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Project-based Learning: Equipping Youth with Agripreneurship by Linking Secondary Agricultural Education to Communities

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Acknowledgements

The Innovation in Agricultural Training and Education project—InnovATE—is tasked with compiling the best ideas on how to build the capacity of Agricultural Education and Training (AET) institutions and programs and disseminating them to AET practitioners around the world. As part of this effort, InnovATE issued a Call for Concept Notes to accept applications for discussion papers that address *Contemporary Challenges in Agricultural Education and Training*. These concept papers define the state of the art in the theory and practice of AET, in selected focus domains and explore promising strategies and practices for strengthening AET systems and institutions.

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Cover Photo: Agricultural Students at Iganga Girls Senior Secondary School in Eastern Uganda Drenching Cattle at the School Farm. Such Opportunities Provide Students with *Hands-on, Minds-on* Learning Experiences.

Table of Contents

Introduction & Problem Statement

How do we ensure food security for a global population approaching nine billion people? This is one of many concerns for world leaders. The phenomenon is worsened by the declining number of youth engaged in or who aspire to pursue agricultural-related professions or careers across the globe (Mukembo, Edwards, Ramsey, & Henneberry, 2014, 2015). The situation is more distressing for developing countries in Africa, such as Uganda, which 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 Africa, although many young people (youth) are becoming better educated (see Figure 1), the investments made in them have not yielded the anticipated returns, because most are unemployed or underemployed (Gough, Langevang, & Owusu, 2013; Gyimah-Brempong & Kimenyi, 2013; Montpellier, 2014). Further, many of the skills they acquire in school do not match those needed by employers or help the youth to become self-employed (Lugemwa, 2014; Montpellier, 2014). When youth leave school early without the necessary life skills to survive in the real-world, it limits the income they are likely to earn, which negatively impacts their quality of life and communities (Valle, 2012). More distressing is that the prospect of African youth securing good livelihoods is not assured even if they attain higher education (Valle, 2012).

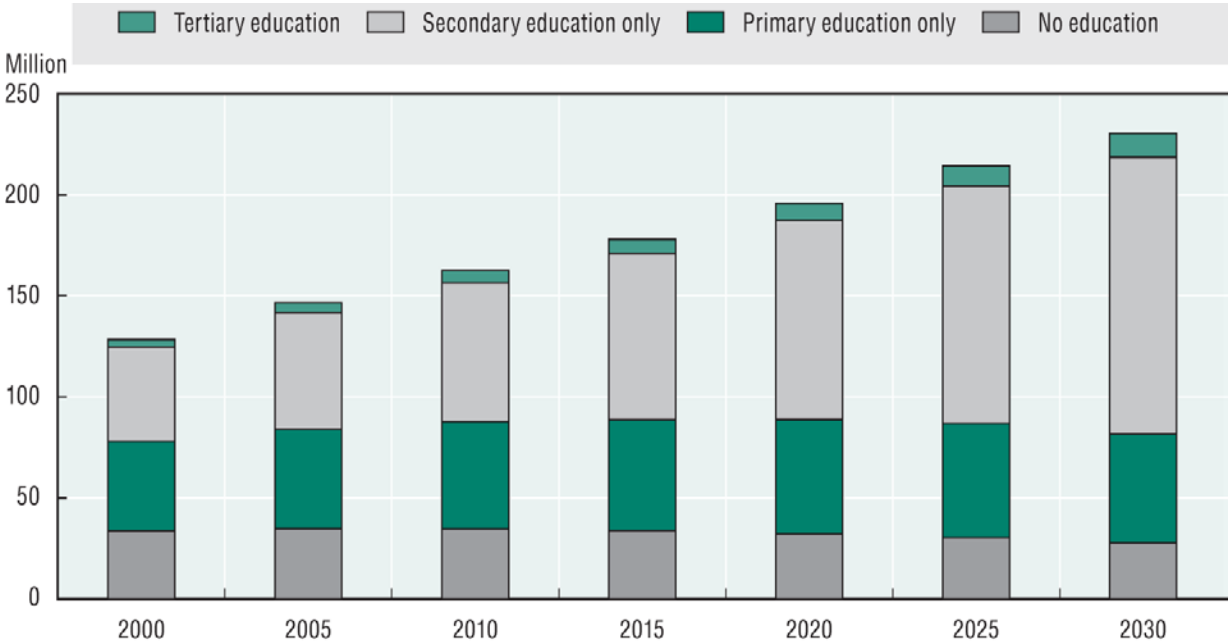

Figure 1Africa is experiencing rapid growth in educated young people (20 to 24 year-old cohorts by education, 2000-2030) [Africa Economic Outlook, 2012, p. 24].

According to the International Labor Organization [ILO] (2014), youth entrepreneurship in agriculture, i.e., *agripreneurship*, could be the missing link to address the challenges of poverty and unemployment experienced by many young people, especially in developing countries. Further, promotion of agricultural entrepreneurship, including value addition to agricultural products by youth entrepreneurs, has the potential to mitigate the challenges many young people experience, to improve their livelihoods, and to increase food security (International Youth Foundation, 2014; Montpellier, 2014). Many youth, unfortunately, have a negative attitude toward agricultural careers due to the hardships and drudgeries associated with farm work in most developing countries (Food and Agriculture Organization, Technical Centre for Agricultural and Rural Cooperation, & International Fund for Agricultural Development, 2014; International Youth Foundation, 2014; Mukembo et al., 2014, 2015). It is important, however, to note that many rewarding and satisfying careers exist in agriculture beyond the farm gate (Mukembo et al., 2014), especially along the agriculture value-chain (International Youth Foundation, 2014; Montpellier, 2014). To that end, how could project-based learning be used to equip students with agripreneurship competencies and other valuable life skills while linking secondary agricultural education to communities for improved livelihoods? This is the question we seek to address.

The approach discussed would help to build capacity among secondary school students by facilitating *hands-on, minds-on* learning experiences to reinforce what they learn in their courses at school (Mukembo et al., 2014; Vandenbosch, 2006), equip them with skills in agricultural entrepreneurship, as well as foster initiative and creativity in real-world settings through project-based learning. Further, by the learners reaching out to and engaging with their communities, especially entrepreneurial farmers, they would to learn from practitioners what works in real-life situations and also what may not be applicable or realistic. In addition, the students would be empowered to educate the community members about better methods of farming to increase productivity. This would be a reciprocal and mutualistic relationship where each party benefits from the other (see Figure 2).

