Evaluation of training methods in an urban agriculture apprenticeship program

by

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Abstract

Place-based education is used throughout agricultural education as a means of experiential learning and is a powerful tool for training adult beginning farmers due to its ability to provide context, utility, independence, and use for previous experiences in the learning process. Apprenticeship – one method of place-based learning – is widespread in United States agriculture, particularly in the organic vegetable production sector. Researchers have analyzed the goals of apprenticeship programs and their training methods, but little research exists analyzing the effectiveness of these training methods.

Growing Growers is an Extension-partnered apprenticeship program in Kansas City that offers participants sustainable agriculture training in three learning environments: workshops, host farm mentoring, and experiential, employment-based learning. This training and instructional format provides a unique opportunity to analyze the effectiveness of learning environments in an agricultural context. A survey was developed to understand the training methods of the program's host farms and preferred learning environments of program participants. Following survey distribution, the results were used to identify effective learning environments, and recommendations are made for the improvement of Growing Growers as well as similar programs.

Survey results indicated that participants preferred formal environments for four learning objectives, mentoring for two learning objectives, field work for three learning objectives, and had no learning environment preference for five learning objectives. Additionally, participants indicated that nine learning objectives need formal educators, and eight need contextual application. Three learning objectives (production planning, small farm equipment, insect management) require both formal educators and contextual application.

Respondents almost unanimously indicated that their business management training was lacking, confirming previous research that mentioned apprenticeship programs' inability to connect participants to business start-up resources. In particular, participants were not comfortable with land acquisition and capital, which prevented many apprentices from pursuing commercial food production. Recommendations regarding future changes to the program concern business management education, including adding project-based business plan development, providing locations for apprentices to contextually apply business management knowledge, and exploring alternatives to land acquisition.

Table of Contents

List of Figures

Note: For the purposes of chapter division
L: Literature Review, A: Journal Article, R: Evaluation Report

List of Tables

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Dedication

This thesis is dedicated to anyone who feels called to lead people into farming.

Introduction

As the world population progresses towards 11.2 billion people by 2100, government organizations are paying more attention to the people who will supply the food needed to support that population boom. The United States Department of Agriculture runs a census of all commercial food producers every five years to identify demographic and production patterns in its agriculture industry. Data from these censuses suggests two patterns that could pose as barriers to consistent food production in the coming decades for the world's leading food exporter.

The first pattern is that America is losing farmers. Proportionally, the percentage of America's workforce involved in agriculture has fallen drastically. In 1900, even following the Industrial Revolution, 38% of the United States still worked in agriculture. In 2008, that figure had fallen to 2%, with 1% directly involved in food production. This is a result of two sets of factors. Urbanization and industrialization drew people away from rural areas to cities for higher paying jobs. Farm consolidation and technological advancement allowed fewer people to produce the same amount of food. Thanks to these technological advancements, this shrinking population of farmers has not hindered production for the United States, which exports the most food of any country. However, if agriculture enters a transition period where current farmers stop producing food, recruiting new farmers becomes necessary and food production could easily lag in the interim.

The second pattern identified by the USDA Censuses of Agriculture signals this upcoming transition period. The average age of a United States farmer is rising. Since 1954, the average age has risen from under 50 years old to 58.3 years in 2012. This is also the result of previously mentioned technological advancement in food production, which allows farmers to continue producing later into their lives. However, with one exception (1974) the average age of the farmer has risen in every census since 1910. Today, farmers over the traditional retirement age of 65 account for a third of all United States farmers. If there are fewer people farming in the United States than ever before, and the third of current food producers above retirement age stop producing food through death or retirement, how will the United States continue to produce the food necessary to support the world's growing population?

The answer to this question at one time relied upon intergenerational succession, where sons and daughters would inherit farms from their aging parents. Hampering this potential solution is the failure of family-owned businesses such as farms. According to the SCORE Association, a federal non-profit created to offer business planning and mentoring (SCORE Association, 2018):

- Only *30%* of all family-owned businesses survive the transition between the first and second generations.
- Only *12%* survive the transition between second and third generations.
- Almost half *(47%)* of all small business owners who plan to retire in the next five years have not identified a successor for their business.

If we can only count on succession for replacing a third of transitioning farmers, agricultural education and recruitment become vital to keeping agriculture in the United States stable and productive.

Across the United States, there are approximately 1 million students with exposure to agriculture through primary and secondary education (National Council for Agricultural Education, 2012). However, despite the broad reach of formal agriculture education, degree attainment in postsecondary education still meets only 61% of all annual job openings in the agriculture sector (Goecker, Smith, Fernandez, Ali & Goetz Theller, 2015; DataUSA, 2016**)**. Recognizing the need for beginning farmer training programs aimed at adults, Congress included funding for the New Farmer & Rancher Development Program in the 1990 Farm Bill. This program offers competitive grants to "support new and established local and regional training, education, outreach and technical assistance initiatives to increase opportunities for beginning farmers and ranchers." This definition of the program's purpose is intentionally vague in order to allow for flexibility in methods, which vary from program to program.

One common training model in United States trade industries is apprenticeship. Although called apprenticeships, in the agriculture industry these positions vary greatly from trade-based counterparts of the past. Historically, apprenticeships lasted for several years to allow time for apprentices to gain and practice skills in their desired industry. However, the length of apprenticeship rarely exceeds one year in today's agricultural contexts, which limits the potential for educational opportunities and skill development. Many apprenticeship programs offer formal education opportunities through partnerships with universities, non-profits, and county Extension offices as a means of supplementing on-farm education.

In order to ensure that beginning farmers transition into food production successfully, they must learn farming principles in the most effective manner. Partnered apprenticeship programs provide a unique opportunity to study the way program participants learn about agriculture in formal, nonformal, and informal learning environments, which can assist future programs tasked with training beginning farmers. This thesis reports on an evaluation of Growing Growers, a partnered apprenticeship program in Kansas City. Through this evaluation, training needs of new farmers and the best environments to use to train these beginning farmers are identified. The results lead to recommendations to Growing Growers regarding teaching methods, and future apprenticeship programs can use the results when creating educational opportunities.

Literature Review

World demographics

In 2017, the United Nations released their revised World Population Prospects report, which estimates that the world population will rise to 9.8 billion people by 2050 and 11.2 billion people by 2100. Following the worldwide trend, the United States population will increase 120 million people by 2100 (United Nations Department of Economic & Social Affairs, 2017). Scholars have voiced concerns that agricultural productivity must improve for the industry to support this booming population (Acevedo, 2011; Bratspies, 2014; Godfray et al., 2010). Of the 168 sovereign countries with per-person dietary energy supply data, only two are below a food supply of 2,000 calories/person/day (Roser & Ritchie, 2018), and the world's current food production is estimated to feed 10 billion people. This implies, and Bender et al. (1993) supports, that inequitable food distribution causes malnutrition and not agricultural productivity.

Farming demographics in the United States

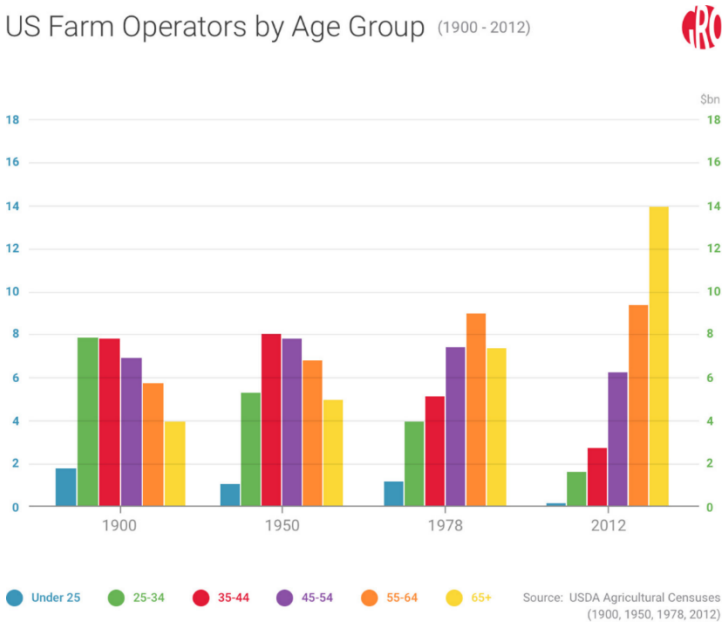

Figure L-1. Earnings of 6 different age ranges across 4 Censuses of Agriculture (GroIntelligence, 2016).

While food production can currently sustain the world's growing population, farmer demographics present an upcoming challenge for the agriculture industry in the United States. According to the 2012 United States Census of Agriculture, 33.2% of principal farm operators are over the traditional retirement age of 65, and 12% are over the age of 75 (United States Department of Agriculture [USDA], 2014). Figure L-1 indicates trends of age ranges across four historical censuses of agriculture and their relative earnings in billions of US dollars. The Under 25 and 25-34 age ranges see constant decline across all four censuses, while the 58-64 and 65+ age ranges see constant growth across all four censuses, indicating the population age shift across the past 112 years. As these older farmers begin transitioning into retirement, the need for consistent food production to support a rising population increases the impact of farm succession.

Farm succession, defined as the passing of control over a farm to another person, is crucial to the survival of the industry and maintaining the current level of agricultural output (Gale, 1994; Mishra et al, 2010). However, failure in succession is one reason why the ratio of young farmers is diminishing. Historically, U.S. farmers relied heavily upon intergenerational succession in order to maintain the agricultural workforce. Today, the proportion of the United States population

working in crop production is the lowest it has ever been, at 1%, which increases the impact of succession failure if farmers cannot transfer control of their farm to their children or grandchildren. Succession faces several daunting statistics. According to the SCORE Association (2018), a federal non-profit created to offer business planning and mentoring:

- Only *30%* of all family-owned businesses survive the transition between the first and second generations.
- Only *12%* survive the transition between second and third generations.
- Almost half *(47%)* of all small business owners who plan to retire in the next five years have not identified a successor for their business.

These succession numbers have changed little from when Wheeler (1926) observed that only 35% of farmers received their farm through inheritance, marriage, or gratuitous gifts. The other 65% of farms either remain in operation through transfer to external parties or close, which negatively impacts regional food production. Because these farms are transferred outside of families, the industry benefits from ensuring that these producers with diverse backgrounds and experiences have the skills and knowledge necessary to successfully produce food and maintain stable businesses.

Educating prospective farmers

Education is one method used to generate interest for prospective farmers to fill the gap of skilled labor left by the lack of intergenerational farm succession. Education can target adults or children, but primarily targets children and adolescents who are still developing career goals and interests. The 1862 Morrill Land-Grant Act established universities devoted to teaching practical sciences such as agriculture, and the Smith-Lever Act of 1914 established cooperative extension as a means of connecting the general public with education and training. According to the National Council for Agricultural Education (2012), "agricultural education is a systematic program of instruction available to students desiring to learn about the science, business, and technology of plant and animal production and/or about the environmental and natural resources systems" (para. 1). Through programs such as the USDA's Agriculture in the Classroom and Cooperative Extension's 4-H, there are approximately 1 million students with exposure to agriculture through primary and secondary education (National Council for Agricultural Education, 2012). Despite the broad reach of formal agriculture education, it does not generate enough skilled labor to meet industry demand. According to DataUSA (2016), students in postsecondary agriculture programs received 35,642 degrees across the nation in 2016 – a figure that fills only 61% of the expected 57,900 annual job openings in the agriculture sector (Goecker et al., 2015). Because of this shortfall, adult education must complement primary and secondary education in generating skilled labor to fill the gap, and alternative education pathways should exist for those who do not want to or cannot attend university for agricultural training.

