (members of YFC) have selected to implement. This will be done before and after they have implemented the project. Other questions will require the student to provide his or her age and class. Further, focus group interviews will be conducted with your students. The students' identity will remain confidential and used for evaluation purposes only during the pre- and post-test evaluations. The data will be reported in aggregate form only. The results of this study will be used only for research purposes and will not in any way affect your students' school grades. Further, please be advised that no information collected during this research will be released to the school or any other persons. All information collected will be destroyed at the end of the study. Your students' participation in this research project is voluntary and you may request that he or she be withdrawn from the study at any time with no penalty.

You may contact any of the researchers at the following addresses and telephone numbers, should you desire to discuss your students' participation in the study and/or request information about the results of the study: Dr. M. Craig Edwards, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405)-744-8141; [craig.edwards@okstate.edu](mailto:craig.edwards@okstate.edu). Or, Stephen C. Mukembo, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405) 589-4378; [stephen.mukembo@okstate.edu](mailto:stephen.mukembo@okstate.edu). If you have questions about your rights as a research volunteer, you may contact Dr. Hugh Crethar, IRB Chair of Oklahoma State University Institutional Review Board (IRB), 223 Scott Hall, Stillwater, OK 74078, 405-744-3377; [irb@okstate.edu](mailto:irb@okstate.edu)

If you agree to your students' participation in this study, please complete and sign the attached consent form and give it to my research assistant.

Sincerely

Stephen Mukembo

PhD. Student, Agricultural Education

Oklahoma State University, USA

10-14-15  
10-13-18  
AG-1545

**CONSENT DOCUMENTATION:**

I have been fully informed about the procedures listed here. I am aware of what my students and I will be asked to do, and the benefits of my participation. I also understand the following statements:

I have read and fully understand this permission form. I sign it freely and voluntarily.

A copy of this form will be given to me. I hereby give permission for my agricultural students to participate in this study.

\_\_\_\_\_  
Signature of Legal Guardian /Head Teacher

\_\_\_\_\_  
Date

10-14-15  
10-13-18  
R615-45

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods**

**Script**

Good morning, my name is Andrew Zirintusa. I am a teacher of agriculture at a different secondary school, Makerere College, and my colleague is Mr. James Isooba is also an agriculture teacher at Iganga Secondary school. We are very glad to be with you today!!!

We are here to ask you to participate in a study we're doing to better understand how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to the real-world. This could equip students with valuable life skills, such as agriprenurship to enhance self-reliance and improve their livelihoods. Your head teacher and agriculture teacher are in support of this project.

The questionnaire has three parts. The first section is aimed at assessing competencies in agricultural entrepreneurship, the second section is about general concepts in agriculture that are related to the entrepreneurial agricultural project that we would intend to help you implement. The last section includes a few questions about yourself and it will help us to know more about agriculture students generally. You will be provided with a pen which you will use to answer the questions. This pen will become yours at the end of the study as a token of our appreciation.

Your participation in this study is strictly voluntary but it would be greatly appreciated by us, and by the College of Agricultural Sciences and Natural Resources at Oklahoma State University in the USA.

In no way will your answers affect your school grades!!!

But we do hope that this study will help us to make recommendations on how project-based learning could be best used to equip youth with entrepreneurial skills in agriculture, preparing them to be job creators and not job seekers. This will help reduce the high levels of unemployment among the youth and increase food production to ensure food security for the community. Further, we hope that the results of this study creates awareness on the use of projects to help youth acquire practical skills to use what they learn from class in real-world settings while connecting with people in the community.

If you are going to participate, please read the consent information form and sign it before you start completing the questionnaire. As stated on that form, your answers will be entirely confidential and anonymous. The approximate time to complete this questionnaire is 45 minutes.

When you begin filling in the questionnaire, please write directly on it. Please, remember, we are asking for your honest opinions. Please, hand back the completed questionnaire to us as you finish.

If there is a question that you do not understand, please raise your hand and we will be glad to come make the clarification for you.

Are there any questions? (Answer questions as needed.)

\_\_\_\_\_  
Please, begin.

10-14-15  
10-13-18  
AG-15-45

Project-based Learning: Equipping Youth with Valuable Life Skills while Linking Secondary Agricultural Education to Communities for Improved Livelihoods

Student Consent Form

Dear Student,

We are doing a study to evaluate how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to real-world environments. This can equip students with valuable life skills, such as agripreneurship to enhance self-reliance and improve their livelihoods. We are assisting researchers at Oklahoma State University in the USA. Your head teacher and agriculture teacher are aware of this study.

Please understand that you do not have to do this. You do not have to respond any questions that you do not wish to answer. You may stop at any time and go back to your classroom.

Please check one of the following boxes

- I consent to participate in this study.
- I do not consent to participate in this study.

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

10-14-15  
10-13-18  
AG-15-45

## CONSENT FORM FOR TEACHERS, FARMERS, AND EXTENSION AGENTS

### OKLAHOMA STATE UNIVERSITY

**PROJECT TITLE:** Project-based Learning: Equipping Youth with Valuable Life Skills while Linking Secondary Agricultural Education to Communities for Improved Livelihoods

**INVESTIGATORS:** Stephen C. Mukembo and Dr. M. Craig Edwards, Oklahoma State University

**PURPOSE:** The primary purpose of the study is to evaluate how project-based learning can be used by agricultural teachers to enhance students' understanding and applications of agricultural concepts taught in their classrooms to real-world environments. This could equip students with valuable life skills, such as agripreneurship to enhance self-reliance and improve their livelihoods. A another purpose is to assess students', teachers', extension workers', and farmers' experiences with regard to the use of school-based agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities. To achieve the purpose, eight objectives guide this study:

- 1) describe participants personal characteristics;
- 2) evaluate how project-based learning can be used to equip students with life skills such as agripreneurship, leadership, communication, and teamwork, while they also learn about the many career opportunities available in agriculture;
- 3) compare differences in knowledge acquisition between students who have been taught only in the classroom versus those who experience project-based learning and field trips involving agripreneurship;
- 4) evaluate students perceived agripreneurship competencies (skills) before and after implementing an agripreneurship project;
- 5) evaluate the likelihood of students to start agricultural entrepreneurship projects when they finish school;
- 6) determine the relationship between students' prior agricultural experiences and their self-reported competencies/skills in agripreneurship;
- 7) evaluate students' lived experiences with regard to the use of school-based, agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities;
- 8) evaluate teachers', farmers', and extension workers' experiences with regard to the use of school-based, agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities.