Although the debate about the entrepreneurial abilities of farmers is still ongoing (Vik & McElwee, 2011), some scholars, such as Carter (1998), McElwee (2008a), as well as Alsos, Carter, Ljunggren, and Welter (2011), posited that farmers have been entrepreneurs since time immemorial, and continue to pass on these skills to their offspring, including creating employment for others. On that note, to be successful, farmers have had to adjust and adapt to a wide range of issues in agriculture, such as changing trends in the market as well as regulations, requiring them to be entrepreneurial in many of their endeavors (McElwee, 2008b; Vesala & Pyysiäinen, 2008). Therefore, developing mentor-protégé and mutualistic relationships between farmers and students is an important concept to consider. If realized, it would stand to provide feedback to all participants - learners, teachers, community members, and researchers - leading to appropriate recommendations for policymakers, which also may help to increase agricultural productivity and food security in the communities and countries involved (see Figure 2).

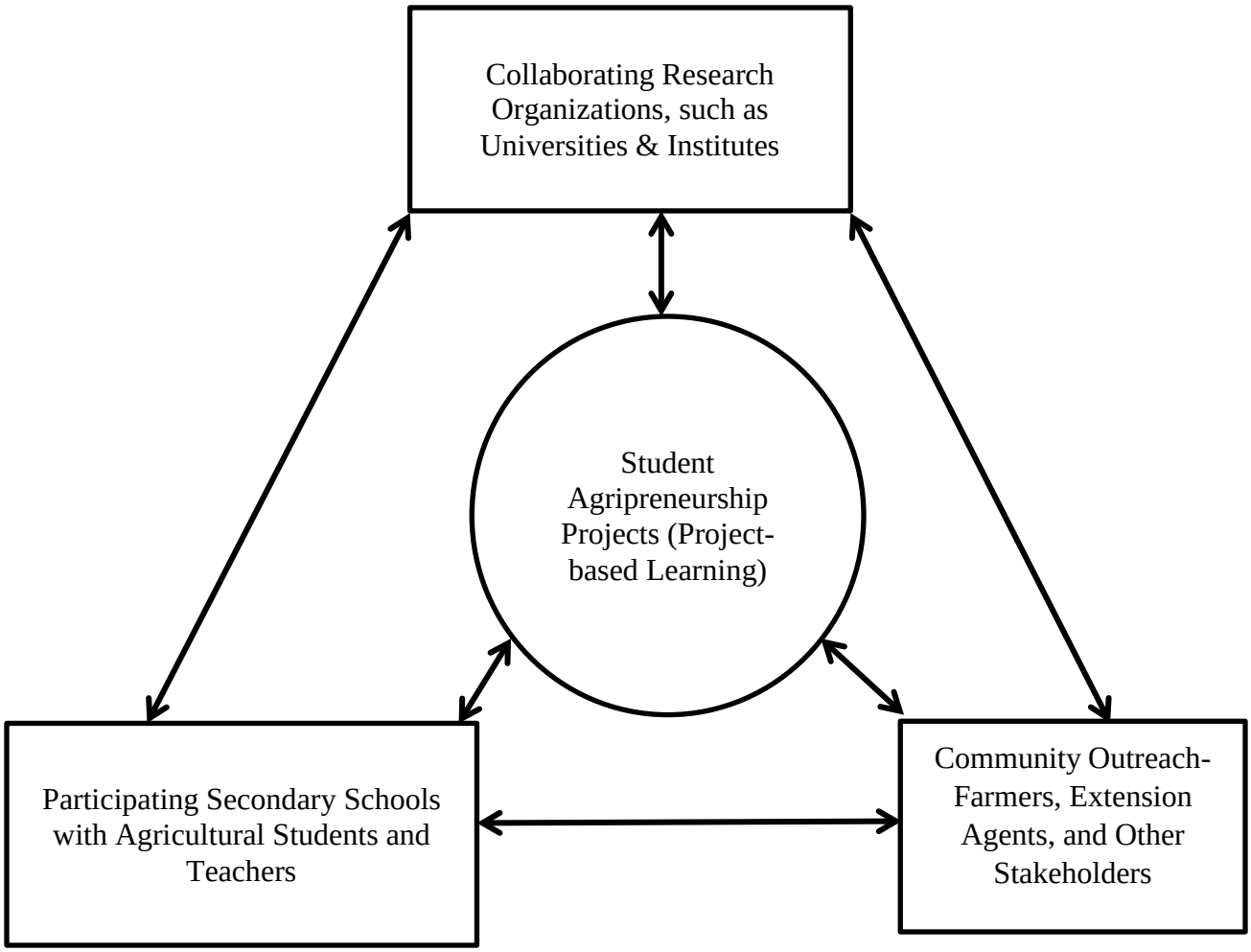

Figure 2 Diagrammatic representation of the synergy and reciprocal flow of information between collaborating institutions, participating institutions, and the community.

Engaging students with local farmers is one way to bridge the gap between agricultural education in high schools and improving agriculture in the surrounding communities. In addition, when students are engaged in agripreneurship projects, it increases the likelihood of changing their mindsets to consider agriculture as a business that could provide gainful employment and improve their economic prospects while also lifting communities. A multi-disciplinary approach would be adopted that engages teachers of agriculture and entrepreneurship, entrepreneurial farmers, researchers, and extension agents to achieve the project's stated objectives. This would help address some of the current Agricultural Education and Training (AET) challenges in developing countries such as Uganda and elsewhere.

Agricultural entrepreneurship has the potential to contribute to a country's economic development by creating employment for the local populace in direct and indirect ways, improving nutrition, and contributing to food security and food sovereignty (Bairwa, Lakra, Kushaha, Meena, & Kumar, 2014; Khayri, Yaghoubi, & Yazdanpanah, 2011; Mujuru, 2014; Rajaei, Yaghoubi, & Donyaei, 2011; Yaghoubi, 2010). Further, through value addition and commodity exportation, agricultural entrepreneurship earns countries foreign exchange thereby helping to solve some of the challenges associated with balance of payment problems, especially in countries that may be dependent on agriculture as their main source of international trade. In addition, equipping the population with skills in agripreneurship helps to develop a country's agriculture and increase the likelihood of food security for its growing population (Rezai, Mohamed, & Shamsudin, 2011). Alsos et al. (2011) posited that communities and nations dependent on agriculture as their main source of livelihood can be helped to develop by transforming the agriculture sector to embrace agricultural entrepreneurship and support aspiring agricultural entrepreneurs.