Legislators have incentivized these alternative education pathways through recently established education grant programs. The 1990 Farm Bill established the New Farmer & Rancher Development Program (now renamed the Beginning Farmer & Rancher Development Program, or BFRDP). This program offers competitive grants to "support new and established local and regional training, education, outreach and technical assistance initiatives to increase opportunities

for beginning farmers and ranchers" (Food Agriculture, Conservation, & Trade Act of 1990, 7 U.S.C. §2279(d)(1)). The Secretary of Agriculture [hereafter referred to as Secretary] has the authority to establish education teams "to develop curricula, conduct educational programs and workshops for beginning farmers and ranchers" (7 U.S.C. §2279(d)(14)(A)). This program received $20 million per fiscal year from 2014 through 2018. However, the 2018 Farm Bill increased funding for the grant program to $30 million for FY2019/2020, $35 million for FY2021, $40 million for FY2022, and $50 million for 2023 and beyond (Agriculture Improvement Act of 2018, 7 U.S.C. §2279(l)(1)). The increase in funding from the government highlights lawmakers' perceived need for well-developed training programs targeting prospective farmers.

The definition of training program only stipulates the target population and does not require specific methods. These programs can vary in their methods, which might include classroom-based activities (e.g. workshops, seminars, consultations, and lectures), experiential learning opportunities (e.g. supervised agricultural experiences, internships/apprenticeships), and mentoring/network development (Niewolney & Lillard, 2010). Additionally, students interested in farming span a continuum of typologies and cohorts of students may include one or more of these typologies (Sheils & Descartes, 2004). In order to develop robust training programs that legislation requires, programs must identify the typologies and learning strategies of its students, and teach the right topic in the most effective manner. This necessitates solid development and routine evaluation of new farmer training programs.

Program theory

A program is any set of events or organizations that use a program model to distribute goods/services and influence outcomes. Programs have many potential overarching organizations, such as governmental agencies, academic institutions, and charities.

The following section describes Chen's (2005) program model, shown in Figure L-3. Programs exist in order to solve a perceived problem using a "change model," which identifies the external context of the problem and its relationship with the program. There are three components to a change model:

- Outcome – This is the desired result of a program's intervention.
- Determinant – This is the variable or set of variables that decides whether the program achieves its outcome.
- Intervention – The program provides this in order to influence the determinant.

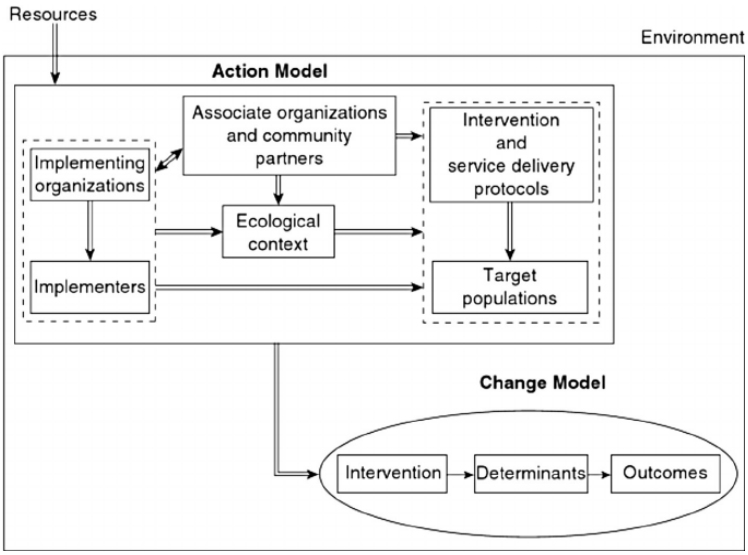

Figure L-2. Chen's program model, which highlights a program's relationship between a problem (change model) and its organizational structure (action model) (Chen, 2005).

The change model reflects a program's descriptive assumptions, or the perceived cause/effect relationship between a variable and an outcome. By identifying a variable that influences an outcome and changing this variable through providing a good or service, the program hopes to improve upon a desired outcome or to prevent an undesired outcome. Programs identify their change models through mission statements.

It is vital to note that a program's success or failure relies on coordinators' ability to assess their descriptive assumptions and the cause-and-effect relationship between determinant and outcome accurately. Resources go to waste on a program that incorrectly identifies the cause of the outcome they wish to change, and the desired outcome often goes unachieved. Therefore, programs should research their determinants in the planning phase before implementing the model *in situ*.

Once the program defines its change model, program creators must then identify their method(s) of intervention. This becomes the program's "action model." The action model determines all relationships between a program's moving parts and reflects the program's prescriptive assumptions, or the assumptions for how the program can best provide its intervention. Action models vary significantly between programs, even those programs with the same change model, and external context heavily influences chosen intervention methods.

The action model determines how the program will organize itself and what methods it will use to transform inputs into interventions. The program's prescriptive assumptions, or how the program can most effectively influence the determinant from the change model, determine these methods. Action models vary even between programs with the same desired outcome based upon each program's context.

The components of the action model are:

- Implementing organizations – These are the program's overseers
- Implementers – The individuals responsible for providing the intervention
- Associate organizations/community partners – Any outside organizations with a programmatic relationship. The roles of these organizations vary and can range from publicity to secondary implementation.
- Intervention & service delivery protocols (SDP's) – This is the intervention specified in the change model, along with the steps to realize this intervention.
- Target populations – the group of participants which will receive the intervention
- Resources – Any input that is necessary for the functioning of the program

Programs often have defined life cycles. A life cycle is the time it takes for the program to complete its intervention and observe its desired outcome in the participant. Life cycles vary depending on the purpose of the program, ranging from instantaneous (e.g. making and serving meals at a homeless shelter) to years long, (e.g. targeted career education). Programs may be cyclical, completing multiple iterations of delivery and outcome within its life cycle (Thiry, 2012b). For example, using Figure L-4 below, an agriculture education program has yearly cohorts. After coordinators define the program, each cohort goes through the cycle of delivery and outcome. Each subsequent year's cohort begins at the diamond and the cycle repeats until the program closes. In

order to determine whether a program is successfully achieving its goals, coordinators must evaluate methods and results at several life cycle checkpoints.

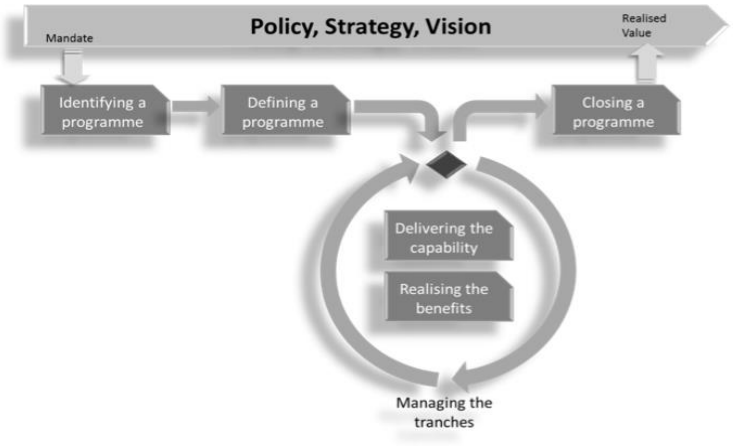

Figure L-3. A diagram explaining the life cycle of a program with recurrent interventions (Thiry, 2012a).

Evaluation theory

Program coordinators conduct an evaluation at specific intervals during/after a program's life cycle in order to assess the validity of the program's change and/or action models. Using information from the evaluation and experiences from the program's life cycle, the program coordinators will determine the accuracy of their models and adapt these models for future iterations of the program. Due to program-related biases, coordinators rarely conduct formal evaluations themselves. Instead, evaluations are collaborations between program coordinators and external evaluators. One limiting factor for evaluations conducted by external evaluators is the proper conveyance of the program model and coordinators' goals for the evaluation. Just as the program's success is determined by the cause/effect relationship understanding, the evaluation's success is determined by a mutual understanding between program coordinators and evaluators of the goals of the evaluation and the program model.

Once evaluators and coordinators reach this understanding, the evaluator creates their evaluation tool(s). Evaluation methods vary depending on the goals of each program. Because programs are largely people-focused, social science methodologies such as surveys, focus groups and interviews are the most common evaluation tactics. When designing an evaluation, constant communication between evaluator and coordinator is necessary to ensure that they design the tools in a way that will achieve the coordinators' goals.

Evaluations are either formative or summative in nature. Both analyze different parts of the program model, and the evaluator determines the evaluation type based on coordinators' motives. Formative evaluations analyze a program's methods to identify areas where it can improve the likelihood of achieving its desired results. The program's prescriptive assumptions and action model come under scrutiny in formative evaluations. Alternatively, summative assessments focus on discovering whether the program achieves its desired outcomes without regard to method. Summative evaluations analyze the program's descriptive assumptions and change model. While

formative-prescriptive and summative-descriptive evaluations are the two most common combinations of evaluation goals, formative evaluations can also assess the change model, and summative evaluations can assess the action model. Listed below are examples of each combination:

Formative-prescriptive: Is our action model's organization the most effective way we can deliver our intervention?

Formative-descriptive: Are there other interventions we can address to increase our outcome attainment?

Summative-prescriptive: What parts of our action model account for our [lack of] outcome?

Summative-descriptive: Is our change model the most complete change model, or are variables missing?

Every Farm Bill since the inception of the BFRDP in 1990 has included a section outlining the need for these programs to seek stakeholder input using methods such as program evaluations. The Act calls for the Secretary to "seek stakeholder input from beginning farmers and ranchers" as well as "national, State, Tribal and local organizations and other persons with expertise in operating programs for beginning farmers and ranchers." (7 U.S.C. §2279(f)) This is done so that programs can "include content tailored to specific audiences of beginning farmers and ranchers" (7 U.S.C. §2279(d)(14)(B)).

Due to their mission of farmer education and outreach, cooperative extension agencies collaborate with these programs to assist in training new farmers, and typically conduct evaluations. However, these evaluations are mostly summative in nature, and do not investigate learning methods and environments. Programs should investigate how participants best learn multiple pieces of a holistic curriculum when provided with multiple learning environments. By doing so, program coordinators can adjust their methods in order to increase the effectiveness of their participants' training and increase their chances for success in commercial food production.

Learning environments & strategies

The effectiveness of learning depends largely on its environment and employing the correct strategies in those environments. In order to convey information effectively, different curricula require different learning contexts, sometimes differing even from topic to topic. According to the Organization for Economic Cooperation & Development (n.d.), learning falls into one of three categories:

- Formal education is structured learning based upon clearly defined learning objectives. Classroom-based education falls into this category.
- Nonformal education is a structured teaching style with a set of intentional learning objectives, but with a variable curriculum and methods based upon the needs and learning style of participants.
- Informal learning is unstructured learning with no defined curriculum, based upon the participant's observations, experiences, and participation. Also defined as experiential education.