**PROCEDURES** This interview is semi-structured and will last for about 45 minutes to one hour. By signing the consent form, you agree to participate in the study. You are free to opt out of this study at any time. In the study, your identity will remain confidential and no identifying information will appear anywhere in its report. Please tell us your, name, age, number of years of you have been working on in agriculture. We would like you to share with us your experiences of working with and mentoring students trying to implement a project similar to what you do or

assist with either as a teacher or extension agent.

**RISKS OF PARTICIPATION:**

There are no known risks associated with this project, which are greater than those ordinarily encountered in daily life. If you experience any risks, please contact the Oklahoma State University Institutional Review Board (IRB), Dr. Hugh Crethar, IRB Chair, at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu.

**BENEFITS OF PARTICIPATION:**

There are no direct benefits to you as a participant in this pilot study. But we hope that the findings of this pilot study will help us to make recommendations to various stakeholders on how project-based learning could be best used to equip youth with entrepreneurial skills in agriculture, preparing them to be job creators not job seekers. This will help reduce the high levels of unemployment among the youth and increase food production to ensure food security for the community. Further, we hope that the results of this study can create awareness on the use of projects to help youth acquire practical skills, and to use what they learn in class in real-world settings while connecting with people in their communities.

**CONFIDENTIALITY:**

Your confidentiality is very important to us. Please be informed that throughout this study, no identifiable information about you will be reported. The records will be kept private and secured on a computer, which is password protected and only accessible to the researchers. Pseudo names will be used in cases where direct quotations are made in reference to your contributions. The stored data will be destroyed after a period of one year as soon as the study is completed.

**COMPENSATION:**

There is no compensation associated with this study. Your participation is voluntary with no direct benefits.

**CONTACTS:**

You may contact any of the researchers at the following addresses and telephone numbers, should you desire to discuss your participation in the study and/or request information about the results of the study: Dr. M. Craig Edwards, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405)-744-8141; craig.edwards@okstate.edu. Or, Stephen C. Mukembo, Agricultural Hall, Department of Agricultural Education, Communications and Leadership at Oklahoma State University, Stillwater, OK 74078, (405) 589-4378; stephen.mukembo@okstate.edu. If you have questions about your rights as a research volunteer, you may contact Dr. Hugh Crethar, IRB Chair of the Oklahoma State University Institutional Review Board (IRB), at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377; irb@okstate.edu

**PARTICIPANT RIGHTS:**

I understand that my participation is voluntary, there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this study at any time without penalty.

**CONSENT DOCUMENTATION:**

I am aware of what I will be asked to do, including the benefits of my participation. I also understand the following statements:

I agree to be video and audio recorded.

I affirm that I am 18 years of age or older.

I have read and fully understand this consent form.  
I voluntarily agree to consent to participate in this study by appending my signature below.

Name of participant \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

## APPENDIX B

### Study's Pretest Instrument



Name: \_\_\_\_\_ Stream: \_\_\_\_\_

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods**

**Instrument**

**Part One:**

**Agricultural Students' Agricultural Entrepreneurship (*Agripreneurship*)  
Competence**

**Directions:** In the table below is a list of statements used to describe entrepreneurial abilities of individuals. Please indicate the level to which you Agree/Disagree with each statement describing your entrepreneurial abilities by ticking in the corresponding column.

		Strongly Disagree	Disagree	Neutral/ Undecided	Agree	Strongly Agree
1	I am able to recognize business opportunities in agriculture					
2	I am able to evaluate an agricultural opportunity and determine if it is viable					
3	I seek advice and information about the agriculture project I want to implement before its actual implementation					
4	I can find creative ways to develop agricultural projects for income generation					
5	I can develop innovative and creative ways to ensure success of agricultural projects					
6	I am able to develop mental models (plans) on how to turn an agriculture opportunity into a business					

7	I do not fear taking calculated risks on new agricultural ventures					
8	I often take calculated risks on new ventures (business ideas)					
9	I am able to bear the uncertainties in my agricultural project(s)					
10	I often identify risks before or during implementation of a new entrepreneurial project					
11	I can transform my mental models (plans) into action					
12	I am able to successfully implement my agricultural project(s)					
13	I can manage an agricultural project to attain its intended goals/objectives					
14	I take challenges as learning opportunities					
15	I always plan and schedule activities for my agricultural project (s)					
16	I blame others if my project(s) fail					
17	I am always confident that my agricultural projects will be successful					
18	I take responsibility for any outcome of the agricultural venture(s) or project(s) I do					
19	When working on an agricultural venture, I plan and think about the future					
20	I strive to ensure sustainability of my agricultural venture(s)/project(s)					
21	I make rational decisions which align with the					

	future goals of my project(s)					
22	I am able to look for ways to market my agricultural product(s)					
23	I am able to brand and set the right price(s) for my agricultural product(s)					
24	I am able to determine the type of agricultural product(s) that my customers want					
25	I can convince others to buy my agricultural product(s)					
26	I have the skills required to convince someone to fund my agricultural entrepreneurship idea(s)/project(s)					
27	I feel comfortable working with others on agricultural projects					
28	If the need arises, I am able to make independent decisions for the success of my agricultural project(s)					
29	I consult with other individuals who are knowledgeable about the agricultural project(s) I am pursuing					
30	I am able to overcome failures resulting from agricultural projects and start all over again					
31	I do not easily give up when faced with challenges involving my idea(s)/project(s)					
32	I like being in control of my agricultural project(s)					

33	I like to influence others to achieve the goals of my agricultural project(s)					
----	---	--	--	--	--	--

How likely are you to become an agricultural entrepreneur after school? (Mark the appropriate box that describes your likelihood.)

Highly likely     Likely     Not sure/Undecided     Unlikely     Not likely at all

### Part Two: Running and Managing a Poultry Enterprise

**Direction: Answer the following questions by circling the correct response**

1. How many inches of dry litter are recommended in a poultry house for proper management?

- A. 10 to 15cm      B. 25 to 30cm      C. 1 to 5cm      D. 31 to 35cm

2. What is the major reason for putting litter material in a poultry house?

- A. to make birds comfortable      B. to keep birds busy  
C. to provide birds with warmth      D. to absorb moisture from the droppings

3. Under proper management and feeding, how long do chickens kept purposely for meat (broilers) take to reach market weight?