In an interview with the ILO, Suk Moo, one of the successful young agricultural entrepreneurs growing blueberries in rural Eumseong-gun, South Korea, stated that "as a little boy, I dreamed of becoming an entrepreneur. After examining the opportunities in various industries, I discovered that the agricultural sector had enormous potential for prosperity" (ILO, 2014, para. 3). In 2013, Moo's blueberry farm made a profit of $200,000 (ILO, 2014). Moo added:

> The agricultural sector has enormous potential for growth. It would be a great idea for the Government to adopt a more systematic approach to encourage and support new agri-entrepreneurs and farmers to succeed in running their own farms and agribusinesses. (ILO, 2014, para. 17)

Background of Agricultural Entrepreneurship or *Agripreneurship*

Agricultural entrepreneurship is synonymous with *agripreneurship* (Bairwa et al., 2014). Agripreneurship emanates from the discipline of entrepreneurship (Lans, Seuneke, & Klerkx, 2013; Uneze, 2013). Although various authors have defined entrepreneurship differently (Lauwere, Enting, Vermeulen, & Verhaar, 2002; McElwee, 2008a; Singh & Sharma, 2012a), classical economist Joseph Schumpeter's description of entrepreneurship grounds most of the definitions (Lans et al., 2013; Volkmann, Tokarski, & Grünhagen, 2010).

> Joseph A. Schumpeter (1883-1950) describes entrepreneurship as the *implementation or realization of new factor combinations in the form of new products or new qualities of a known product, new production methods, the opening-up of new sales markets, new organizational forms or new forms of procurement.* (Volkmann et al., 2010, p. 3)

The discipline of entrepreneurship is multifaceted and includes a conflation of several disciplines (Chigunta, Schnurr, James-Wilson, & Torres, 2005). Macher (1999) defined agripreneurship as a "profitable marriage of agriculture and entrepreneurship – more plainly,

turning your farm into a business" (p. xi), and Nagalakshmi and Sudhakar (2013) described agripreneurship as "generally, sustainable, community-oriented, directly-marketed agriculture" (p. 208).

We define agripreneurship as the application of entrepreneurial principles to identify, develop, and manage viable agricultural enterprises/projects optimally and sustainably for profit and improved livelihoods. Lans et al. (2013) posited that, although agripreneurship encompasses "many characteristics of 'generic' entrepreneurship, [the concept] also has its distinct features due to the specific context of the agricultural sector" (p. 45).

Agripreneurs have been described differently by various authors. For example, Macher (1999) posited that "[a]n agripreneur is someone who runs an agricultural business – farming in particular – at his or her own risk" (p. 9). Further, Aleke, Ojiako, and Wainwright (2011) described an agripreneur as "a business owner who is self[-]employed and seeks to create wealth within the agricultural industry" (p. 70). In addition, Nagalakshmi and Sudhakar (2013) stated that an agripreneur is an "entrepreneur whose main business is agriculture or agriculture-related" (p. 208). Any individual, therefore, who develops innovative ways to invent, transform, or create an agricultural product or project, including value addition to existing products, while bearing the risks, would be considered an agripreneur (Bairwa et al., 2014; Nagalakshmi & Sudhakar, 2013; Singh & Sharma, 2012b; Tripathi & Agarwal, 2015).

A number of factors were identified that drive people into entrepreneurship and the same factors may motivate youth to pursue agripreneurship. These factors form two categories, i.e., push *and* pull factors (Alsos et al., 2011; Vyavahare & Bendal, 2012). Whereas the *push factors* mainly arise from situations and circumstances surrounding an individual, i.e., extrinsic forces, the *pull factors* emerge from the individual's inner self or desire; their motives are intrinsic.

Agripreneurs need to consider their personal goals and the income they expect to earn from an agricultural project before they commit themselves to its implementation (Macher, 1999). In addition, Singh (2012), as well as Singh and Sharma (2012b) identified a number of personal characteristics that make up agripreneurs. These characteristics include market- and achievement-oriented, flexibility, leadership, inspirational, perseverance, self-criticism, initiative, empathy, and creativity (Singh, 2012; Singh & Sharma, 2012b). Further, contrary to assertions made by some scholars that entrepreneurs or agripreneurs *are born*, most of the skills that make up successful agripreneurs are learned through formal and informal learning experiences (Rezai et al., 2011; Singh & Sharma, 2012b; Tripathi & Agarwal, 2015). Alsos et al. (2011), moreover, posited that "[a]lthough some individuals may appear to have strong innate skills, the majority acquire entrepreneurial skills through practice" (p. 15).

Agripreneurship involves taking risks and accepting uncertainties to develop a business venture with the goal of getting a profit or returns on the investment (Volkmann et al., 2010). It

is important to note that, although the amount of risks anticipated can be calculated, this is not the case with uncertainties (Volkmann et al., 2010). Uncertainties may include changes in government policy and unpredictable price fluctuations. Moreover, sustainability and profitability are the underlying principles of any agripreneurship venture (Macher, 1999; Vyavahare & Bendal, 2012). "Sustainable agriculture is an economically viable, environmentally sound, and socially acceptable system of agriculture" (Macher, 1999, p. 6).

Extension and Farmers' Entrepreneurial Undertakings and Extension

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 and individual interests that existed among farmers, including their entrepreneurial abilities and desires (Lans et al., 2013; Rajaei et al., 2011). Moreover, limited research-based evidence exists about the entrepreneurial abilities of farmers (McElwee, 2008b), especially in developing countries. Even though not all farmers are entrepreneurs, having entrepreneurial skills and competencies contributes significantly to the success and profitability of a farm (Richards & Bulkley, 2007).

According to Tripathi and Agarwal (2015), if farmers are to succeed as agripreneurs, they need "to be active, curious, determined, persistence, visionary, [and] hardworking, [to] come up with ideas, [be] communicative with strong management and organizational skills, recognize suitable marketing opportunities" (p. 535), and manage resources optimally, as well as bear the risks. Kahan (2013) added that agripreneurial farmers have "the initiative, drive, capacity and ability to take advantage of opportunities" (p. 4). Díaz-Pichardo, Cantú-González, López-Hernández, and McElwee (2012) posited that to transform an individual from the status of a "farmer as a farmer" to a "farmer as [an] entrepreneur" (p. 97) involves empowering the person with the necessary entrepreneurial competencies and skills through both formal and non-formal education. To that end, Rudmann, Vesala, and Jäckel (2008), as well as Kahan (2013) recommended the need for extension service providers to support and promote development of entrepreneurship skills among farmers, including the mentoring of aspiring farmers.