While these three environments exist at every formal and informal learning institution, the way in which adults and children learn differs, and adult learning requires modified teaching methods. In 1980, Malcolm Knowles coined the term andragogy to describe the "art and science of helping adults learn." Knowles based his methods in andragogic development on the following assumptions (Knowles, Swanson & Holton, 2005):

1. Adults must understand why learning new information or skills will be important to them.
2. Adults desire self-direction and learn better when transitioning from dependency (lack of skill) to self-directed learning and skill development.
3. Adults bring numerous prior experiences into the learning environment and apply them to their current learning situations.
4. Adults learn more effectively when the knowledge presented will help them cope with immediate, everyday problems.
5. Adults seek out learning due to some internal or external motivator(s).

These learning assumptions create several hurdles for facilitators planning educational programming for adults. For every topic that a teacher wants an adult to learn, they must help the adult understand their "need to know." The learning environment should be designed in a way that allows the adult to apply self-direction in their learning, and to use their previous experiences in their current learning (Ota et al., 2006).

The needs of each individual learner are determined by their preferred learning strategy. One model used to determine the preferred learning strategy of an adult student is the ATLAS model, which classifies learners into one of three different groups (Conti & Kolody, 1999; Ausburn & Brown, 2006):

- Navigators – Desire efficient learning through order, structure, logical sequences, and a clear roadmap. They learn best in logical sequence in controlled classrooms.
- Problem-solvers – Desire the freedom to experiment with creative solutions to problems and test out the validity/utility of previous learning experiences in new contexts.
- Engagers – Desire relational learning through collaboration, involvement, and interaction with people they can learn from, and teach in turn.

Because these three different learning strategies roughly correspond with the three learning environments defined by the OECD (navigators to formal, engagers to nonformal, and problem-solvers to informal), identifying preferred learning environments in a holistic curriculum allows researchers to draw conclusions about the instructional needs of each learning objective and how to interact with learners in those topics.

The abundance of needs each learner requires can clash with the traditional "diffusion of knowledge" content-based model inherent in formal education. J.F. Bobbitt, early authority on curriculum development, said that "educational experiences must take place where they can be normal" (Bobbitt, 1918), and Wheeler (1926) echoed this sentiment when he said that "farming must be taught, where farming can be carried on under normal conditions … farming must be

taught on the farm and through farming" (p.22). Therefore, to remedy these challenges, adult educators should look to the use of place-based learning to identify valuable learning experiences.

Place-based learning occurs in agriculture education in the form of supervised agricultural experiences, or SAE's. These experiences give students exploratory, placement, entrepreneurship and research experience, and provide a means of contextualizing knowledge gained in formal environments. When combined with extracurricular activities and classroom learning, the student has access to all three learning environments in an agriculture context, which allows the student to customize their education to an extent based upon their own learning style and gives a place to put their newly gained knowledge to use to solve problems and gain meaningful experiences. This education strategy is useful for keeping students invested in their own recruitment and adult educators can use this strategy to meet the unique learning needs of adults thanks to its close alignment with the assumptions of adult learning.

Apprenticeships, a method of place-based vocational education, are described as a source of "critical experiential education and mentorship that cannot be acquired through classroom study alone" (Pointeau, Sullivan, & Wentzel-Fisher, 2016, p. 9), making it a useful educational tool for industry recruitment and training in an environment that is "broad enough in scope to allow for managerial participation on a business basis as well as for operative participation in production" (Wheeler, 1926). Literature exists on apprenticeships' ability to enhance learning. However, this research only investigated the learning of high school students (Schafbuch et al., 2016). Therefore, it becomes important to analyze apprenticeships as an educational tool in an adult learning context.

Apprenticeship

An apprenticeship is a job training technique used since antiquity where skilled workers provide apprentices with access to their expertise and a place to practice putting that knowledge to work for themselves. The Code of Hammurabi first defined apprenticeship as early as 1700 BC, which required skilled tradesmen to teach their trade to the next generation. In the Middle Ages, this practice extended beyond tradesmen to fields such as law, medicine and theology. Vocational and technical schools have largely replaced apprenticeship in the United States, and apprentices associate with the industry instead of a single employer (Encyclopedia Britannica editors, 2019).

In the United States, the Department of Labor (or equivalent state-based agencies) administer apprenticeship programs to ensure they meet national standards and produce highly specialized workers. Apprentices earn a wage averaging $15 per hour to start, increasing across the length of the program. Most apprenticeships are four years long, although they range from one to six years, and normally include "2,000 hours of on-the-job training and a recommended minimum of 144 hours of related classroom instruction" per year (United States Department of Labor [US DoL] "Frequently Asked" n.d.). Some trade-based apprenticeships go beyond these requirements. For example, the Kansas City Electrical Joint Apprenticeship & Training Committee requires a five-year commitment with 8000 on-the-job hours and 900 hours of related study.

The managing agency issues Certificates of Completion of Apprenticeship at the conclusion of apprenticeships and apprentices earn a "journeyworker" status. According to the Department of Labor, "apprentices who complete their program earn approximately $300,000 more over their

career than non-apprenticeship participants" (US DoL, n.d.). However, apprenticeship programs are neither required to register with the federal apprenticeship program nor meet its standards. Unregistered apprenticeships number "in the hundreds of thousands." Informal, unregistered apprenticeships may not be as transformative in people's careers because they are not required to meet any standards or certification requirements, but in order to remain competitive these opportunities tend to offer comparable wages to formal, registered apprenticeships (Perlin, 2012).

Apprenticeship today has benefits for both employers and employees (US DoL, n.d.).

For the worker, an apprenticeship provides:

- Hands-on career training
- Customized training based upon the needs of the industry and geographical context
- A low-cost alternative to postsecondary education
- Potential long-term employment with their place of apprenticeship

For the employer, an apprenticeship provides:

- Customized training based upon industry needs and business/geographical context
- Employee retention
- Stable influx of invested workers

Historically, apprenticeships lasted for several years, in which time skilled tradesmen would confer knowledge about their career field to the apprentice and provide them a place to utilize their skills. As a means of recouping any lost revenue invested into preparing the apprentice for their career, tradesmen paid apprentices below market price for their services, instead using training and the potential for higher future earnings as the primary form of payment. Apprenticeship knowledge increased over time and apprentices could expect to receive much higher wages upon completion of their training than through other working-class jobs (Perlin 2012). While this payment strategy may sound exploitative, most apprenticeship wages increased as the apprenticeship period continued, in order to incentivize the apprentice remaining for the length of their apprenticeship term. The idea was that as they proceeded through their apprenticeship, the apprentice had more knowledge of the industry, and therefore less reason to stay and continue learning, particularly if they could earn higher wages independently. (Fischer, 2017). Despite the educational advantage of apprentices, earning higher wages was no guarantee without completing the terms of their apprenticeship. Most industries carried with them certification systems that granted an apprentice a certificate indicating completion of their predetermined apprenticeship period. Without this certificate, apprentices struggled to find employment at higher wages, which deterred apprentices from leaving their apprenticeship early before profits could be realized (Elbaum & Singh 1995). The incentivization of using the full apprenticeship period reduced educational time constraints and removed the pressure of having to rush training.

These characteristics are still evident in trade-based apprenticeships today, but agriculture apprenticeships rarely have these characteristics. Although called agricultural apprenticeships, these vary greatly from their historical counterparts. Pre-modern apprenticeships used strategies such as the previously mentioned certification, as well as limiting the number of apprenticeships,

in order to limit entry into their career field and decrease potential competition. While some apprenticeships do offer certificates of completion, these do not carry the same weight as pre-modern apprenticeship certificates due to a lack of industry standards between programs. This is partially because of the large number of apprenticeship programs. Agricultural apprenticeships are abundant, and not intended to limit entry into the industry as pre-modern apprenticeships were. This could be because as mentioned before, apprentices are not transitioning into the industry. However, little research aside from Fischer's (2017) comparative analysis investigates the motives of apprenticeship programs. More research on this subject is recommended.

Agricultural apprenticeships, though more popular now than ever, are not a new phenomenon. Documented in the Hudson Valley of New York as far back as the mid-nineteenth century (Gray, 2013), these apprenticeships are increasingly popular in small-scale, sustainable farms (Gray 2013; MacAuley & Niewolny 2016). However, they have not seen much use on conventional farms (Guthman 2014). For instance, in Ontario, apprentices, interns, and volunteers make up 65 percent of workers on alternative farms but only 5 percent of the total Ontario agricultural workforce (Ekers & Levkoe 2016).

These programs vary heavily depending on external and internal contexts but share some key characteristics. When comparing 26 agricultural apprenticeship programs, Fischer (2017) determined that:

- 65% explicitly stated education to be a goal of the apprenticeship program
- 58% explicitly stated creating new farmers as a goal
- 15% explicitly stated removing beginning farmer barriers to entry (such as land and capital) in their mission statements, despite over half of programs aiming to create new farmers.

While goals of the various apprenticeship programs varied slightly, there was a much stronger consensus on apprenticeship practices.

- Hands-on training (96%)
- Field workshops (85%)
- Classroom components (65%)
- Individual business advising (12%)

The disparity between creating new farmers and business advising methods has several potential causes, the most likely being that apprentice graduates do not enter production agriculture after finishing their training. Barriers to entry in agriculture are high and require a significant investment that even apprentices fully skilled in business management might not be comfortable making. Not helping apprentices overcome these barriers is the fact that 20 of the 26 apprenticeship programs in the study above taught some form of business management, but only three offered any connection to land/capital opportunities to apprentices who had graduated their program. Although more programs expressed a desire to share these connections as best they can, the lack of a systemic solution to link land and capital with those interested in farming frustrated many mentors (Fischer, 2017). However, despite the lack of post-apprenticeship farm creation, many apprenticeship programs measured success by apprentices who remain involved in food and supporting

sustainable agriculture in any capacity, not just in the number of farmers they create (Pointeau et al., 2016). This indicates that the creation of an agricultural ethos - the characteristic spirit of a community as manifested in its beliefs and aspirations - is a hidden but important goal of these apprenticeship programs.

The length of apprenticeship rarely exceeds one year in today's agriculture sector as opposed to pre-modern apprenticeships. Fischer (2017) found that only three of 26 programs studied exceeded one year in length. This shortened apprenticeship period creates problems for both the mentor and apprentice. Apprentices have less time to practice skills necessary to succeed in the agriculture industry, while mentors have little incentive to dedicate training time to those apprentices who will likely leave within the calendar year. Instead, farmers could view training apprentices as a risk, receiving apprentices only when they are "most costly and least skilled" (Fischer, 2017), which potentially cuts into the farm's profitability. Employers in early twentieth century Britain "emphasized that an apprentice in the initial years was 'an expense rather than a profit'" (Elbaum & Singh 1995) and mentors only realize apprenticeship profits over multiple years. Without incentives such as standardized certification or a guarantee of educational outcomes to increase apprentice retention, time constraints this narrow reduce the apprentice relationship to lower-cost seasonal work than the educational relationship to which many apprenticeship programs aspire (Fischer, 2017).

Despite time constraints and potential reluctance to train, there are ways for farmers to provide supplementary training and education for their apprentices. Historically, apprenticeships only used nonformal and informal learning environments to train their workers. Today, apprenticeship programs use all three learning environments through educational partnerships with universities, non-profits, and extension agencies in order to provide apprentices with book knowledge that mentors can supplement, and apprentices can put into practice in the workplace. On the farmer's end, this minimizes the risk of accepting low-skilled workers by co-opting similarly skilled stakeholders into collaborative training. On the apprentice's end, this collaborative training often exceeds what one farmer can teach and gives apprentices access to resources they can use in the future.