- A. 12 weeks      B. 10 weeks      C. 6 weeks      D. 3.5 weeks

4. Which of the following is the most common method of raising broiler chickens in Uganda?

- A. battery system      B. free range system  
C. fold unit system      D. deep litter system

5. The space requirement for broiler chickens is \_\_\_\_\_ square foot per bird.

- A. 2      B. 3      C. 1      D. 2.5

6. Before starting a poultry enterprise, a farmer should consider the following factors \_\_\_\_\_ **except** .

- A. reliable market      B. availability of quality chicks

- C. access to extension services                      D. climate
7. Which one of the following chicken breeds is specifically bred for meat production?
- A. White Leghorn                      B. Light Sussex                      C. Rhode Island Red  
D. Cornish
8. Which of the following practices should **not** be done on arrival of one day-old chicks to a brooder?
- A. provide them with chick mash immediately    B. provide them clean water mixed with glucose  
C. isolate the weak ones                                      D. provide suitable brooding temperature
9. Which of the following combinations of vitamins needed by poultry are all fat soluble vitamins?
- A. K, D, E, and B                                      B. A, D, E, and C  
C. A, D, E, and K                                      D. B, C, D, and E
10. In the digestive system of a bird, which structure is also known as the “true or glandular stomach”?
- A. crop                      B. gizzard                      C. proventriculus                      D. caeca
11. In which part of the digestive system of a bird may we find grit (small stones)?
- A. crop                      B. gizzard                      C. proventriculus                      D. caeca
12. The major reason for giving birds greens is to \_\_\_\_\_
- A. provide carbohydrates                      B. prevent birds from pecking one another  
C. provide vitamins & minerals    D. provide protein
13. Which type of feed should be given to broilers when they reach six weeks of age?
- A. growers mash                                      B. carbohydrates  
C. broiler starter                                      D. broiler finisher
14. Why should broilers be given a small living space in the house?
- A. to reduce exercise that waste energy                      B. to have many birds in the house  
C. to make the birds docile                                      D. to prevent cannibalism

15. Which type of feed is fed to broiler chicks from one day-old to four weeks of age?
- A. chick and chuck mash      B. broiler starter  
C. broiler finisher      D. growers mash
16. In poultry, mechanical breakdown of food (digestion) takes place in the \_\_\_\_\_
- A. gizzard      B. glandular stomach      C. beak      D. crop
17. The following are the main reasons it is important to provide adequate ventilation in a poultry house **except for which answer?**
- A. to allow free circulation of air  
B. helps to avoid buildup of ammonia  
C. to allow birds to see the outside environment  
D. helps to regulate temperature in the poultry house
18. Which of the following diseases of poultry is caused by a virus?
- A. Newcastle      B. coccidiosis      C. salmonellosis      D. fowl typhoid
19. Which vaccine is given to one week-old chicks?
- A. Newcastle vaccine      B. gumboro vaccine      C. fowl pox vaccine      D. fowl typhoid vaccine
20. Which of the following diseases is common in birds?
- A. anthrax      B. coccidiosis      C. foot & mouth disease      D. mastitis
21. A bird is noticed with drooping wings, muscle paralysis and thick mucus discharge from its nostrils. From which one of following diseases could the bird be suffering?
- A. fowl typhoid      B. coccidiosis      C. Newcastle      D. fowl pox
22. Which vaccine is given to birds at four weeks of age?
- A. gumboro      B. Newcastle      C. fowl typhoid      D. infectious bronchitis
23. Which of the following does **not** cause stress in birds?
- A. imbalanced feeds      B. sudden and sharp noise  
C. parasite infestation      D. adequate feeding

24. Which of the following diseases is associated with brownish diarrhea when brooding chicks?
- A. Newcastle bronchitis      B. gumboro      C. coccidiosis      D. infectious
25. Where does fertilization of the ovum (yolk) occur in a hen?
- A. ovary      B. infundibulum      C. uterus      D. vagina
26. The part of the hen's reproductive system where the egg white (albumen) is added to the yolk is the \_\_\_\_\_.
- A. ovary      B. infundibulum      C. magnum      D. uterus
27. Which one of the following is **not** an abnormality in eggs?
- A. double yolk      B. blood spots      C. twisted chalazae      D. meat spots
28. How much feed does a broiler consume from one day to four weeks of age?
- A. 5kg      B. 1.5kg      C. 4kg      D. 2kg
29. How much feed does a broiler consume from one day-old to seven weeks of age?
- A. 6kg      B. 10kg      C. 3.5kg      D. 15kg
30. For proper ventilation in a poultry house, the recommended height of the solid wall to the chicken wire mesh is \_\_\_\_\_
- A. 0.5m      B. 2m      C. 2.5m      D. 1m

### Part Three: Personal Profile

**Directions: Either tick the answer that applies or write your answers.**

1. How old are you? \_\_\_\_\_
2. Sex       Male       Female
3. Which of the following best describes your home environment (the place where you stay with your parents or guardian when not at school)?
- Town       Rural       Mixed/Peri-urban (near town)

4. Do you currently keep or have you ever kept poultry at home?  Yes  
 No

5. If you answered “yes” to number 4, what type of poultry do you keep or have you kept at home?

---

6. Have you ever reared poultry for commercial purposes (i.e., sold the eggs or the birds)?

Yes  No

7. How much learning about poultry keeping have you had previously in school (tick the answer that applies)?

None  A little  Some  Much  A great deal

8. Have you previously or are you currently enrolled in entrepreneurship as a subject (tick the answer that applies)?

Yes  No

9. If you indicated yes to question 8, how much do you know about agricultural entrepreneurship (tick the answer that applies)?

None  A little  Some  Much  A great deal

**Thank you for your participation and honest responses!!**



## APPENDIX C

### Study's Posttest Instrument

Name: \_\_\_\_\_ Stream: \_\_\_\_\_

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods**

**Instrument 2**

**Part One:**

**Agricultural Students' Agricultural Entrepreneurship (*Agripreneurship*)  
Competence**

**Directions:** In the table below is a list of statements used to describe entrepreneurial abilities of individuals. Please indicate the level to which you Agree/Disagree with each statement describing your entrepreneurial abilities by ticking in the corresponding column.