Agricultural entrepreneurship is important "for the survival of small-scale farming in an ever-changing and increasingly complex global economy" (Kahan, 2013, p. 2). Farmers need to be equipped with production skills as well as skills in agripreneurship and farm management if they are to survive and succeed as agripreneurs (Kahan, 2013; Rudmann, 2008; Tripathi & Agarwal, 2015). A research project funded by the European Union titled *Developing Entrepreneurial Skills of Farmers* identified five skills/competencies that farmers need to be successful agripreneurs:

a) professional skills, i.e., technical and production knowledge in the area/project that the farmer would like to implement;

b) management skills, i.e., financial and human resource management skills, planning and customer care skills;
c) opportunity skills, i.e., ability to identify and take advantage of a business opportunity, conduct a risk assessment and management, and being innovative;
d) strategic skills, i.e., skills to develop and evaluate the feasibility of a business idea, thinking conceptually, and setting goals;
e) cooperation/networking skills, i.e., leadership, flexibility, teamwork, and cooperation. (de Wolf & Schoorlemmer, 2008; de Wolf, Schoorlemmer, & Rudmann, 2007; McElwee, 2008b; Rudmann, 2008; Vesala & Pyysiäinen, 2008)

According to de Wolf and Schoorlemmer (2008) and de Wolf et al. (2007), three of these five skills, i.e., opportunity, strategic, and cooperation skills, are what make a farmer an entreprenuer.

Extension workers need to help farmers recognize, evaluate, and exploit the agripreneurship opportunities available within their communities, countries, and regions (Kahan, 2013). In addition, they can help train farmers in value addition to increase efficiency and profits, connect farmers to other agripreneurs within and outside their communities, and to researchers, and help them access better markets and potential sources of credit (Kahan, 2013). When extension workers facilitate the connections between agripreneurial farmers in the community with others outside their locales, including researchers, it fosters teamwork and helps build strong networks which facilitate flow of knowledge about innovations that can lead to agricultural and community development (Navarro, 2008). Further, extension agents must play a supportive role beyond the trainings they provide if farmers are to become successful agripreneurs (Kahan, 2013). However, because most extension agents are specialists in one particular field, they may require additional training in the principles of agricultural entrepreneurship to be effective at mentoring aspiring agripreneurs (Kahan, 2013).

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). Blumenfeld et al. (1991) defined project-based learning as "a comprehensive approach to classroom teaching and learning that is designed to engage students in [the] investigation of authentic problems" (p. 369). In project-based learning, the students take charge of their learning with some degree of independence and responsibility while working on a project, 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).

According to Blumenfeld et al. (1991), this relationship between students and teachers is akin to that of a "master-apprentice relationship" (p. 371) in which the teacher models for

learners and equips them with techniques to work and solve problems but the student 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, i.e., *learning by doing* with "a goal-directed process that involves inquiry, knowledge building, and resolution" (Thomas, 2000, p. 3).

Although project-based learning requires a substantial amount of time and resources to implement, the returns or benefits arising from it may be enormous (Blumenfeld et al., 1991; Nilson, 2010). Project-based learning helps students to acquire problem solving skills in real-life situations, promotes the development of inter-personal communication skills, and students learn how to work in teams, which promotes high-order thinking and reasoning skills (Blumenfeld et al., 1991; Mills & Treagust, 2003; Nilson, 2010; 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). Moreover, because of the responsibilities assigned to team members, students acquire leadership skills, as well as knowledge and skills attained from problem solving experiences with their projects, which they are likely to retain and use later in life; this may not be the case with some traditional methods of teaching, such as lecturing or rote memorization (Blumenfeld et al., 1991; Thomas, 2000).

Blumenfeld et al. (1991) posited that, if project-based learning is 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 more. This could be achieved by designing projects around problems that students face or are likely to encounter in their communities (Blumenfeld et al., 1991). In addition, the project's focus should be on the learning outcomes to be attained by students rather than their grades (Blumenfeld et al., 1991). Blumenfeld et al. (1991) added:

> It is insufficient merely to provide students with opportunities designed to promote knowledge that is integrated, dynamic, and generative, if students will not invest the effort necessary to acquire information, generate and test solutions, and evaluate their findings. . . . Consequently, project-based education is not likely to work unless projects are designed in such a way that, with teacher support, they marshal, generate, and sustain student motivation and thoughtfulness. (pp. 374-375)

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; Dadisman, 1921; Davis, 1911; Phipps, Osborne, Dyer, & Ball, 2008; Swortzel, 1996). For example, the use of Supervised Agricultural Experience (SAE) as reflected in the three-circle model of high school agricultural education in the United States (see Figure 3) provides learners with opportunities to apply the content taught in the classroom to situations in real-life (Barrick, Hughes, & Baker, 1991; Camp, Clarke, & Fallon, 2000; Croom, 2008; Dailey, Conroy

and Shelley-Tolbert, 2001; Hughes & Barrick, 1993; Phipps et al., 2008). Although the three circles in the model are connected (see Figure 3), each component, such as SAE, is usually done independently (Barrick, 1992; Croom, 2008; Hughes, 1992; Hughes & Barrick, 1993), and is designed to provide agricultural experiences that align with the students' "agricultural career pathway[s]" (Croom, 2008, p. 110).

Phipps et al. (2008) described SAEs as consisting of all "planned, sequential agricultural activities of educational value conducted by students outside of class and laboratory instruction for which systematic instruction and supervision are provided by their teachers, parents, employers, or others" (p. 438). Camp et al. (2000), however, proposed a definition of SAE as "*the planned, supervised application of agricultural principles and concepts*" (p. 20). Phipps et al. (2008) posited that "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). Barrick et al. (1991) asserted that SAEs have been a "significant component of secondary agriculture programs since their inception" (p. 31). Retallick (2010) postulated that the genesis of SAEs may have "evolved from the apprenticeship model utilized in Colonial America" (p. 59).

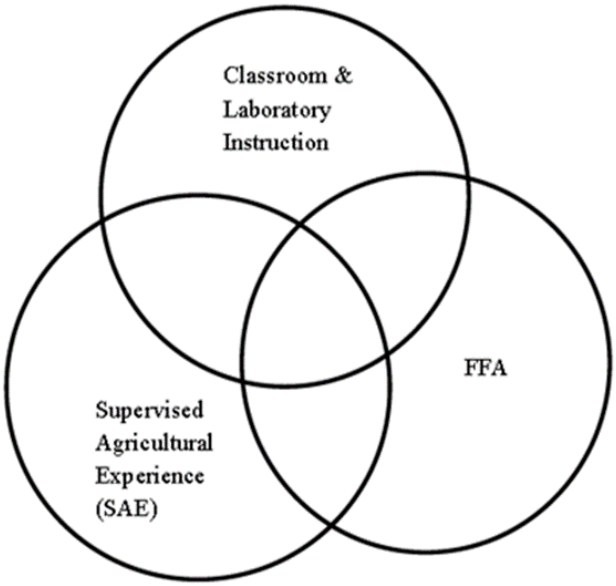

Figure 3 The Three-Circle Model of Agricultural Education (National FFA Organization, 2015a).