Because this collaboration is mutually beneficial, many apprenticeships now take place in the context of these educational programs, including Cornell's Beginning Farmer's Initiative, UC Santa Cruz's Center for Agroecology and Sustainable Food Systems, Michigan State University's Organic Farmer Training Program (Niewolney & Lillard, 2010), and NC State's Center for Environmental Farming Systems apprenticeship. Partnered apprenticeship programs provide a unique opportunity to study the way program participants learn about agriculture in all three learning environments, and this information will inform the prescriptive assumptions of future program coordinators. To that end, one question is vital: In a program whose goal is to equip participants with all the skills necessary to pursue sustainable food production as a career, how do beginning farmers in a partnered apprenticeship program best learn agriculture principles from a holistic curriculum?

The following chapter has been formatted to meet the requirements for the Journal of Extension.

The Partnered Apprenticeship Model: Implications for Beginning Farmer Learning & Program Development

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Introduction

According to the 2012 United States Census of Agriculture, the number of new farmers who began their operation from 2007-2012 fell by 23.3% compared to 2002-2007. Of the 2.11 million principal farm operators in the United States (United States Department of Agriculture [USDA], 2014):

- 701,276 (33.2%) are over the traditional retirement age of 65.
- 257,705 (12.2%) are over the age of 75.
- 119,833 (5.7%) are under the age of 34.

In order to ensure a stable population of knowledgeable producers, Extension professionals must equip prospective farmers with the skills and confidence to enter the industry. Education specifically targeting *adult* extra-collegiate training programs began with the 1990 Farm Bill, which established the New Farmer & Rancher Development Program. This competitive grant program "support[s] new and established local and regional training, education, outreach and technical assistance initiatives to increase opportunities for beginning farmers and ranchers" (Food Agriculture, Conservation, & Trade Act of 1990, 7 U.S.C. §2279(d)(1)).

The grant program stipulates only the target population of beginning farmers, and does not require specific methods, which can include classroom-based activities, (e.g. workshops, seminars, consultations, and lectures) experiential learning opportunities (e.g. supervised agricultural experiences, internships and apprenticeships) and mentoring/network development (Niewolney & Lillard, 2010). In order to effectively develop and coordinate educational opportunities for beginning farmers, extension professionals must understand the learning strategies adult students use and which learning environments most effectively train new farmers when choosing teaching methods.

Learning Strategies & Environments

The environment in which information is presented is crucial to effective learning. A holistic curriculum of multiple learning objectives, each with their own differing learning environment needs, complicates program development for equipping beginning farmers with the skills necessary to enter food production. According to the Organization for Economic Cooperation & Development [OECD] (n.d.), learning falls into one of three categories:

- Formal education – Structured teaching based upon clearly defined learning objectives.
- Nonformal education – Structured teaching with a set of intentional learning objectives, but varies its curriculum and methods based upon the needs and learning style of participants.
- Informal learning – Unstructured learning with no defined curriculum, based upon the participant's observations, experiences, and participation.

When analyzing learner behavior, researchers look at how students confront information and their preferences for learning strategies. One model for typifying adult learners is the ATLAS model, which classifies learners into one of three groups based on how they choose to approach learning. These groups are (Conti & Kolody, 1999, Ausburn & Brown, 2006):

- Navigators – Desire efficient learning through order, structure, logical sequences, and a clear roadmap. They learn best in logical sequence in controlled classrooms.
- Problem-solvers – Desire the freedom to experiment with creative solutions to problems and test out the validity/utility of previous learning experiences in new contexts.
- Engagers – Desire relational learning through collaboration, involvement, and interaction with people they can learn from, and teach in turn.

These three learning strategies roughly correspond with the three learning environments described above, and factor in assumptions for adult learning, which differs from pedagogy principles and include the following (Knowles et al., 2005):

1. Adults must understand why learning new information and skills will be important to them.
2. Adults desire self-direction and learn better when transitioning from dependency (lack of skill) to self-directed learning and skill development.
3. Adults bring numerous prior experiences into the learning environment and apply these various experiences to their current learning.

4. Adults learn more effectively when the knowledge presented will help them cope with immediate, everyday problems.
5. Adults seek out learning to satisfy some internal/external motivator(s).

These assumptions argue that adult educational opportunities must cater to each learner's context, independence, past, and relative utility. Ota, DiCarlo, Burts, Laird and Gioe (2006) assert that an educational opportunity should be designed in a way that allows the learner to apply self-direction and previous experiences in their learning, as well as understand the importance of the information for solving problems the learner currently faces. This abundance of needs, compounded by the need to educate larger groups, clashes with the traditional "diffusion of knowledge" content-based model inherent in formal education. However, place-based learning closely aligns with these assumptions. In adult education, this takes the form of apprenticeship.

Apprenticeships

An apprenticeship is described as a source of "critical experiential education and mentorship that cannot be acquired through classroom study alone" (Pointeau et al., 2016, p. 9). These learning environments give participants exploratory, placement, and entrepreneurship experience by providing external motivators (employment) and everyday problems for the learner to solve. Through solving these problems, the learner perceives the need to know, particularly if working for an agribusiness that closely aligns with future career goals. Because of this, apprenticeship is a useful educational tool for industry recruitment and training by providing an environment "broad enough in scope to allow for managerial participation on a business basis as well as for operative participation in production" (Wheeler, 1926).

Historically, apprenticeships lasted for several years to allow time for apprentices to gain and practice skills in their desired industry. However, the length of apprenticeship rarely exceeds one year in today's agricultural contexts (Fischer, 2017), which limits the potential for educational opportunities and skill development. Despite time constraints, farmers find ways to provide supplementary training and education for their apprentices. Many apprenticeship programs offer formal education opportunities through partnerships with universities, non-profits, and Extension offices.

Partnered apprenticeship programs provide a unique opportunity to study the way participants learn about agriculture in all three learning environments, and Extension agents can use this information in the development, coordination, and facilitation of future educational opportunities for beginning farmers. In a program with the goal of equipping participants with all the skills necessary to pursue sustainable food production as a career, which learning environments teach adult students agriculture principles best?

Growing Growers

Growing Growers, a self-sustaining partnership program initiated in 2004, provides a farm apprenticeship and an annual workshop series through collaboration with Kansas State University, University of Missouri and Lincoln University Extension, the Kansas City Food

Circle, Cultivate Kansas City, and the Kansas Rural Center. The program has 14 learning objectives (see appendix) that apprentices should understand at the end of their apprenticeship. Program developers chose these objectives based on day-to-day farm operations. To teach these learning objectives, the program uses three strategies:

- Workshop training – The program provides monthly workshops from February through September to beginning farmers that cover many of the skills needed to run a successful farm. Six core workshops cover all 14 learning objectives and attendance for five is required for program completion.
- Host farmer mentoring – The apprentice is placed on one of the collaborating host farms, where they receive mentoring from the farm owner on the apprentice's choice of learning objectives. Host farmers log their mentoring hours with the program to document learning experiences.
- On-the job, independent learning – The apprentice can use their previous experiences and experiment with various farming techniques through host farm employment.

We conducted a formative evaluation of this program in 2017-2018. This article reports on results of a survey of Growing Growers apprentices that investigated the learning environment preferences and opinions on this beginning farmer training program.

Methods

Using the operative definition of program as "any set of events or organizations that use a program model to distribute goods/services and influence outcomes," Growing Growers' program model was defined using Chen's (2005) conceptual framework (Figure A-1).

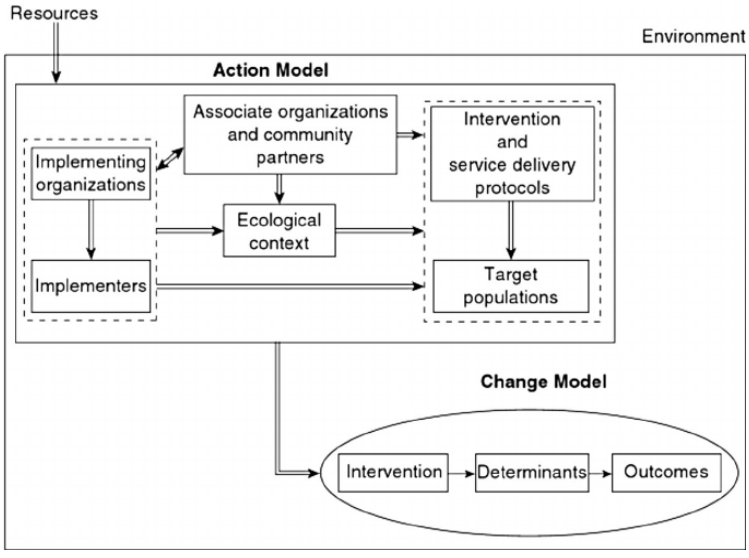

Figure A-1. Conceptual framework for an educational program (Chen, 2005).

Programs solve a perceived problem defined in a "change model" through organized interventions, or the "action model." For most farmer training programs, the desired outcome is to develop new farmers. According to Sheils and Descartes' (2004) typology of new farmers,

Growing Growers focuses on reaching 'Explorers' and 'Planners' with introductory agriculture classes and host farm placement for an apprenticeship, which provides a structured program to teach necessary food production skills in all three learning environments. At the conclusion of their participation in the program, apprentices should have the necessary skills to start their own commercial farm, should they so choose.

The research question for this project was what parts of the program are effective at preparing apprentices for future work in the industry? This question was addressed through identifying apprentice learning environment preferences based on the program's learning objectives and determining if the program outcomes are being met. A survey was developed using Qualtrics XM (Provo, Utah, United States) with 46 questions that included short-answer, multiple choice and Likert-scale questions in five sections: 1) general information; 2) host farm experience; 3) Growing Growers learning objectives; 4) program outcomes; and 5) demographics.

The Likert scale used for apprentices to self-rank their knowledge before and after attending the workshops was:

1 – I would need significant help successfully managing this part of the farm.
2 – I would need some help successfully managing this part of the farm.
3 – I could manage this part of the farm on my own, but would not feel comfortable doing so.
4 – I could comfortably manage this part of the farm on my own.
5 – I could manage this part of the farm on my own and teach others how to do the same.

The survey was distributed to past apprentices using three methods – distribution through an electronic mailing list sponsored by Growing Growers, distribution of personalized links to individuals with updated contact information provided by program coordinators, and distribution of the survey on Growing Growers' Facebook page. In total, 37 apprentices responded to the survey from a population of 139, for a response rate of 27%. Due to multiple distribution methods that could potentially overlap, responses were cross-referenced to ensure no data duplication.

Using SAS (SAS Institute Inc. 2013. SAS® 9.4), we ran χ^2 analysis on learning environment data to determine statistical evidence of preference. We also ran the Cochran-Mantel-Haneszel test comparing hours worked per week against workshop score change for each learning objective, as well as whether apprentices felt confident that they had all the necessary skills to farm commercially. This was analyzed to see if increased exposure to the operative setting and to mentors' knowledge of farming practices positively impacted apprentices' overall skill development.

The Kansas State University Committee on Research involving Human Subjects determined this project was exempt from review.