		Strongly Disagree	Disagree	Neutral/ Undecided	Agree	Strongly Agree
1	I am able to recognize business opportunities in agriculture					
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7	I do not fear taking calculated risks on new agricultural ventures					
8	I often take calculated risks on new ventures (business ideas)					
9	I am able to bear the uncertainties in my agricultural project(s)					
10	I often identify risks before or during implementation of a new entrepreneurial project					
11	I can transform my mental models (plans) into action					
12	I am able to successfully implement my agricultural project(s)					
13	I can manage an agricultural project to attain its intended goals/objectives					
14	I take challenges as learning opportunities					
15	I always plan and schedule activities for my agricultural project (s)					
16	I blame others if my project(s) fail					
17	I am always confident that my agricultural projects will be successful					
18	I take responsibility for any outcome of the agricultural venture(s) or project(s) I do					
19	When working on an agricultural venture, I plan and think about the future					
20	I strive to ensure sustainability of my agricultural venture(s)/project(s)					
21	I make rational decisions which align with the					

	future goals of my project(s)					
22	I am able to look for ways to market my agricultural product(s)					
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33	I like to influence others to achieve the goals of my agricultural project(s)					
----	---	--	--	--	--	--

How likely are you to become an agricultural entrepreneur after school? (Mark the appropriate box that describes your likelihood.)

Highly likely     Likely     Not sure/Undecided     Unlikely     Not likely at all

### Part Two: Managing a Poultry Enterprise

**Directions: Answer the following questions by circling the correct response**

- What is the importance of feeding grit to birds?
  - to grind food in the stomach
  - to prevent poultry diseases
  - increase egg production
  - to supply calcium
- Which of the following organs in poultry is considered part of the digestive system?
  - kidneys  
pancreas
  - lungs
  - ovary
  - D.
- The rearing of young chicks from day one to four weeks of age is referred to as?
  - incubation
  - project enterprise management
  - brooding
  - broiler
- Which of the following management practices is done to prevent the outbreak of Newcastle disease in poultry?
  - giving birds antibiotics in drinking water
  - provision of clean feeds
  - vaccination using the correct vaccine
  - proper cleaning of the poultry house
- The reason why a good poultry house is **not** built with fully enclosed walls and shutters is to?
  - allow for good ventilation
  - keep birds free from pests such as rats
  - reduce darkness in the house
  - make picking of eggs easier

6. Which of the following answers is an advantage of using a deep litter system in poultry rearing?
- A. birds are free to feed on a variety of feedstuffs in the open
  - B. the system prevents scavenging for food in the compound
  - C. many birds can be kept in a small area
  - D. there is no risk of disease spread among birds
7. Which of the following practices is **not** associated with the brooding of chicks?
- A. hatchery litter
  - B. feeding
  - C. heat source
  - D. poultry
8. Which of the following is **not** a necessary condition for the incubation of eggs?
- A. favourable temperature
  - B. favourable relative humidity
  - C. regular turning of eggs
  - D. provision of light
9. Birds are able to digest greens well because of the action of?
- A. enzymes in the gizzard
  - B. presence of hydrochloric acid in stomach
  - C. bile from the liver
  - D. bacteria in the caeca
10. Which of the following combinations of vitamins required by poultry are water soluble?
- A. Vitamin B and C
  - B. Vitamin C and D
  - C. Vitamin B and D
  - D. Vitamin D and C
11. Where does most of the absorption of food nutrients occur in a bird?
- A. proventriculus
  - B. crop
  - C. gizzard
  - D. small intestines
12. The following are different ways of administering Newcastle vaccine to poultry **except?**
- A. through drinking water
  - B. through aerial or nasal spray
  - C. through eye drops
  - D. through intra-muscular injection
13. Which of the following are common internal parasites in poultry?
- A. mites
  - B. liver flukes
  - C. roundworms
  - D. tapeworms
14. The provision of suitable conditions for a fertile egg to develop into an embryo is referred to as?

- A. incubation                      B. brooding                      C. hatching                      D. candling
15. Which of the following feeds has the highest protein content?
- A. growers mash                      B. broiler finisher                      C. broiler starter                      D. maize bran
16. What part of the egg develops into an embryo after fertilization?
- A. yolk disc                      B. chalazae                      C. egg white                      D. germinal disc
17. Which of the following is a function of albumen in regard to a developing chick embryo?
- A. provides nutrition  
 B. holds the developing chick embryo in position  
 C. protects the chick embryo from external gases  
 D. protects the chick embryo from experiencing morbidity
18. Why is it advisable to maintain a suitable temperature in a brooder house?
- A. to allow chicks to move around properly  
 B. to provide chicks sufficient light  
 C. to prevent chicks from overcrowding in one place and suffocating one another  
 D. to increase the likelihood of drafts (uneven air flow)
19. The main reason farmers prevent visitors from entering their poultry houses without adequate sanitation measures is which of the following answers?
- A. visitors may step on the birds  
 B. visitors may be a source of infectious diseases to the birds  
 C. the birds may peck the visitors  
 D. the birds may be a source of disease for the visitors
20. How long do chicks stay in the brooder house?
- A. one to two weeks                      B. two to three weeks  
 C. three to four weeks                      D. four to five weeks
21. Why do farmers limit the space available to broiler birds more as compared to layer birds?
- A. to make them grow faster  
 B. to avoid wasting space and reduce cannibalism  
 C. to keep more broilers in a small space

- D. to conserve energy by reducing exercise which should increase weight gain
22. The system of raising poultry where birds are kept in individual cages is referred to as?
- A. a battery system                      B. a free range system  
C. a fold unit system                      D. a deep litter system
23. The main reason farmers are advised to sell their broilers as soon as they reach market weight is?
- A. to bring in a new stock                      B. to maximize the potential for profit  
C. to clean the house                      D. to meet their customers' demands
24. The following are examples of vices in poultry **except**?
- A. debeaking                      B. feather pecking                      C. cannibalism                      D. toe pecking
25. Which of the following is true about poultry in regard to reproduction?
- A. some birds can lay two eggs in a day                      B. birds have two functional ovaries  
C. only the left ovary is functional                      D. only the right ovary is functional
26. When using an intensive system of poultry rearing, how often should fresh, clean water be provided?
- A. in the morning                      B. in the evening                      C. after feeding                      D. all the time
27. Why is it **not** advisable to give one day-old chicks feed immediately after arriving to the brooder?
- A. the chicks do not have teeth  
B. the unmoistened (dry) feed may choke the chicks causing death  
C. the chicks are tired  
D. the chicks have not yet learnt how to digest feed
28. Which of the following diseases of poultry is caused by protozoa and may be associated with poor sanitation practices in the poultry house?
- A. Coccidiosis                      B. Gumboro                      C. Newcastle                      D. Marek's