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

objectives, as well as the career opportunities that may arise from such learning experiences (Barrick et al., 1992; Camp et al., 2000; Croom, 2008; Hughes, 1992; Swortzel, 1996).

Agricultural entrepreneurship is an important aspect of SAE and has been instrumental in helping students establish their own agricultural enterprises after graduation from school (Moody, 1992). In addition, Barrick et al. (1992) posited that when students develop and manage their entrepreneurship agricultural projects, they are able to "develop the necessary skills and competencies to become established in their business or gain employment" (p. 29). Students working on entrepreneurial agricultural projects acquire a variety of skills, such as good work ethics, record keeping, persistence, risk-taking and management skills, creativity, idea generation, and skills to solve problems encountered in real-life situations (Moody, 1992). According to Barrick et al. (1992), students working on entrepreneurial SAE projects implement their projects in a school or community setting but they must own the resources used in the implementation of such projects. Connors (1992) asserted that when students volunteer to work on projects such as in a well-established agribusiness as part of their SAE, they are provided with business ideas which can be transformed into their own agricultural entrepreneurship projects. He added "[w]hat a better way to learn entrepreneurship than by working closely with successful agribusiness professionals" (Connors, 1992, p. 19).

During the early part of the 20th century in the United States, the use of project-based learning through agricultural clubs, such as *corn clubs,* was 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 farmers observed the clubs' demonstrations (Davis, 1911; Howe, 1910). The boys' parents and other community members where agricultural club members presented demonstrations were astonished by the yields they achieved and this motivated them to adopt better crop varieties and farming practices (Davis, 1911; Howe, 1910). The demonstrations conducted by the club 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 areas (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)

Project-based learning also has been used in Africa 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 (Akeredolu, n.d.; Kanté, Edwards, & Blackwell, 2013a, 2013b; Kwarteng & Boateng, 2012; Maguire, 2012; Mutimba &

Khaila, 2011). After its inception in Ghana, in 1993, SAFE has grown and expanded to eight other countries, i.e., Benin, Burkina Faso, Ethiopia, Malawi, Mali, Nigeria, Tanzania, and Uganda, and collaborates with 21 universities and colleges across the nine countries to provide professional development for mid-career extension agents (SAFE, n.d.). In each nation, SAFE has facilitated capacity building among extension workers to immerse them in real-world experiences through Supervised Enterprise/Experience Projects [SEPs] (Akeredolu, n.d.; Kanté et al., 2013a, 2013b; Kwarteng & Boateng, 2012; Maguire, 2012; Mutimba & Khaila, 2011; Zinnah, 1997).

In the SEP model, students, i.e., extension agents, with the help of their instructors and supervisors, are guided to develop a project proposal to solve a farmer-focused problem identified within their respective communities, which is implemented with the local farmers (Akeredolu, n.d.; 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 an "off-campus, farmer-focused, action research" (p. 260) project. Further, according to Kanté (2010), the approach taken by SAFE's SEP is akin to that of an apprenticeship project for the agricultural extension agents who are upgrading their knowledge and skills. The students who complete the SAFE program earn a bachelor's of science degree, where previously they held only a diploma or certificate, usually in a technical area of agriculture (Kanté, 2010).

SEPs provide opportunities for mid-career extension agents to acquire hands-on experience in working with farmers to identify problems in their communities, and also provides the extension agents with opportunities to gain firsthand experience for the kind of work they are likely to do in the future (Annor-Frempong, n.d.; Kwarteng & Boateng, 2012; Mutimba & Khaila, 2011; Zinnah, 1997). Zinnah (1997) added that SEPs help to ensure that mid-career extension agents acquire the right experiences, knowledge, and skills in regard to the kind of services they provide to avoid a potential *mismatch* between the community's needs and human resources. Further, according to Dr. Jefferson Mutimba (personal communication, September 7, 2015), the coordinator for SAFE in East and Southern Africa, one important aspect of the SAFE program is that the mid-career extension agents are already employed with various government or agricultural organizations. Therefore, the professional development provided is aligned with their work experiences and the needs of communities in which they work.

In Uganda, Gulu University uses project-based learning to ensure that its agricultural graduates receive hands-on experiences through a model referred to as "Gulu University's Student-Centered Outreach" (Kalule, Mugonola, Odongo, & Ongeng, 2014, p. 1), which aims at transforming agriculture in communities. Kalule et al. (2014) added that the outreach program aims "to facilitate the transfer and diffusion of innovative and user-friendly technologies intended to yield improved agricultural productivity and socio-economic progress" (p. 2). Similar to the SAFE model, Gulu University students pursuing a bachelor of science degree in

agriculture, who are in their final year before graduation, are attached to smallholder farmers in communities near the university (Kalule et al., 2014; P. Omara, personal communication, September, 5, 2015; W. Odongo, personal communication, September 12, 2015).

Unlike the SAFE model by which students experience their SEPs in the communities where they have been working in most cases, identify a need, write a proposal, and work with farmers to solve their problems, this is not the case with Gulu University. Agricultural students from Gulu University are matched with farmers in the communities who are willing to provide apprenticeships to the students; the students work with the farmers on projects to learn and they provide technical advice, as may be appropriate (W. Odongo, personal communication, September 12, 2015; P. Omara, personal communication, September, 5, 2015). This approach of field attachment to famers while working on an agricultural project enables the students to acquire real-world experiences prior to their graduation (Kalule et al., 2014). Further, the model is being revised to add aspects of agricultural entrepreneurship, where students will use project-based learning, i.e., *Student Enterprise Scheme* (SES), to acquire skills in opportunity recognition and development of agricultural business enterprises (Kalule et al., 2014).

Similar to the community outreach model being undertaken by Gulu University, Costa Rica's EARTH University uses project-based learning to ensure that students in their second and third years of study work with small-scale farmers to address challenges impacting agricultural production in their communities (Study at Earth, n.d.a). EARTH University's community outreach model has different areas of specialty, such as human development, agricultural development, as well as rural micro-businesses, and students engage with the community on a project addressing one or more of these areas (Study at Earth, n.d.a).

EARTH's students are equipped with skills in entrepreneurship during their first three years of study, and each student develops an entrepreneurial project which is funded with a loan from the university (Study at Earth, n.d.b). The students work in teams on their projects during their three years of study to ensure implementation and success, while, at the same time, learning about various aspects related to business development and management, such as "accounting, project administration, marketing, and product evaluation" (Study at Earth, n.d.b, para. 2). Further, the students are required to evaluate the "social and environmental implications" (para. 3) of their projects, and the students whose projects are found to have a positive impact on the environment are given more financial support (Study at Earth, n.d.b). To ensure sustainability of the program at the university, the students are required to payback their loans with interest, and profits accruing from the business ventures are shared among the group members during their third year, which helps to keep the students focused and motivated (Study at Earth, n.d.b).