Results & Discussion

Demographics

The average Growing Growers apprentice is female, white, in their mid-20's, and has a postsecondary degree. Twenty-six respondents (74%) were female, which reflects the trend of more women entering agriculture, up 26.6% between 2012 and 2017 (USDA, 2019). Regarding race, apprentice demographics follow overall US farmer demographics almost exactly, at 94% white compared to 95% nationally. Age-wise, apprentices are 27.6 years old on average, which is 30 years younger than the average U.S .farmer, and 19 years younger than the average beginning farmer.

Thirty-one respondents (86%) had received at least a Bachelor's degree. Two respondents had a technical/Associate's degree, and three had no postsecondary degree. Of the 31 respondents with at least a Bachelor's degree, 15 (48%) had obtained a post-graduate degree.

Preferred Learning Environments

There were differences in preferred learning environment across the 14 program learning objectives (Table A-1). Five learning objectives had no evidence of a preferred learning environment. These results highlight differing adult learning needs across a curriculum and provide evidence that adults shift their learning strategy based upon the topics they are learning, supporting Fellenz and Conti's (1989) claim that "learning strategies… are techniques rather than stable traits and they are selected for a specific task" (pp. 7-8).

Ausburn and Brown (2006) determined that a significant percentage of career and technical education [CTE] students used the Engager learning strategy and hypothesized that this result would also apply to non-traditional adult students learning in contexts outside strictly formal institutions. However, the balanced selection of all three learning environments suggests that learning strategies are used in roughly equal measure by program apprentices, which mirrors Conti and Kolody's (1999) learning strategy distribution across adult populations. While this data does not reflect the larger proportion of engagers that Ausburn and Brown saw in their study, the engager-aligned learning environment did receive the most selections, giving weight to their hypothesized link between CTE and non-traditional students.

Table A-1. Number of Respondents from an Online Survey for Apprentices in a Beginning Farmer Training Program Indicating Their Preferred Learning Environments for 14 Sustainable Agriculture Learning Objectives

Classroom/Workshop	Workshop	Mentoring	Field work	χ^2
Business management	21	9	4	.0012
Food safety	21	7	7	.0037
Soil conservation	19	10	6	.0224
Marketing	18	8	9	.0743
1-on-1 Mentoring				
Plant propagation	2	20	13	.0009
Production planning	9	20	6	.0095
Field Work				
Weed management	4	10	21	.0017
Irrigation	6	12	17	.0743
Postharvest handling	6	12	17	.0743
No Preference				
Disease management	13	13	9	n.s.
Fruit production	13	9	10	n.s.
Insect management	12	12	11	n.s.
Small farm equipment	9	15	10	n.s.
Season extension	6	11	16	n.s.
Total Selections	**159**	**168**	**156**	

Note: n.s. = no significance

Because instructional methods overlap between the three learning environments, analyzing selections with similar instructional characteristics provides additional insight into the learning needs of apprentices. Using the data from Table A-1, we assessed each learning objective's need for a formal educator and contextual application. We used the OECD definition of formal educator as someone who guides learning of an objective through controlled methods, which includes workshop leaders and host farm mentors. Therefore, we summed the total selections of classroom/workshop and 1-on-1 mentoring with host farmer for each objective. Similarly, contextual application indicates that the apprentice best learned this principle in a location where they could immediately translate learned knowledge into skills. This definition includes 1-on-1 mentoring and fieldwork, which were also summed. After running χ^2 analysis, nine learning objectives require a formal educator and eight learning objectives require contextual application (Table A-2).

Table A-2. Percentage of Respondents' Preferences for Formal Guidance (Workshop/Mentoring) & Contextual Application (Mentoring/Field Work) for 14 Sustainable Agriculture Learning Objectives from an Online Survey for Apprentices in a Beginning Farmer Training Program

	Formal Guidance[a]		Contextual Application[b]	
Learning Objective	%	χ^2	%	χ^2
Business management	88	<0.0001	38	n.s.
Soil conservation	83	0.0001	46	n.s.
Production planning	83	0.0001	74	0.0041
Food safety	80	0.0004	40	n.s.
Marketing	74	0.0041	49	n.s.
Disease management	74	0.0041	63	n.s.
Small farm equipment	71	0.0112	74	0.0041
Fruit production	69	0.0133	59	n.s.
Insect management	69	0.028	66	0.063
Plant propagation	63	n.s.	94	<0.0001
Season extension	52	n.s.	82	0.0003
Irrigation	51	n.s.	83	0.0001
Postharvest handling	51	n.s.	83	0.0001
Weed management	40	n.s.	89	<0.0001

Notes: n.s. = no significance
[a]Formal Guidance: Sum of Workshop & Mentoring preferences
[b]Contextual Application: Sum of Mentoring and Field Work preferences

Table A-3 describes the average scores of apprentices' confidence in completing each learning objective before and after their participation in the workshops. Prior to attending the workshops, respondents indicated that they would need significant help to some help in successfully managing all learning objectives. In all learning objectives except for fruit production, respondents felt that they could sufficiently manage related food production tasks independently, albeit uncomfortably, after attending the workshops.

Business management requires special mention. According to apprentice responses in Table A-1, the preferred learning environment for business management is the classroom/workshop. However, this alone might not be enough experience for beginning farmers. In workshop score comparisons (Table A-3), business management placed 12th out of 14 learning objectives in workshop score improvement. When asked what the biggest barrier to starting an agribusiness is, 34/36 responses included capital, land acquisition and/or financing, and 13 indicated that management-related barriers are actively keeping them from starting their own agribusinesses.

These results reaffirm Fischer's (2017) assertion that despite the desire of mentors, apprenticeships are not equipped to connect apprentices to resources and business management opportunities that promote entry into commercial food production, and also implies that programs targeting beginning farmers must emphasize business management in order to reach students of Sheils and Descartes' (2004) 'Planner' typology.

Table A-3. Average Workshop Pre-Scores, Post-Scores, and Change in Scores for 14 Learning Objectives from an Online Survey for Apprentices in a Beginning Farmer Training Program

Learning Objective	$\bar{x}$ (pre)	Rank	$\bar{x}$ (post)	Rank	ΔScore	Rank
Food Safety	*2.08*	*1*	*3.92*	*2*	*1.84*	*4*
Postharvest Handling	2.06	2	3.95	1	1.89	1
Weed Management	1.92	3	3.58	5	1.66	10
Marketing	*1.91*	*4*	*3.40*	*7*	*1.49*	*12*
Plant Propagation	1.84	5	3.62	4	1.78	6
Soil Conservation	*1.84*	*5*	*3.71*	*3*	*1.87*	*2*
Business Management	*1.65*	*7*	*3.14*	*12*	*1.49*	*12*
Production Planning	1.58	8	3.44	6	1.86	3
Insect Management	1.54	9	3.32	9	1.78	6
Season Extension	1.53	10	3.31	10	1.78	6
Irrigation	1.50	11	3.34	8	1.84	4
Small Farm Equipment	1.47	12	3.09	13	1.62	11
Disease Management	1.41	13	3.16	11	1.75	9
Fruit Production	1.32	14	2.59	14	1.27	14

Note: Italicized objectives were preferred in the workshop learning environment

Effects of Differing Time Commitments

Apprenticeship participants chose a farm where they could learn operative and managerial skills necessary for commercial food production through mentor-mentee and employer-employee relationships. However, due to differing needs of partnering host farms and differing availability of apprentices, the number of hours spent on the host farms varied. This provides the opportunity to determine what correlation, if any, increased exposure in an experiential setting has on perceived skill development in each of the 14 learning objectives.

When comparing hours per week against each respondent's change in workshop knowledge scores, there were two learning objectives – insect management & small farm equipment – where working more hours resulted in a greater proportion of higher changes in workshop scores (Tables A-4 and A-5). The other 12 learning objectives had no statistical correlation between hours worked and change in workshop score. This implies that topics in insect management and small farm equipment benefit from increased exposure in an operative context and supports the results in Table A-2 showing apprentices preferred both formal guidance and contextual application for these learning objectives.

Table A-4. Correlation between Hours/Week Beginning Farmer Training Apprentices Worked on a Host Farm and Workshop Knowledge Score Change for the Learning Objective Insect Management

	ΔScore					
Hours/Week	0	1	2	3	4	Total
1-20	2	7	5	1	0	15
21-40	0	5	8	0	2	15
>40	0	1	4	2	0	7
Total	2	13	17	3	2	37

Cochran-Mantel-Haenszel Test
Nonzero Correlation p = 0.0296

Spearman's Correlation Coefficient
$\rho = 0.3901$

Table A-5. Correlation between Hours/Week Beginning Farmer Training Apprentices Worked on a Host Farm and Workshop Knowledge Score Change for the Learning Objective Small Farm Equipment

	ΔScore				
Hours/Week	0	1	2	3	Total
1-20	1	9	2	0	12
21-40	1	4	4	4	13
>40	0	3	4	2	9
Total	2	16	10	6	34

Cochran-Mantel-Haenszel Test
Nonzero Correlation p = 0.0247

Spearman's Correlation Coefficient
$\rho = 0.4121$

When comparing hours per week against perceived development of all skills necessary for entering commercial food production, there was no statistical correlation between the number of working hours per week and perceived development of all the program's desired skills (Table A-6). This implies that the existence of a location to contextually apply learning is more important than the length of time spent at these locations. Extension professionals who develop on-farm training opportunities such as apprenticeships can tailor the necessary work experience to the desire and availability of both the participant and the host farmer without compromising potential skill development.

Table A-6. Correlation between Hours/Week and Overall Food Production Skill Development in Beginning Farmer Training Apprentices

	Hours/Week			
Have Needed Skills?	1-20	21-40	>40	Total
No	6	4	5	15
Yes	10	7	4	21
Total	16	11	9	36

Cochran-Mantel-Haenszel Test
Nonzero Correlation p = 0.4304

Conclusion & Recommendations

Partnered apprenticeship is a valuable tool for educating prospective farmers thanks to its ability to provide multiple learning environments and the ability to customize the curriculum to each learner's preferred learning style. This study provides several content recommendations for Extension professionals who coordinate similar programs:

- Production planning, small farm equipment, and insect management topics taught in workshops independent from the apprenticeship setting require giving students a contextual, hands-on opportunity to solve an immediate problem using their new knowledge.
- Programs of this nature attract Planner typologies who require in-depth education on business start-up. Extension professionals should develop training materials covering the start-up process and should connect participants with opportunities for managerial application of business management principles (e.g. incubator farms). Additionally, workshop teachers should teach alternatives to purchasing land, (e.g. leasing/renting) and explore the idea of landless agribusiness or agribusiness on land participants already own, which will reduce the chance of land acquisition becoming a barrier to entry into the industry.
- Working more hours for the host farm did not correlate with higher workshop scores for 12 of the 14 learning objectives. Insect management and small farm equipment were the two exceptions, and mentors should allow for extra experience in these two topics during 1-on-1 mentoring and job responsibilities.

Because learning objective preferences were evenly split between the three learning environments, program coordinators aiming to teach a holistic curriculum of multiple topics need to strike a balance of learning opportunities through formal, nonformal, and informal education. As future research identifies patterns in preferred learning environments, coordinators are encouraged to shift emphasis for different learning objectives to learners' preferred environments and utilize learning strategy characteristics to inform teaching methods.

Limitations & Suggestions for Future Research

While this study provides useful information on potential learning patterns in adult beginning farmers, the given data only provides conclusions for a.) beginning farmers that b.) have never owned their own agribusinesses. Experienced farmers and beginning farmers that have owned their own agribusinesses may have different learning environment preferences. Future research that analyzes the impact of agribusiness ownership on preferred learning environments would prove useful in determining whether learning needs of these populations differ.