29. Which of the following chicken breeds is considered dual-purpose and was developed for meat and egg production?

- A. White Leghorn      B. Light Sussex      C. Rhode Island Red      D. Cornish

30. In a bird's digestive system, the proventriculus is?

- A. the crop      B. the gizzard or ventriculus  
C. the true or glandular stomach      D. the caeca

**Thank you for your participation and honest responses!!**

## APPENDIX D

### Agripreneurship Training Modules

## Agripreneurship Training Modules

### Training Modules for S.2 in Agricultural Entrepreneurship

#### **Module 1: Understanding entrepreneurs and entrepreneurship in regard to agriculture**

##### **Objectives**

By the end of the module, participants will be able to:

- a) Define entrepreneurship
- b) Describe entrepreneurs in agriculture
- c) Outline the characteristics of entrepreneurs, using agricultural examples
- d) Identify and explain the responsibilities of an agricultural entrepreneur
- e) Using examples in agriculture, discuss the challenges and benefits of being an agricultural entrepreneur

##### **Content**

- a) Who is an entrepreneur
- b) Definition of entrepreneurship, using examples from agriculture
- c) Characteristics of entrepreneurs, using agriculture as the context
- d) Responsibilities of agricultural entrepreneurs
- e) Challenges and benefits associated with entrepreneurship in agriculture

#### **Module 2: Idea generation, opportunity recognition, risks and uncertainties in agriculture**

##### **Objectives**

By the end of the module, participants will be able to:

- a) Explain the difference between an idea and an opportunity
- b) Outline ways to determine if your business idea is viable (good)
- c) Explain the difference between risk and uncertainties
- d) Identify risks and uncertainties associated with their poultry project
- e) Discuss different ways to reduce the identified risks and uncertainties

##### **Content**

- a) Idea generation and opportunity recognition in agriculture
- b) Assessing the viability of business ventures/ideas in agriculture
- c) What is meant by risks and uncertainties in agriculture
- d) Risks and uncertainties associated with poultry production as an entrepreneurial venture

- e) Managing risks and uncertainties in agriculture, especially in regard to poultry production

### **Module 3: Writing a business plan (Using their poultry project as an example)**

#### **Objectives**

By the end of the module, participants will be able to:

- a) Determine name for their projects
- b) Develop a mission and vision statement for their poultry projects
- c) State objectives of their projects
- d) Develop a business plan for their poultry projects

#### **Content**

Considerations when naming a business

- a) Developing mission and vision statements
- b) Setting objectives for an entrepreneurial project
- c) What is a business plan and its contents
- d) Steps involved in writing a business plan

### **Module 4: Budgeting, costs of production, and record keeping in agriculture**

#### **Objectives**

By the end of the module, participants will be able to:

- a) Define budgeting
- b) Describe the importance of budgeting
- c) Identify and outline the costs associated with poultry projects
- d) Differentiate between direct and indirect costs
- e) Identify the types of records kept by poultry farmers
- f) Outline the importance of record keeping
- g) Calculate net profits or losses associated with poultry projects

#### **Content**

- a) Definition of budgeting
- b) Importance of budgeting in agriculture
- c) Meaning of direct and indirect costs in agriculture
- d) Direct and indirect costs in poultry production
- e) Examples of records associated with poultry production
- f) Importance of record keeping
- g) Profit and loss account

### **Module 5: Agricultural marketing**

## **Objectives**

By the end of the module, participants will be able to:

- a) Define what is meant by agricultural marketing
- b) Identify various ways to market agriculture products using examples from poultry production
- c) Outline factors to consider when pricing poultry products
- d) Demonstrate how to price products

## **Content**

- a) What is meant by agricultural marketing
- b) Marketing of agricultural products
- c) Pricing of products
- d) Factors to consider when pricing agricultural products

## **Module 6: Value addition in agriculture**

### **Objectives**

By the end of the module, participants will be able to:

- a) Define what is meant by value addition in agriculture
- b) Identify various ways of adding value to agriculture products using examples from poultry production
- c) Explain benefits of value addition

### **Content**

- a) Meaning of value addition in agriculture
- b) Ways to add value to agricultural products using examples from poultry production
- c) Benefits associated with adding value to agriculture products

### **Examples of Learning Activities**

Use a word search puzzle to identify words related to agricultural entrepreneurship.

Completing a profit and loss account

### **Questions for participants to reflect on as they make their journal entries**

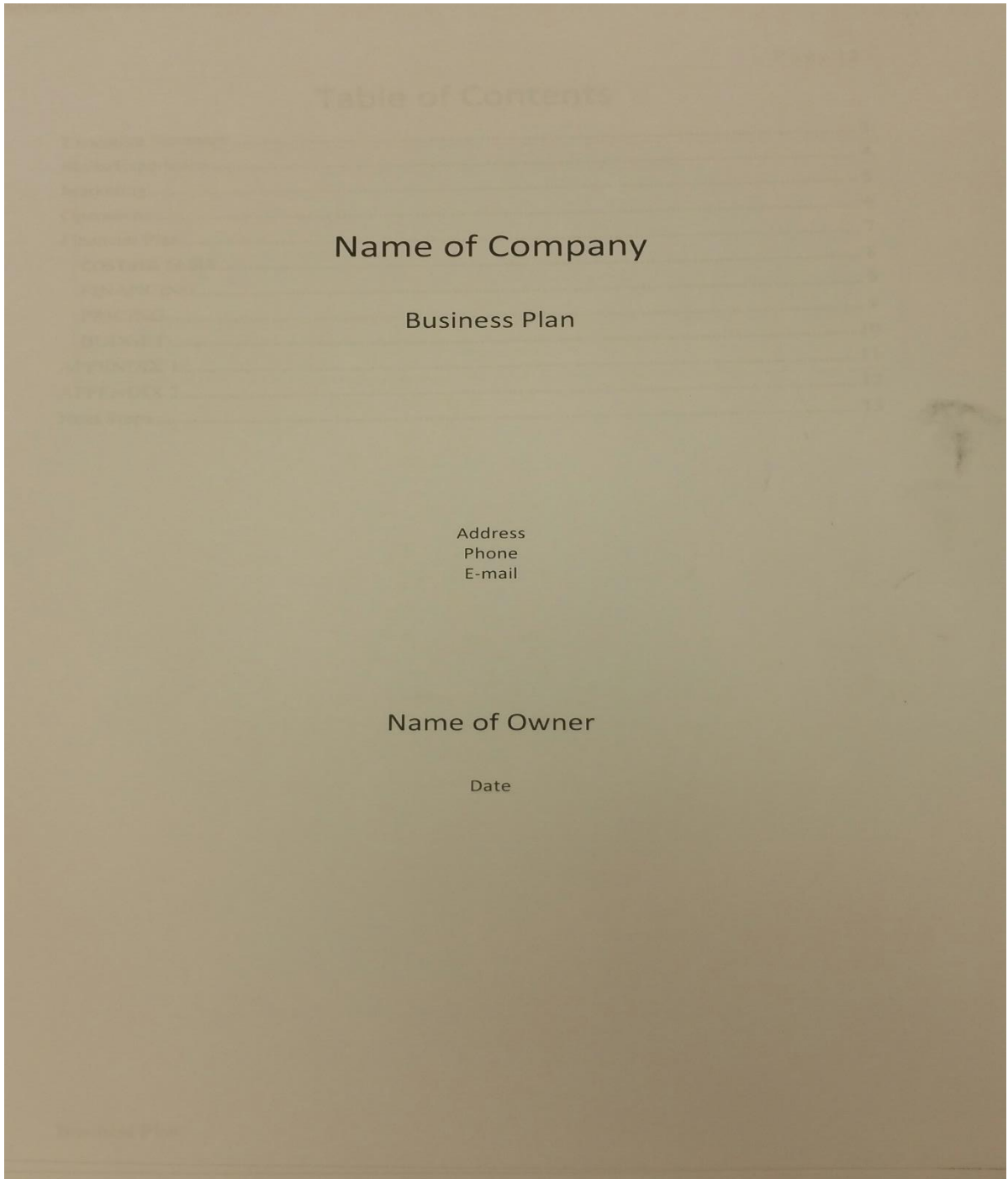
What did I learn today that I did not already know?