Strength of Existing Approaches

Project-based learning approaches, such as SAEs and SEPs, provide learners with opportunities to apply the concepts learned in their courses to real-world problems under the guidance of experienced personnel, including farmers in some cases (Annor-Frempong, n.d.; Connors, 1992; Kwarteng & Boateng, 2012; Moody, 1992; Mutimba & Khaila, 2011; Swortzel, 1996; Zinnah, 1997). Dailey et al. (2001) posited that the use of "SAEs had helped bridge the gap and work by providing students with opportunities to apply what they have learned in the classroom and transfer those knowledge and skills to a real-world situation" (p. 11). Moreover, some of the entrepreneurial projects implemented by students using the knowledge and skills acquired through hands-on experiences have been transformed into viable businesses after students graduate from school, especially with the case of SAEs (Connors, 1992; Moody, 1992). In addition, SAEs equip students with critical thinking skills, problem solving, and improve on the relationship between the school and community (Barrick et al., 1992).

SAEs have been credited with improving student academic achievement because it emphasizes putting interests of the students at the forefront of the learning experience, i.e., a student-centered approach (Retallick, 2010). Dailey et al. (2001) as well as Ramsey and Edwards (2004) reported improved science and mathematics achievement among students whose SAEs involved projects leading to the application of scientific principles learned in real-world situations. Ramsey and Edwards (2004) added that SAEs "are integral extensions of the classroom that require students to use theories and applications learned in the classroom in various real-world contexts involving the agriculture, food, fiber, and natural resources system" (p. 87). Further, the use of project-based learning through SAEs had a positive economic impact on students' communities, as well as their pursuit of agricultural careers (Retallick, 2010; Retallick & Martin, 2005, 2008).

The approach used by SAFE in training mid-career extension personnel, whereby they assess and develop projects based on the needs of communities, as identified by local farmers, has been instrumental in ensuring the training, knowledge, and skills provided to the extension agents aligns with what is needed to be successful in their future work. Further, working with farmers as partners to solve their problems ensures a mutualistic relationship whereby both parties benefit, reducing pro-innovation bias sometimes associated with development projects (Rogers, 2003), and, at times, has led to new innovations and the co-creation of knowledge (Mauser et al., 2013; Navarro, 2008; Regeer & Bunders, 2009; Vargo, Maglio, & Akaka, 2008).

According to Dr. Jefferson Mutimba (personal communication, September 7, 2015), in the case of the SAFE model, the professional development provided to the mid-career extension agents, while still on-the-job, ensures that the extension agents do not have to look for a job but rather they return to work in their communities. This enables the agents to design project-based learning experiences that will resonate with the kind of challenges they are likely to encounter in their work. Moreover, an assessment of the performance of SAFE graduates by

Kanté et al. (2013a) indicated that, as a result of graduates' SEPs training and community-based implementations, their self-efficacy improved and were prepared better to serve farmers.

In the case of SAE model, when students work on projects, some are able to showcase their outcomes, such as livestock and plant products in FFA-sponsored competitions, which enable them to receive proficiency awards, FFA degrees, and even scholarships to further their education (Dailey et al., 2001). This helps to motivate and interest students in agriculture and related careers. The students are exposed to and become aware of the various careers related to agriculture which they can pursue. Further, the students learn a number of life skills, such as communication, leadership, record keeping, as well as good citizenship through the community engagement made possible by their experiences (Dailey et al., 2001; Retallick, 2010).

The approaches of working with communities during the implementation of projects, as evidenced by SAFE, Gulu University, and EARTH University, help to promote better working relationships between the institutions and their communities which facilitates knowledge transfer and applied research opportunities. In addition, Duo and Bruening (2007), in their evaluation of SAFE's program performance in Ghana, reported that the approach of using SEPs in the community to train mid-career extension agents had strengthened the participating University of Cape Coast's outreach mission through its Department of Agricultural Economics and Extension. To that end, these project-based learning models have helped bridge the gap between universities and farmers, and the two-way interaction and learning relationships between farmers and students has led farmers to adopt better methods to improve their agricultural production which translates into improved livelihoods and uplifted communities (Kalule et al., 2014; Kwarteng & Boateng, 2012). Further, the cost-sharing approach used by the SAFE model, where they partner with the various agricultural ministries/agencies employing the extension workers, as well as the loan repayment model adopted by EARTH University have helped to ensure sustainability and continuity of the training approaches (Akeredolu, n.d.; Kanté et al., 2013a, 2013b; Kwarteng & Boateng, 2012; Maguire, 2012; Study at Earth, n.d. b; Zinnah, 1997).

Weaknesses/Challenges of the Existing Approaches

Although the project-based learning models discussed provide students with *hands-on, minds-on* learning experiences in real-world environments, some shortcomings exist. For example, in the case of the three-circle model used in school-based (secondary school) agricultural education in the United States, each of the circles, including SAE, are frequently delivered as independent entities (Barrick, 1992; Croom, 2008; Hughes, 1992; Hughes & Barrick, 1993). This lack of synergy stands to make it difficult for students, as well as their teachers, to realize the benefits that could accrue from a more integrated approach, such as transfer of knowledge from one part of the model to another, or, as Roberts and Edwards (2015) suggested, an approach by which "the whole really is greater than the sum of its parts" (pp. 227-228).

In the case of SAFE and Gulu University, emphasis has been put on equipping mid-career extension agents and agricultural students, respectively, with the necessary knowledge and skills needed to be successful in the communities where they are expected to provide advisory services to farmers (Akeredolu, n.d.; Kanté et al., 2013a, 2013b; Kalule et al., 2014; Kwarteng & Boateng, 2012; W. Odongo, personal communication, September 12, 2015). This makes them dependent on the ministries of agriculture in the respective countries for employment, because most farmers practice subsistence agriculture and cannot afford to pay for private agricultural advisory services. Little or no effort has been dedicated to equipping them with entrepreneurial skills in agriculture for job creation as is the approach used by Earth University (Study at Earth, n.d.a, b). Therefore, if the respective ministries are not able to hire and pay for the services of these graduates, return on the investments made in their training may not be realized. For example, take the case of Uganda, which decided to restructure its extension services, retrenching all its extension services, and replacing agents with personnel from the Uganda Peoples' Defense Forces (Lumu & Kiwuuwa, 2014; Mukembo & Edwards, in press; Rwakakamba & Lukwago, 2014; The State House of Uganda, 2014; Uganda Media Centre, 2014). Because of this abrupt change in government policy, the mid-career extension agents trained by Makerere University with support from SAFE are now jobless due to Uganda's army supplanting their role in the communities as part of the National Agricultural Advisory Services (Dr. Jefferson Mutimba, personal communication, September 7, 2015).