Additionally, this study relies heavily on respondent memory from up to 15 years previous for retrospective data, and this could impact responses when compared to immediate collection. Given the small population size of this study, selection bias may skew demographics. It is recommended that research into preferred learning environments be replicated with participants in similarly modeled programs, in order to verify or refute the findings of this study and increase statistical reliability across various demographics.

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Appendix

Growing Growers Learning Objectives & Descriptions

Learning Objective	Description
1. Soil conservation	Able to manage soil through cover cropping, rotation, tillage, compost, and amendments
2. Insect Management	Able to identify common pests and understand concepts of IPM, biological control, and pesticide use.
3. Disease Management	Able to identify common crop diseases, their causes, and methods of control.
4. Weed Management	Able to identify common weeds and their methods of control.
5. Irrigation	Able to set up and maintain irrigation systems for purpose on a small farm.
6. Production Planning	Able to set up effective schedules for seasonal crop production.
7. Small Farm Equipment	Able to use basic farm tools and machines, and understand their sourcing, safety, maintenance, and repair.
8. Plant Propagation	Able to source plants, and to propagate seeds, transplants, and cuttings.
9. Postharvest Handling	Able to time harvests and understand washing, sorting, cooling, storing, and packing.
10. Business Management	Able to develop a business plan, identify financing options, complete bookkeeping, budgeting, taxes, and insurance for farm activities.
11. Marketing	Able to identify potential marketing strategies for the business, and how to best sell produce to consumers.
12. Food Safety	Able to maintain minimum GAP/FSMA standards for crops, and to develop a food safety plan.
13. Season Extension	Able to use production structures, (high tunnels, hoop houses, greenhouses, etc.) to extend crop growing seasons
14. Fruit Production	Able to grow temperate crops suitable for our region.

Abstract

Place-based education is a powerful tool for training beginning farmers due to its alignment with the assumptions of adult learning. Apprenticeship – one method of place-based learning – is widespread in United States agriculture, but little research exists analyzing apprenticeship's teaching methods and their effectiveness. Using survey results from participants of an Extension-partnered apprenticeship program, we make a case for Extension to partner with local apprenticeship programs to provide enhanced training opportunities and discuss best practices for Extension professionals developing future educational opportunities for beginning farmers.

Keywords
apprenticeship, learning environment, sustainable agriculture curriculum, andragogy, program development

Growing Growers Evaluation Report

An Analysis of Evaluation Results for the Growing Growers Apprenticeship Program

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Purpose

The purpose of this program evaluation is to identify where Growing Growers can improve its educational opportunities for future apprentices and make recommendations regarding educational methods based upon feedback from previous apprentices. This evaluation also analyzes host farmer feedback in order to identify the role these farmers play in the program model, and workshop participant feedback in order to identify the impact the program has on outside participants. However, the primary scope of this evaluation will be on apprentices.

Program Description

This evaluation uses an operational definition of program as any set of events or organizations that use a program model to distribute goods/services and influence outcomes. Growing Growers is a vocational training program located in the Kansas City metropolitan area that accepts participants from the Kansas City and Lawrence metropolitan areas. These participants become apprentices through on-the-farm work at a collaborating host farm throughout the metropolitan area. The program has 14 learning objectives (listed in Appendix A) that apprentices should understand at the end of their apprenticeship. The program uses a three-pronged model of participant education:

- Workshop training – The program provides monthly workshops to beginning farmers from February through September. These workshops cover many of the skills needed to run a successful farm. Six core workshops cover all 14 learning objectives and attendance to five is required for program completion.
- One-on-one host farmer mentoring – Once the apprentice begins work at their host farm, they work one-on-one with their host farmer to determine what objectives they would like to learn more about.
- On-the job, independent learning – The apprentice has the opportunity to put their knowledge of farming to the test and learn new information/strategies in a workplace environment.

Work at host farms varies between locations, and can differ in compensation, housing, business practices, and/or length of work. However, all host farms must use organic/sustainable practices, be in business for at least two years, and willing to share their farming knowledge.

This program model is similar to Michigan State's Organic Farmer Training Program and UC Santa Cruz's Center for Agroecology & Sustainable Food Systems apprenticeship program. Partnered apprenticeship programs such as these provide an educational curriculum in all three learning environments. Learning environments exist on a continuum, and educational programs often prioritize one learning environment over another. The use of all three learning environments gives Growing Growers foundational merit for future agriculture vocational education programs.

Program Theory

The first step in the evaluation process is to identify the program's model and assumptions. For this, Chen's (2005) conceptual framework of the program model was used and is shown below. Chen's model separates the program into two separate but equally important halves – the change model and the action model. This model uses the program's descriptive and prescriptive assumptions about a desired outcome. After Growing Growers' assumptions were defined, this model helped to create the evaluation tools.

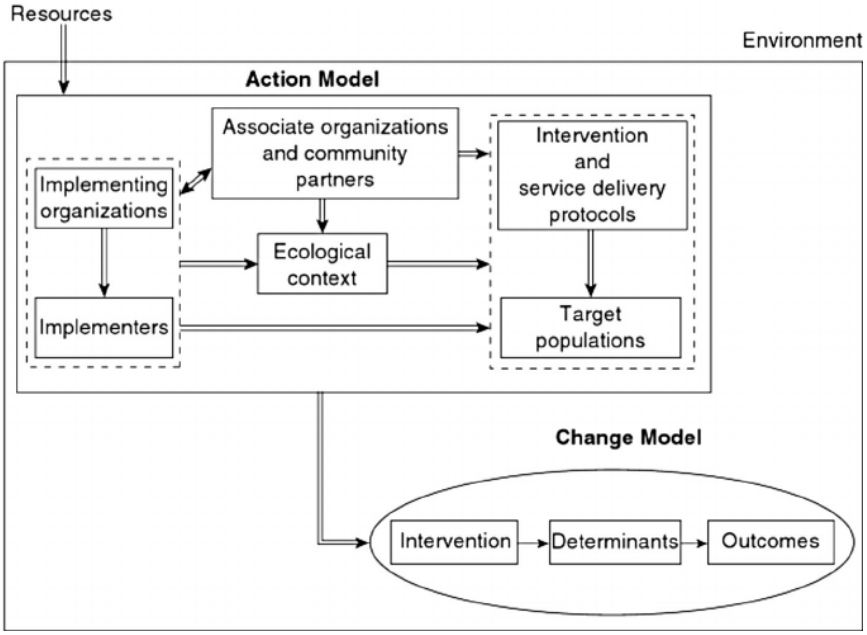

Figure R-1. Chen's program model, the conceptual framework for this evaluation (Chen, 2005).

Change Model

The change model identifies the external context of the program and its relationship to the problem that the program is trying to solve. There are three components to the change model:

- Outcome – This is the desired result of a program's intervention.
- Determinant – This is the variable or set of variables that decides outcome attainment, or lack thereof.
- Intervention – The program provides this in order to influence the determinant.

Essentially descriptive assumptions ask, "What needs to change in order to achieve our desired outcome(s)?" By identifying a variable that the program can influence through an intervention, the program hopes to influence its participants. Program mission statements often identify the program's change model. Listed below is the change model for Growing Growers, identified through collaboration between evaluator and coordinators:

> **Growing Growers will provide a structured program that will teach necessary food production skills in all three learning environments, (INTERVENTION) so that apprentices will develop skills and gain confidence in food production**

(DETERMINANT). At the conclusion of their participation in the program, apprentices should have the necessary skills to farm commercially, should they so choose (OUTCOME).

It is vital to note that a program's success or failure relies on coordinators' ability to assess their descriptive assumptions and the cause-and-effect relationship between determinant and outcome accurately. For example, if apprentices chose not to pursue agriculture-based careers for reasons other than lack of knowledge, Growing Growers would not achieve its outcome by trying to educate apprentices on farming skills, and would waste resources trying to leverage an irrelevant determinant.

Action Model

The action model determines how the program organizes itself to transform inputs into outputs and outcomes effectively. Once coordinators identify a problem and decide upon an intervention, they must then decide their method(s) of intervention. These methods use the program's prescriptive assumptions – how the program can most effectively influence the determinant from the change model. Action models vary even between programs with the same desired outcome based upon each program's context.

The components of the action model are:

- Implementing organizations – These are the program's overseers.
- Implementers – The individuals responsible for providing the intervention.
- Associate organizations/community partners – Any outside organizations with a programmatic relationship. The roles of these organizations vary and can range from publicity to secondary implementation.
- Intervention & service delivery protocols (SDP's) – This is the intervention specified in the change model, along with the steps to realize this intervention.
- Target populations – The group of participants that will receive the intervention.
- Resources – Any input that is necessary for the functioning of the program.

Below is the Growing Growers action model. Host farms and not-for-profit organizations play a dual role in the program model as both implementers and community partners, so their relationship with the program is particularly important to the success of the program. These not-for-profit organizations include the KC Food Circle, Cultivate Kansas City, and the Kansas Rural Center.

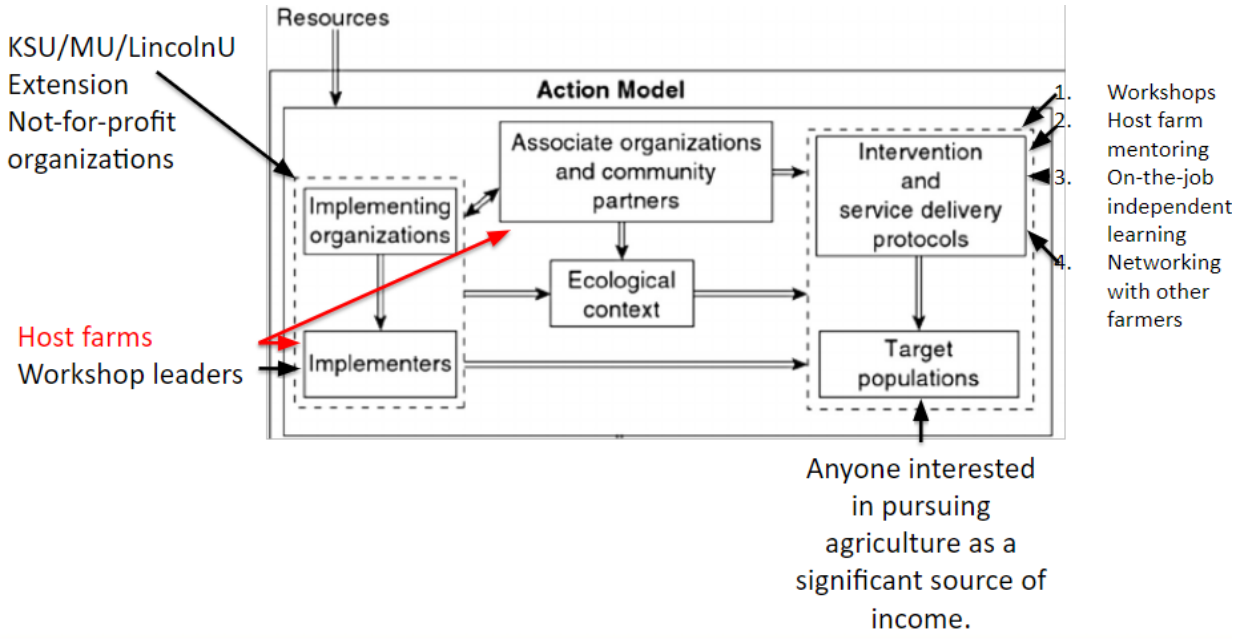

Figure R-2. The Growing Growers "action model."