How can I use the knowledge I learned from these modules in real-life entrepreneurial projects?

## APPENDIX E

### Business Plan Template

# Business Plan Template



## Table of Contents

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PRICING.....	9
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## Executive Summary

*Briefly describe, in 1 – 2 pages, the following items about your business:*

- NAME OF BUSINESS
- BUSINESS DESCRIPTION
- BUSINESS LOCATION
- MISSION STATEMENT
- VISION STATEMENT

*This section should give your audience a concise understanding of your business. It should be professional yet enthusiastic, covering the information you would want to convey during a brief interview or meeting.*

## Skills/Experience

*Briefly describe, in 1 – 2 pages, the following items about your skills/experience related to your business:*

- EDUCATION
- SKILLS
- PREVIOUS EXPERIENCE

*This section should give your audience an understanding of what skills or experiences you have that are related to your business. You can also attach your CV.*

## Marketing

*Briefly describe, in 2-3 pages, the following items about your marketing plan:*

- TARGET CUSTOMERS
- 4 P'S
- COMPETITION

*This section should give your audience an understanding of why your business will be successful. It should comprehensively describe your market research.*

## Fin Operations

*Briefly describe, in 2-3 pages, the following items about your operational plan:*

- LEGAL REQUIREMENTS
- PERSONNEL/STAKEHOLDERS
- TIME OF OPERATIONS

*This section should give your audience an understanding of how you will operate your business.*

## Financial Plan

*Briefly describe, in about 1 page, the following item about your financial plan:*

- FINANCIAL OBJECTIVES/GROWTH PLAN

*Also, complete the templates on the following pages:*

- COSTING
- FINANCING
- PRICING
- BUDGET

*This section should give your audience an understanding of why your business is a good investment and how you will make a profit.*

## COSTING TABLE

PARTICULARS	AMOUNT
<b>One time (Start-Up Costs)</b>	
Business plan preparation	
Market research	
Advertising	
Professional fees	
Licenses/permits	
Stationary before starting operations	
Airtime	
Equipment/Production machine	
Rent deposits	
Deposit for utilities (Water and Electricity)	
Purchases of facilities (Premises)	
Furniture	
Cash registers	
Telephones	
Vehicles	
Opening office supplies	
<b>(I) TOTAL START-UP COSTS</b>	
<b>Ongoing Operations (Recurrent Monthly Costs)</b>	
Loan interest payments/Interest on financing	
Rent	
Insurance	
Utilities (Water and Electricity)	
Repairs and Maintenance	
Advertising	
Airtime	
Stationery	
Salaries/wages	
<b>(II) TOTAL ONGOING OPERATIONS COSTS</b>	
<b>Cost of Goods/Services Sold (Variable Monthly)</b>	
Cost Packaging/assembly	
Raw materials/goods	
Transport for the raw materials	
<b>(III) TOTAL COST OF GOODS/SERVICES SOLD</b>	
<b>(IV) TOTAL (I + II + III)</b>	

**FINANCING**

FINANCING SOURCE	AMOUNT
<b>TOTAL</b>	

**PRICING**

$$\begin{array}{ccccccc} \text{ONGOING} & & \text{COSTS OF} & & \text{NUMBER OF} & = & \text{BREAK-EVEN} \\ \text{OPERATIONS} & + & \text{GOODS/} & \div & \text{CLIENTS/GOODS} & & \text{PRICE} \\ \text{COSTS} & & \text{SERVICES} & & & & \\ \hline \square & & \square & & \square & & \square \end{array}$$

**BUDGET**

	Period Before Operations Start	MONTH/PERIOD 1	MONTH/PERIOD 2	MONTH/PERIOD 3
<b>Opening Balance</b>				
<b>CASH IN</b>				
Personal Savings				
Relatives & Friends				
Government Youth fund & Loan				
Grants & Awards				
Investors (Equity)				
Sales Revenue (P x Q)				
<b>I. TOTAL CASH IN (Include Opening Balance)</b>				
<b>CASH OUT</b>				
Business plan preparation				
Market research				
Advertising				
Professional fees				
Licenses and permits				
Stationery				
Airtime				
Production machine/ equipment				
Rent deposits				
Deposit for utilities				
Purchases of facilities				
Furniture				
Telephones				
Principle + Interest on loan repayment				
Rent				
Insurance				
Utilities(water and electricity)				
Repairs and Maintenance				
Salaries/ wages				
Raw materials/ goods				
Transport for the raw materials				
Cost of packaging/ assembly				
<b>II. TOTAL CASH OUT</b>				
<b>CLOSING BALANCE (I -II)</b>				



## APPENDIX 1

## PROFORMA PROFIT AND LOSS ACCOUNT

..... ENTERPRISES

FOR THE PERIOD ENDING .....