According to Kanté et al. (2013a), SAFE formed a cost-sharing partnership with the respective government institutions employing the mid-career extension agents to provide support to the agents so they could fund and implement their SEPs, which is a core requirement for graduation. Although SAFE fulfilled its obligation, this was not the case for all governments, and some of the participants did not receive funding for the SEPs from their respective employers (Kanté et al., 2013a). This impacted the progress of their work in the communities as well as the trainees' graduation (Kanté et al., 2013a). Further, Kanté et al. (2013a) added that "as trainees, the graduates needed to work on topics relevant to the villagers' problem. Therefore, they needed assistance to implement these types of SEPs or risk losing the confidence of their clients" (pp. 81-82).

Another weakness that impacted the use of SEPs as a project-based learning strategy was the lack of proper coordination and communication between the various stakeholders. According to Kanté et al. (2013a), in the case of Mali, supervision of trainees was not well coordinated and the flow of information between the stakeholders who were responsible for supervising the students was not forthcoming. For example, whereas the employers of the extension agents "were informed about what their employees were doing in the SAFE training program . . . they were not involved deeply in their work, [and they did not] . . . have a clear understanding of the SEP approach" (p. 82). In addition, less than a cordial and productive working relationship existed between some supervisors and SAFE trainees; some trainees asserted that the supervisors and employers did not have a proper understanding of how the

SEPs approach was designed to work (Kanté et al., 2013a). To that end, one trainee, stated that "during the defense of our theses, we encountered many problems with some professors because they did not understand the approach we used with SEPs" (Kanté et al., 2013a, p. 82). "Moreover, other graduates indicated that a few supervisors behaved more as inspectors or 'fault finders' rather than as helpers and advisors" (Kanté et al., 2013a, p. 82).

According to Dr. Jefferson Mutimba (personal communication, September 7, 2015), another challenge for which SAFE has been criticized is the lack of agricultural projects other than crop production. Because of the resources allocated and the limited time frame available to students to implement their SEPs, most tend to focus more on crops because they are able to complete their projects in a short time with minimal resources. Less attention is given to other aspects of agriculture, such as animal husbandry, which would require more time and resources to implement. Kanté et al. (2013a), in their assessment of SAFE graduates, also stressed this and added that the six to eight months within which the trainees were required to produce results was not adequate.

In Uganda, at Makerere University, where the SEPs approach was implemented in partnership with SAFE, because of limited resources and a need to maintain a self-sustaining program, the institution has had to recruit more students amidst a small number of staff, thus increasing the student-to-supervisor ratio, which has made supervision of students' projects difficult (J. Mutimba, personal communication, September 7, 2015). As a result of this challenge, the university moved away from the SEPs approach and resorted to placements in which students are attached to institutions or other workplaces where they are expected to receive some real-world experiences supporting their career preparation (J. Mutimba, personal communication, September 7, 2015).

With the exception of the SAE approach used in the United States (Barrick, et al., 1991; Camp, et al., 2000; Croom, 2008; Dailey, et al., 2001; Hughes & Barrick, 1993; Phipps et al., 2008), in most developing countries, the approach of project-based learning in agriculture has focused mainly on students in tertiary institutions, e.g., EARTH University, Gulu University, as well as the SAFE approach (Akeredolu, n.d.; Kanté, et al., 2013a, 2013b; Kalule et al., 2014; Kwarteng & Boateng, 2012; Maguire, 2012; Mutimba & Khaila, 2011; Study at Earth, n.d. a, b). Little effort has been directed toward empowering youth in secondary schools with real-world experiences in agriculture, such as agricultural entrepreneurship through project-based learning for skills development and economic survival after graduation. Moreover, the education systems in many developing countries, such as Uganda, have been criticized for graduating students without the necessary knowledge and skills to address existing or emerging problems in their communities, for example, declining crop yields, issues related to climate change, and endemic youth unemployment (Lugemwa, 2014; Namuli-Tamale, 2014; Semboja, 2007; The Economic Intelligence Unit, 2014).

Further, the deficit of youth engagement in agriculture, especially professional women agriculturists, is alarming (Beintema, 2006; Kanté, et al., 2013b; Kruijssen, 2009; Mukembo et al., 2014, 2015; Mukembo, Aguirre-Uscanga, Edwards, & Brown, 2015), yet women and youth provide most of the agricultural labor in developing countries (Ajambo & Synnevåg 2011; Ben-Ari, 2014; Beintema & Di Marcantonio, 2009). According to Leung (2008), Super, in his *life-career-rainbow model,* described five career development stages through which individuals progress, i.e., growth, exploration, establishment, maintenance, and decline. Donald Super (1980) professed that youth, i.e., individuals aged 15 to 24 years, are at the *exploration stage* during which they form attitudes toward work, gain experience, develop skills, and begin to choose careers they wish to pursue (Leung, 2008; Super, 1980). This age group of 15 to 24 years comprises the majority of students in secondary schools and tertiary institutions in developing countries (Africa Economic Outlook, 2012; Montpellier, 2014).

Liang (2002) posited that secondary education is vital in ensuring future economic prosperity of any country by preparing students for various future career trajectories to pursue after secondary education. It is also a critical bridge between elementary schools and tertiary institutions (Liang, 2002). To that end, a need exists to devote more effort to ensure students in secondary schools are exposed to real-world experiences through project-based learning, as well as opportunities for community engagement involving agriculture. This approach may help them acquire life skills such as teamwork, problem solving, leadership, as well as agricultural entrepreneurship, and the youth may also become aware of and develop interest in agricultural careers (Kruijssen, 2009; Mukembo et al., 2014, 2015).

Conclusion and Implications

Based on this review of literature, it is worth noting that although many young people in Africa are becoming better educated and literate (see Figure 1; Africa Economic Outlook, 2012), the skills and knowledge acquired from school have had minimal impact in preparing them to solve many of the challenges encountered in their communities. These challenges include food insecurity, unemployment, underemployment, and poverty, among others (Gough et al., 2013; Gyimah-Brempong & Kimenyi, 2013; Montpellier, 2014). If youth are educated but cannot use the knowledge and skills acquired in school to solve challenges encountered in everyday life, the value of their education is not only questionable it — *may be irrelevant*. Alfred North Whitehead (1927) in his book *The Aims of Education and Other Essays* posited that "[a] merely well-informed man is the most useless bore on God's earth. What we should aim at producing is men who possess both culture and expert knowledge in some special direction" (p. 1). He added:

> 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. (Whitehead, 1927, p. 3)

To that end, students ought to be active in their learning and provided opportunities to apply knowledge and skills acquired in school to real-world situations through *hands-on*, *minds-on strategies.* This aim can be achieved through project-based learning approaches such as those involving agripreneurship.