Evaluation Theory

Evaluations are either formative or summative in nature. Both analyze different parts of the program model and coordinators' motives determine which type of evaluation to use. Formative evaluations analyze a program's methods to identify areas where it can improve the likelihood of achieving its desired results. The program's prescriptive descriptions and action model come under scrutiny in formative evaluations. Alternatively, summative assessments are more interested in discovering whether the program achieves its desired outcomes without regard to method. Summative evaluations analyze the program's descriptive assumptions and change model. While formative-prescriptive and summative-descriptive evaluations are the two most common combinations of evaluation goals, formative evaluations can also assess the change model, and summative evaluations can assess the action model. Listed below are examples of each combination:

Formative-prescriptive: Is our action model's organization the most effective way we can deliver our intervention?

Formative-descriptive: Are there other interventions we can address to increase our outcome attainment?

Summative-prescriptive: What parts of our action model account for our (or lack of) outcome?

Summative-descriptive: Is our change model the most complete change model, or are variables missing?

This evaluation chose formative-prescriptive evaluation, focusing on interventions and service delivery protocols, in order to find the intervention strategies that Growing Growers can make more effective.

Methods

The research method for this evaluation was survey implementation using online questionnaires. Given the methods of survey distribution used, each survey began with qualifying questions to ensure only the targeted populations – apprentices, host farmers, and workshop participants that were not apprentices – completed the survey. If a respondent did not fit into one of these three groups, the survey concluded, and that response was not included in the final data file.

Survey Development

Three surveys were developed for three different demographics: one for apprentices, one for host farmers, and one for workshop participants who were not apprentices. All three groups were asked demographic questions at the end of their responses.

Apprentice Survey

For apprentices, because the change model has participants gaining knowledge through placement on farms and agricultural workshops, the learning of participants was targeted through investigating what was and was not learned, and the environments in which this information was learned. The learning environments for apprentices are workshops, host farm work, and on-the job independent learning. By investigating these three educational methods, the intent was to identify patterns that can inform the educational methods and topics of future cohorts.

The apprentice survey included 14 questions with display logic, which triggered further questions based on apprentices' answers to previous questions (that is, depending on their answer to a topic question, they have several more related questions to answer on that topic, or go directly to the next topic question). Because of this, the apprentice survey ranged from 27-41 questions and length varied between respondents. Two topics – workshops and outcomes – contained 28 of the 41 total questions. Other topics included questions about the apprentice's host farm, experiences with agribusiness, and demographics.

There were two question formats used in the apprentice survey. One was text-entry, or open-ended questions. Apprentices were asked open-ended questions about behaviors/skills they developed from workshops, their most memorable learning experiences from their apprenticeship, and what they believe to be the biggest barrier to starting an agribusiness. Six questions from the workshop block involve respondents inputting pre-workshop and post-workshop scores for the learning objectives of each core workshop they attended, based on a scale listed in each question.

1 – I would need significant help successfully managing this part of the farm.
2 – I would need some help successfully managing this part of the farm.
3 – I could manage this part of the farm on my own, but would not feel comfortable doing so.
4 – I could comfortably manage this part of the farm on my own.
5 – I could manage this part of the farm on my own and teach others how to do the same.

The other question format was selection questions. These questions allow for a single answer, and were used in questions such as preferred learning environments for each learning objective (a drop-down selection) and whether or not they believed they had all the skills necessary to start an agribusiness (yes/no selection).

Host Farm Survey

Because host farms occupy two spots in the Growing Growers action model, ensuring satisfaction of host farmers is important to ensure future participation from the community. The host farm survey included 12 questions that asked about satisfaction with their program affiliation and the nature of their businesses. Because workshops are open to the public, an option was included in the opening sorter question (Host Farmer AND Workshop Participant) that would display both the Host Farm and Workshop Participant questions to the respondent.

Workshop Participant Survey

A six-question survey was also developed for workshop participants who were not apprentices. This population was included to determine the reach Growing Growers has into the community. These questions include how many workshops the respondent attended, and knowledge/skills/behaviors/habits developed as a result of the workshop(s).

Survey Distribution

The survey was distributed in the following ways:

1. Part of Growing Growers' program model is the operation of a ListServ that sends out local food-related news and announcements to all subscribers, some of which fall into the target demographics. Since there were qualifying questions at the beginning of the survey, a message inviting anyone to complete the survey via an anonymous link was sent to the Growing Growers ListServ. A reminder email was sent once every two weeks for eight weeks.

2. Contact information for program apprentices was imported into a Qualtrics contact list. An email with an individual link to the survey was sent to each program apprentice with an email in the contact list. By using this link, each respondent could be tracked to see whether they started the survey (n=14), finished the survey (n=36), opted out of receiving future emails (n=4), or if the email had not reached the contact's email address (n=43). Although the link tracks whether each contact had filled out the survey, it cannot link each respondent to their respective response data. Because the data is aggregated, it cannot reveal individuals who completed the survey, and confidentiality is maintained.

   The high number of emails sent out that did not reach the apprentice's listed email address could be due to email spam filters but is more likely due to out-of-date apprentice contact information. These emails, particularly for apprentices that participated in the program's early years, might be full or no longer exist, which would cause the email to

bounce. Maintaining updated contact information should be a focus point for future cohorts.

3. A post was made for the Growing Growers Facebook group including the previously mentioned anonymous link, pinning it to the top of the page for seven days. This was a single distribution with no repetition.

4. After searching all apprentice names on LinkedIn, those names with their apprentice experience listed on their profile were contacted with a personal request for a survey response.

Data was cross-referenced in order to confirm the absence of multiple submissions from the same respondent. Through all four of these distribution methods, there were:

- 50 apprentice responses from a population of 139 apprentices (36% response rate)
- 9 host farm responses from an unknown population
- 24 workshop participant responses from an unknown population

This number indicates only the number of apprentices who started the survey. The number of respondents who finished the survey was lower. To account for potential survey fatigue and technical issues, the most crucial questions were placed at the beginning of the survey to increase the likelihood of receiving useful data.

Coding

Responses were coded for analysis purposes. Most multiple-choice questions received codes based on each possible answer. However, some were recoded based upon response data. For example, one of the introductory questions asked apprentices what kind of previous experience they had in agriculture. This question had four possible answers: I had owned my own agribusiness/I had worked for an agribusiness for wages/I had volunteered with an agribusiness/None of the above. After analyzing the responses, this question was recoded to indicate the presence or lack of previous experience in agriculture.

Open-response questions (questions where the respondent inputs text instead of choosing answers) addressed skill and behavior development during workshops and codes represent the program's fourteen learning objectives in order to identify the objective-based experiences that apprentices remembered best.

Statistics

Using descriptive statistics (count, average) from Qualtrics reports, the Statistics Consulting Lab in Kansas State University's Department of Statistics was utilized to determine the best way to analyze the data. After two meetings, three analysis methods were chosen. The relevant code tables were imported into and analyzed using SAS, which generated statistical reports.

- Chi-square (χ^2) analysis was used to interpret choices in learning environment and the probability of preference.
- The Cochran-Mantel-Haneszel test determined the probability of correlation between hours per week and workshop score change.
- Fisher's exact test determined the probability of correlation between previous experience and perceived gain of skills.

Results & Discussion

Demographics – Who is participating in Growing Growers and what are their backgrounds?

The following data describes the respondents' demographics:

- The average age of any Growing Growers respondent was 37.3 years old. Because apprentice respondents included current demographic data *and* the year they participated as apprentices, we could determine their age at the time of their participation. At the time of their participation, the average Growing Growers apprentice was 27.6 years old.
- When asked their race, 57/64 respondents indicated that they were white.
- 42 females, 17 males, and 1 other respondent participated in Growing Growers.
- Of those that included demographic data, 50 (82%) had received at least a Bachelor's degree. Three respondents had a technical/Associate's degree, and eight had no postsecondary degree. Of the 50 respondents with at least a Bachelor's degree, 20 (33%) had obtained a post-graduate degree.

Table R-1. Which of the following applied to you before your participation in Growing Growers? (Apprentices)

	n	%
I had worked for an agribusiness for wages.	11	22
I had volunteered for an agribusiness.	9	18
I had owned my own agribusiness.	0	0
None of the above	30	60
Previous experience	**20**	**40**
No previous experience	**30**	**60**

Table R-2. How many hours per week did you work at your host farm? (Apprentices)

	n	%
1-10 hours	8	18%
11-20 hours	10	22%
21-30 hours	9	20%
31-40 hours	8	18%
41+ hours	10	22%

Table R-3. Count of Host Farms' Marketing Models

Marketing models	Count
CSA subscriptions	7
Farmer's markets	7
Restaurants	4
Grocery stores	3
Food hubs	2
Online sales	1
Roadside stands	1
U-pick	1
Personal contacts	1
Sales from home (Customers come to house)	1

Table R-4. Agriculture Products Sold by Host Farms

Agriculture products	Count
Fresh vegetables	8
Herbs	7
Fresh fruit	5
Transplants*	5
Cut flowers*	4
Nuts	1
Mushrooms	1
Honey	1
Eggs	1
Fermented vegetables	1
Meat (lamb/mutton)	1
Organic soaps*	1
Wool*	1
*Non-food product	

There were several agriculture products that were not represented by host farm responses. These include traditional meats (beef/poultry/pork), dairy/cheese, and grains. Non-responding host farms could grow/make these products, or Growing Growers could lack a host farm with these products.

Model Sustainability – Are apprentices and host farms satisfied with the program?

The effectiveness of Growing Growers is predicated on the assumption that the program can attract and retain participants and community partners, and survey responses imply that Growing Growers succeeds in this regard. When asked whether they were satisfied with the program, 45 of 50 apprentices and seven of eight host farms were at least satisfied with their participation. Additionally, host farms were asked if they would agree to serve as a host farm if approached in the future. All eight respondents said that they would serve as host farms. Keeping in mind the small number of respondents, this implies a strong loyalty to training up prospective farmers, which should lead to continued affiliation with the program. Because of the small sample size, it is recommended that evaluation tools be developed that analyze host farmers' perceptions of their involvement in the program.

Growing Growers also attracts participation through workshops. 11 non-apprentice attenders have participated in 1-3 workshops, while 12 have participated in four or more workshops. Generating future participation of this nature assists apprentices in forming networks and provides local producers exposure to the program, which increases the likelihood of future recruitment.

Intervention – Is Growing Growers' education model effective?

Learning Environments

For the question in Table R-5, each respondent could select only one learning environment for each learning objective. Based on χ^2 analysis, six learning objectives had strongly correlated ($p \leq 0.05$) preferred learning environments and three more had correlated ($p \leq 0.10$) preferred environments. Five learning objectives had no statistical preference.

Table R-5. For each learning objective, which learning environment taught you the best? (Apprentices)

Classroom/Workshop	Workshop	Mentoring	Field work	χ^2
Business management	21	9	4	.0012
Food safety	21	7	7	.0037
Soil conservation	19	10	6	.0224
Marketing	18	8	9	.0743
1-on-1 Mentoring				
Plant propagation	2	20	13	.0009
Production planning	9	20	6	.0095
Field Work				
Weed management	4	10	21	.0017
Irrigation	6	12	17	.0743
Postharvest handling	6	12	17	.0743
No Preference				
Disease management	13	13	9	n.s.
Fruit production	13	9	10	n.s.
Insect management	12	12	11	n.s.
Small farm equipment	9	15	10	n.s.
Season extension	6	11	16	n.s.