	Shs	Shs
Sales (P x Q), less returns inwards		
<b>Less cost of sales</b>		
Opening Raw materials		
Add Purchases less returns outwards		
Add transport for raw materials		
Less closing stock	( )	
<b>1. Cost of Goods sold</b>		( )
<b>2. Gross Profit</b>		
Add rates received		
Add discount received		
<b>Less Operating Expenses</b>		
Discount allowed		
Advertising		
Legal fees		
Licenses and permits		
Stationery		
Airtime		
Interest on financing		
Rent		
Utilities		
Repairs and Maintenance		
Insurance		
Depreciation expense		
Salaries/ wages		
<b>Total Expenses</b>		( )
<b>Net Profit (Loss)</b>		



## Next Steps

*Briefly describe, in about 1 page, what you need and/or plan to do next to start your business.*

## APPENDIX F

Treatment Group Students' Interview Guide Regarding their Experience with the Project

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods**

**Interview Guide for the Treatment Group Students**

1. Please share with me your experiences in regard to the broiler project. What did you learn (about poultry keeping; about entrepreneurship)?
2. What do you think can be the best approaches to help interest young students like you to pursue opportunities related to the agricultural sector, including *agripreneurship*?
3. Is there anything else you want to share about your experience and what you learned?

## APPENDIX G

Adult Facilitator's Interview Guide Regarding their Experience with the Project

**Project-based Learning: Equipping Youth with Valuable Life Skills while Linking  
Secondary Agricultural Education to Communities for Improved Livelihoods**

**Interview Guide for the Adult Facilitators Regarding their Experience**

1. Please if you don't mind, tell me your age?
2. How long have you been working on this agricultural project?
3. Please share with me your experiences with regard to the use of school-based, agripreneurial projects to bridge the gap between agricultural education in high schools and improving agriculture in their communities.

## APPENDIX H

### Description of Data Sources Regarding Fidelity of Treatment



*Description of Data Sources Regarding the Study's Fidelity of Treatment*

Data Sources	Descriptions
Agripreneurship puzzles	An agripreneurship puzzle was developed by the researcher together with agricultural and entrepreneurship teachers, including the extension educators. This puzzle was used during the agripreneurship training sessions for students to identify words they could associate with agricultural entrepreneurship to develop a definition of agripreneurship and entrepreneurship. The student puzzles were sent to the researcher and provided data for content analysis (see Appendix I).
Business plan template	The teachers of entrepreneurship, extension educators, together with the researcher developed a business plan template used to guide the students in the treatment group to develop a business plan for their broiler projects (see Appendix E).
Focus group interviews with students in the treatment group	Focus group interviews were conducted with some of the students from the treatment group. The student participants shared their experiences in regard to the project, including the challenges encountered and lessons learned from their experiences.
Students' Journals	Students in the treatment group made journal entries about their experiences. By students journaling about their experiences, it helped the researcher learn more about what the students experienced during the broiler projects and whether the study's intervention was conducted by the facilitators as planned.
Student posters	During the agripreneurship training workshops, the treatment group students were divided into groups and given a topic to discuss and report back to their classmates. Their discussions were made into posters that were sent to the researcher for analysis.

Personal interviews with the adult facilitators	The researcher conducted follow-up personal interviews with the adult facilitators to learn about their experiences with the project.
Training of facilitators	The researcher provided training and worked with the study's facilitators, including teachers and extension educators, through a series of online meetings via Skype, Google documents, and WhatsApp group chats to develop training modules for agripreneurship that would mirror the national curriculum for agriculture and entrepreneurship in Uganda (see Appendix D). Follow up meetings were conducted between the facilitators during the course of the study to ensure proper organization and scheduling of the trainings. All trainings and preparations for the facilitators took place from December of 2015 through early February of 2016 prior to the opening of schools for the first term of 2016 during which the study's intervention occurred.
Training module for students in agripreneurship	The study's facilitators together with the researchers worked to develop a training module for agripreneurship (see Appendix D). The training module helped ensure that all participants in the treatment group received similar content as delivered by the facilitators.
Videorecordings	Six short videorecordings lasting between 15 and 45 minutes about agripreneurship training, including students working on their broiler projects and interacting with the entrepreneurial farmers, were made by the facilitators and sent to the researcher. This helped the researcher verify whether the intervention's trainings were conducted by the facilitators as planned.
Visuals	The facilitators took visual images during the trainings, during field trips to entrepreneurial farmers, and when students were working with their broiler projects. These visual images provided

	evidence that the students participated in the study's intervention.
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## APPENDIX I

### Word Agripreneurship Puzzle Game

### Word Agripreneurship Puzzle Game

Take six minutes to identify and circle words that you have learned in this training about agricultural entrepreneurship (agripreneurship), including characteristics of agripreneur, i.e., an entrepreneur whose business is related to agriculture. Use the words you have identified in the puzzle to develop sentences that would describe an agripreneur.

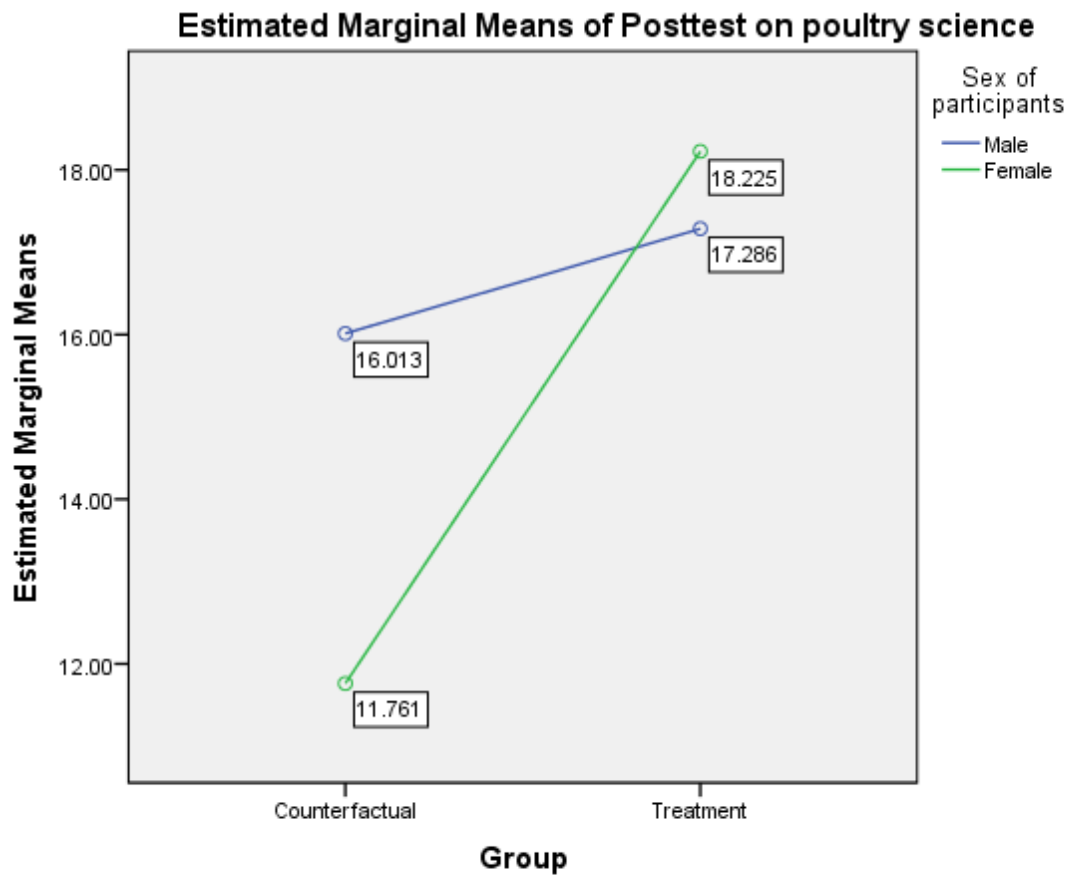
Hint: Some words in the puzzle that are related to agricultural entrepreneurship may be vertical, horizontal, or diagonal. Also, you may find that you have to use a letter more than once to come up with other new words