The use of project-based learning approaches in teaching agriculture with aspects of entrepreneurship, as employed in countries such as the United States, has helped to equip students with practical skills, for example, business development, record keeping, management, and value addition (Moody, 1992). Some of the beneficiaries of this approach have even developed viable businesses, which created employment opportunities in their communities (Barrick et al., 1992; Connors, 1992; Moody, 1992). Therefore, the approach of integrating agricultural and entrepreneurship education using projects could be a way for students to realize agriculture is a business enterprise that can lead to gainful employment after leaving school.

The education of rural youth on and around agricultural issues and practices, especially with regard to the adoption of new technologies within rural communities, is credited with contributing to the development of agriculture in the United States, and thereby enabling its food security and sovereignty (Davis, 1911; Howe, 1910). To that end, the engagement of young people with their communities through agripreneurship projects (see Figure 2) could help contribute to agricultural development while improving food security and food sovereignty. Moreover, as a result of these interactions, new ideas may evolve between the farmers, students, and other stakeholders leading to co-creation of knowledge, solving problems, and adoption of innovative practices (Mauser et al., 2013; Navarro, 2008; Regeer & Bunders, 2009; Vargo et al., 2008). Further, by using agripreneurship as a school-community, project-based learning model, it is likely to contribute to personal, community, and national development, while improving livelihoods (Alsos et al., 2011; Bairwa et al., 2014; Khayri et al., 2011; Mujuru, 2014; Rajaei et al., 2011; Yaghoubi, 2010). However, in working with communities, the proper flow of information must occur among the various stakeholders to minimize misunderstandings and knowledge gaps (Kanté et al., 2013a) and thereby increase the likelihood of the approach achieving its aims.

Annex: Using Project-based Learning to Equip Youth with Agripreneurship Skills to Improve Livelihoods and Agricultural Production in their Communities? The Case of Uganda

As previously stated, Uganda is one of the developing countries in Africa grappling with the problem of youth unemployment and poverty (Lugemwa, 2014; Soucat, Nzau, Elaheebocus, & Cunha-Duarte, 2013; World Bank, 2013). Further, a discrepancy exists between the country's population growth and its agricultural sector. Whereas Uganda's population is growing at a rate of 3.03% per annum (Uganda Bureau of Statistics, 2014), its agricultural sector is growing at a much slower rate of 2.6% to 2.9% per annum (Feed the Future, n.d.; Ministry of Agriculture, Animal Industry & Fisheries, 2010).

The unemployment level among youth in Uganda is thought to range from 61.6% to upward of 80%, and their poverty levels could be as high as 83% (ActionAid International Uganda [AAU], Development Research and Training [DRT], & Uganda National NGO Forum [UNNGOF], 2012; Lugemwa, 2014; National Curriculum Development Centre [NCDC], 2014; Soucat et al., 2013). A study conducted in 2012 by three Non-Government Organizations (NGOs) in Uganda, titled *Lost Opportunity? Gaps in Youth Policy and Programming in Uganda*, reported that a majority of the participants asserted they did not receive the necessary knowledge and skills in school to prepare them for the *real world* (AAU, DRT, & UNNGOF, 2012).

> 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)

Namuli-Tamale (2014) and Semboja (2007) stated that the lack of vocational and entrepreneurial skills among the youth needed to survive in the real-world has contributed to their poverty and high unemployment rate. Further, Arinaitwe (2014) and NCDC (2014) posited that fewer than one-in-four of the graduates produced annually by various educational institutions in Uganda were able to find employment. Moreover, the World Bank (2013) projected that more than 10 million Ugandans will be searching for employment by 2020, if strategies are not developed and implemented to address the employment challenge.

Over time, efforts have been taken to reform Uganda's secondary education curriculum to make it more learner-centric so students are well-prepared to meet the challenges of today and the future (NCDC, 2013). In addition to agricultural education, which was already part of the curriculum, new vocational or practical subjects, such as entrepreneurship, were introduced in 2000 to equip students with knowledge and skills they could use to develop and establish

businesses in communities for job creation and rural development (Luyima, 2010; NCDC, 2014, 2015).

Even though the teaching and learning of most vocational subjects, such as agriculture and entrepreneurship, was meant to involve *hands-on, minds-on* learning experiences with applicability to real-world settings, unfortunately, this has not been the case in Uganda. Most of the instruction is theoretical and subject-centered, and geared toward students getting good grades on examinations to advance to the next educational level (Basaza, Milman, & Wright, 2010; Liang, 2002; Lugemwa, 2014; Namukasa, Kaahwa, Quinn, & Ddungu, 2012; NCDC, 2014; Tashobya, 2014). However, through approaches to curriculum integration students are more likely to understand the relationship between subjects and the applicability of content learned in the classroom to real-world situations (Bean, 1996; Vars, 1991, 2001). This could be done through project-based learning in which teachers across disciplines work together to help students develop projects that integrate knowledge from different subject areas or disciplines, i.e., an interdisciplinary approach with the teaching focused on common themes or concepts (Mukembo & Edwards, in press; Shoemaker, 1989).

Good (as cited in Shoemaker, 1989) posited that 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). For example, in the case of Uganda, curriculum integration could involve developing and implementing a learning project comprised of agricultural knowledge, concepts, and practices as well as principles of entrepreneurship, i.e., *agripreneurship*.

The students could work in teams, under the guidance of their agriculture and entrepreneurship teachers, to develop and implement innovative agricultural projects. The projects could involve principles of entrepreneurship, such as innovativeness, profitability, and sustainability, while engaging stakeholders in the community. In addition, as students develop their innovative agripreneurial projects they would be encouraged to incorporate aspects of creativity, the projects would provide opportunities to acquire *hands-on, minds-on* skills in entrepreneurship, leadership, teamwork, networking, civic engagement, and community outreach. Such innovative projects could be viewed as a *Supervised Agripreneurship Projects [SAPs]* (see Figure 2), and conducted by the students under the mentorship of an interdisciplinary team of agricultural and entrepreneurship teachers. Moreover, as the students implement their projects at school, agricultural extension agents could link them with other farmers in the community working on related enterprises to develop relationships based on mutual agripreneurial interests. Such relationships would involve a two-way learning process with reciprocal flow of information between students, farmers, and other stakeholders. In addition, the students' SAPs could be a nexus for bringing together a variety of interested stakeholders, such as research organizations, school faculty, and other members of the community, through a reciprocal flow of information-sharing, collaboration, and feedback.

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