B	E	N	L	O	R	T	N	O	C
U	I	D	E	N	T	I	F	Y	S
S	R	E	C	O	G	N	I	Z	E
I	D	E	A	S	B	E	I	N	G
N	S	A	G	M	A	R	K	E	T
E	N	H	T	O	Y	U	I	V	A
S	U	E	E	X	A	T	N	I	D
S	R	L	Z	N	E	L	Z	T	D
W	O	M	A	N	K	U	S	A	I
I	P	M	A	V	I	C	P	V	T
N	P	L	O	S	S	I	R	O	I
G	O	A	L	S	S	R	I	N	O
P	R	O	F	I	T	G	C	N	N
W	T	I	N	W	G	A	E	I	A
A	U	E	S	B	E	A	R	S	N
Y	N	T	A	K	E	R	Z	T	F
V	I	S	I	O	N	A	R	Y	S
A	T	R	U	N	N	I	N	G	E
X	Y	C	R	E	A	T	I	V	E

## APPENDIX J

Graph Showing a Statistically Significant Interaction between Students' Group and Sex

Graph Showing a Statistically Significant Interaction between Students' Group and Sex



Covariates appearing in the model are evaluated at the following values: Pretest on poultry science = 10.3750

## APPENDIX K

Sample Letters of Authorization to Conduct the Study: Head Teacher Kiira College  
Butiki



# KIIRA COLLEGE BUTIKI

P.O. Box 1181,  
JINJA  
Tel: 0332280431

Our Ref: .....  
Your ref:.....



24<sup>th</sup> February, 2016

Mr. Mukembo,

Sir,


**RE: PERMISSION TO CARRY OUT RESEARCH ON THE POULTY PROJECT**

The School is happy to have your input in its development by aiding students carry out practical studies in Poultry Management.

You are allowed to go ahead and we wish you the best.

Yours,

KIIRA COLLEGE BUTIKI

  
24 FEB 2016 ★  
Daniel Douglas Kaima

HEADMASTER  
P.O. BOX 1181  
JINJA - UGANDA

## APPENDIX L

Sample Letters of Authorization to Conduct the Study: Head Teacher Busoga College  
Mwiri

# BUSOGA COLLEGE MWIRI

P. O. BOX 20, JINJA- UGANDA  
<http://www.mwiri.sc.ug>



H/M: +256 0772609882  
Email: [bemwiri@yahoo.com](mailto:bemwiri@yahoo.com)

11<sup>th</sup> May, 2016

To:

Dr. M. Craig Edwards  
Agricultural Hall  
Department of Agricultural Education,  
Communication and Leadership  
Oklahoma State University, USA  
Still water, OK 74078, (405) – 744 – 8141.

Thru:

The Headteacher,  
Busoga College Mwiri  
P. O. Box 20,  
JINJA, DISTRICT.

*Forwarded  
Mwiri*



Dear Sir,

**RE: RESEARCH CONDUCTED BY MUKEMBO STEPHEN.**

I am writing to acknowledge the study that Mr. Mukembo Stephen a doctoral student of Agricultural Education at Oklahoma State University, USA, conducted with students of Agriculture at Busoga College Mwiri, Uganda.

The students were given a questionnaire to evaluate their understanding before and after the implementation of the project.

The project – based learning sought to equip the youth with valuable life skills while linking secondary Agricultural Education to communities for improved livelihoods.

I sincerely hope that the information he gathered will enable him achieve his objective.

Yours sincerely,

Agaba Esther Mugoya (Mrs)  
**HEAD OF DEPARTMENT, AGRICULTURE.**

## VITA

Stephen Charles Mukembo

Candidate for the Degree of

Doctor of Philosophy

Thesis: EQUIPPING YOUTH WITH AGRIPRENEURSHIP AND OTHER VALUABLE LIFE SKILLS BY LINKING SECONDARY AGRICULTURAL EDUCATION TO COMMUNITIES FOR IMPROVED LIVELIHOODS: A COMPARATIVE ANALYSIS OF PROJECT-BASED LEARNING IN UGANDA

Major Field: AGRICULTURAL EDUCATION

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Agricultural Education at Oklahoma State University, Stillwater, Oklahoma, USA in July, 2017.

Completed the requirements for the Master of International Agriculture at Oklahoma State University, Stillwater, Oklahoma, USA in 2013.

Completed the requirements for the Bachelor of Vocational Studies in Agriculture with Education at Kyambogo University, Kampala, Uganda in 2005.

Experience:

- ❖ Co-instructor, graduate teaching and research associate at Oklahoma State University, Stillwater, Oklahoma, USA
- ❖ Agricultural education teacher in Uganda
- ❖ Agricultural extension educator in Uganda

Professional Memberships:

- ❖ Association for International Agricultural and Extension Education
- ❖ Association for International Agriculture and Rural Development
- ❖ American Association for Agricultural Education
- ❖ Global Forum for Rural Advisory Services
- ❖ Young Professionals for Agricultural Development