Note: n.s. = no significance

Business management requires special mention. According to apprentice responses in Table R-5, the preferred learning environment for business management is the classroom/workshop. However, this alone might not be enough experience for beginning farmers. In workshop score comparisons (see Table R-7), business management placed 12th out of 14 learning objectives in workshop score improvement. When asked what the biggest barrier to starting an agribusiness is, 34/36 responses included capital, land acquisition and/or financing, and 13 indicated that management-related barriers are actively keeping them from starting their own agribusinesses. Additionally, the most common reason that Growing Growers did not meet the expectations of apprentices was because there was not enough emphasis placed on business management compared to other learning objectives.

These results support Fischer's (2017) assertion that despite the desire of mentors, apprenticeships are not equipped to connect apprentices to resources and business management opportunities that promote entry into commercial food production. Program coordinators should connect participants with opportunities for managerial application of business management principles (e.g. incubator farms) and develop workshops to specifically target business start-up.

Additionally, workshop teachers should inform students on alternatives to purchasing land, (e.g. leasing/renting) and explore the idea of landless agribusiness or agribusiness on land participants already own, which will reduce the chance of land acquisition becoming a barrier to entry into the industry.

The question asked in Table R-5 was recontextualized to identify which learning objectives favor formal educators and contextual application. The OECD definition of formal educator – someone who guides learning of an objective through controlled methods – was used in this analysis. This definition includes workshop leaders and host farm mentors, and so the total selections of classroom/workshop and 1-on-1 mentoring (from Table R-5) were summed for each objective. Similarly, contextual application indicates that the apprentice best learned this principle in a location where they could immediately translate learned knowledge into skills. This definition includes 1-on-1 mentoring and fieldwork, which were also summed. After running χ^2 analysis, nine learning objectives require a formal educator and eight learning objectives require contextual application. Three of these learning objectives require both a formal educator and contextual application.

Table R-6. Formal Guidance (Workshop/Mentoring) & Contextual Application (Mentoring/Field Work) Needs for 14 Sustainable Agriculture Learning Objectives (Apprentices)

	Formal Guidance^		Contextual Application^^	
Learning Objective	%	χ^2	%	χ^2
Business management	88	<0.0001	38	n.s.
Soil conservation	83	0.0001	46	n.s.
Production planning	83	0.0001	74	0.0041
Food safety	80	0.0004	40	n.s.
Marketing	74	0.0041	49	n.s.
Disease management	74	0.0041	63	n.s.
Small farm equipment	71	0.0112	74	0.0041
Fruit production	69	0.0133	59	n.s.
Insect management	69	0.028	66	0.063
Plant propagation	63	n.s.	94	<0.0001
Season extension	52	n.s.	82	0.0003
Irrigation	51	n.s.	83	0.0001
Postharvest handling	51	n.s.	83	0.0001
Weed management	40	n.s.	89	<0.0001

Notes: n.s. = no significance
^Formal Guidance: Sum of Workshop & Mentoring preferences
^^Contextual Application: Sum of Mentoring and Field Work preferences

Workshops

Table R-7 shows the average pre-workshop and post-workshop scores for each learning objective in the program, as well as their respective positions compared to all learning objectives. These scores represent the apprentices' confidence in completing each learning objective before and after their participation in the workshops. The scoring scale used for this question is as follows:

1 – I would need significant help successfully managing this part of the farm.
2 – I would need some help successfully managing this part of the farm.
3 – I could manage this part of the farm on my own, but would not feel comfortable doing so.
4 – I could comfortably manage this part of the farm on my own.
5 – I could manage this part of the farm on my own and teach others how to do the same.

The four learning objectives with classroom/workshop as the respondents' preferred learning environment are italicized.

Table R-7. Average Apprentice Workshop Pre-Scores, Post-Scores, and Change in Scores for 14 Growing Growers Learning Objectives

Learning Objective	$\bar{x}$ (pre)	Rank	$\bar{x}$ (post)	Rank	ΔScore	Rank
Food Safety	*2.08*	*1*	*3.92*	*2*	*1.84*	*4*
Postharvest Handling	2.06	2	3.95	1	1.89	1
Weed Management	1.92	3	3.58	5	1.66	10
Marketing	*1.91*	*4*	*3.40*	*7*	*1.49*	*12*
Plant Propagation	1.84	5	3.62	4	1.78	6
Soil Conservation	*1.84*	*5*	*3.71*	*3*	*1.87*	*2*
Business Management	*1.65*	*7*	*3.14*	*12*	*1.49*	*12*
Production Planning	1.58	8	3.44	6	1.86	3
Insect Management	1.54	9	3.32	9	1.78	6
Season Extension	1.53	10	3.31	10	1.78	6
Irrigation	1.50	11	3.34	8	1.84	4
Small Farm Equipment	1.47	12	3.09	13	1.62	11
Disease Management	1.41	13	3.16	11	1.75	9
Fruit Production	1.32	14	2.59	14	1.27	14
Overall Mean	**1.69**		**3.40**		**1.71**	

Note: Italicized learning objectives are workshop learning objectives from Table R-3.

Apprentices indicated that they could not manage any learning objective without at least some help before participation in the workshops. In all learning objectives except for fruit production, respondents felt that they could sufficiently manage related food production tasks independently, albeit uncomfortably, following workshop attendance. Fruit production scored the lowest in all three score categories and is half a point below the next lowest learning objective in average post-workshop score. This indicates that it is not sufficiently covered in the workshop offered by the program.

One important decision that needs to be made is the standard by which program coordinators judge the success of core workshops. Is the purpose of these workshops to achieve a certain change in pre-workshop and post-workshop score (Δscore), or to reach a minimum standard of knowledge needed for commercial food production ($\bar{x}_{post}$)? It is recommended that a minimum post-workshop average be determined by Growing Growers coordinators based upon the minimum level of comfort they want graduating apprentices to have in performing learning objective-related tasks. *Additionally, workshop evaluation tools should be developed and administered immediately following workshop attendance. This will give a clearer picture of the*

effectiveness of each workshop than can be gathered by this evaluation, which reaches back up to 15 years for workshop scores.

The purpose of the question in Table R-8 was twofold: Identify niche topics that could function as optional workshops, and identify topics that Growing Growers already covers, but for which participants wanted more information. Growing Growers already offers underlined topics in required workshops, but because respondents mentioned them, they did not have enough depth in these topics to remember them.

Table R-8. Were there any workshop topics you would have liked to have seen offered, but weren't? (Apprentices & External Workshop Participants)

Marketing/Business Mgmt.	**Production**	**Other**
Online selling	Composting x2	Farming history
Restaurant marketing x2	Beekeeping	Agriculture politics
Pricing	Cheese making	Physical effects of farming
CSA planning	Non-food products x2	Self-care
Direct marketing	Production planning	Stress management
Wholesale markets	Urban production	Locating financial/learning resources
Consumer education	Companion planting	
Land acquisition x3	Buildings maintenance	
Business management x4		
Hiring/managing employees		
Note: x means this topic was mentioned multiple times across all answers		

Growing Growers can use the variety of business models and agricultural products of partnering host farms to teach some of apprentices' desired topics. Table R-3 (p.39) identifies the marketing strategies of host farm respondents and Table R-4 (p.39) identifies the agriculture products grown/made and sold by host farm respondents. Thanks to the variety of answers from only a sample of partnering host farms, informal exploration of business models and specialty products across multiple host farms provides apprentices a variety of ideas for their own future businesses. Examples of educational opportunities could include discussions with panels of host farmers, or informal one-on-one discussions with host farmers relevant to the interests of the apprentice, in the vein of a "career fair." These hypothetical learning opportunities provide networking opportunities for both parties.

One pattern that emerged in the question concerning desired learning experiences and networking motives was the mention of the physical and psychological tolls of farming, including joint/muscle impacts on the body and sleep. Originally, the physical and psychological tolls of farming were combined into a new optional workshop as a low-priority suggestion. However:

- The CDC recently reported that farmers commit suicide at twice the national rate.
- Apprentices network specifically for emotional/psychological support.
- Kansas State University recently hired an Extension specialist specifically for self-care outreach to farmers, indicating a strong need for self-care among food producers.

These three factors increase the importance of self-care as a necessary topic for prospective farmers to learn. Therefore, establishing a self-care workshop is now a priority recommendation.

Q.) Name 2 skills you developed as a result of your workshop participation
Q.) Name 3 behaviors you developed as a result of your workshop participation.
Q.) Name your 3 most memorable learning experiences from your **host farm apprenticeship**.

The purpose of these questions was to identify the learning objectives that held in apprentices' memories based on the workshop and apprenticeship experiences, which suggests an impactful learning experience. Numbers in Table R-9 are mentions of activities and behaviors in each learning objective, based upon the learning objective's description. If one respondent mentioned the same learning objective twice in their answer, it was counted as two mentions. Blanks indicate that none of the skills and behaviors mentioned across all answers fell into these learning objectives.

Table R-9. Count of Workshop/Apprenticeship Skills, Behaviors & Experiences Gained by Apprentices

	Workshop		**Apprenticeship**
Learning Objective	*Skills*	*Behaviors*	*Learning*
Soil conservation	10	11	5
Insect management	6	6	1
Disease management		1	1
Weed management	1	3	1
Irrigation	4	3	1
Production planning	9	5	5
Small farm equipment	4	4	7
Plant propagation	7		2
Postharvest handling	5	7	9
Business management	6	5	5
Marketing	3	4	7
Food safety			
Season extension	1		3
Fruit production			5
n = Total mentions across all answers			

These results will help to identify blind spots on which program implementers can place emphasis to increase the skill development potential of the program. For example, the food safety learning objective was not mentioned once across all answers to these three questions, despite its high workshop scores (Table R-7, p.42). This implies that apprentices develop skills and behaviors in response to contextual need. Workshop implementers should focus on the skills needed to safely grow, harvest, store and sell food, and mentors should focus on helping apprentices complete food safety tasks in their work.

Workshop participants from outside the apprenticeship program were asked similar questions regarding memorable workshop experiences and many listed the same learning objectives in their answers. Soil conservation was the most useful learning objective in workshops for both apprentices and non-apprentice attenders, which backs up the preferred learning environment data and comparatively high workshop scores. Table R-10 shows these experiences sorted into respective learning objectives.

Table R-10. Count of Memorable Workshop Experiences of Non-Apprentice Workshop Attendees

Learning Objective	Count
Soil conservation	9
Insect management	2
Disease management	
Weed management	1
Irrigation	
Production planning	2
Small farm equipment	
Plant propagation	
Postharvest handling	4
Business management	8
Marketing	
Food safety	5
Season extension	3
Fruit production	
Experiences	
Networking	9
Farm Tours	3
Presenting Knowledge	3
n = Total mentions across all answers	

External participants included apprentice "blind spots" (e.g. food safety and season extension) as memorable workshop experiences. A reason for this inclusion by non-apprentice workshop participants could be the ability to immediately apply food safety principles to their already-formed agribusinesses. Table R-11 details non-apprentice workshop attenders' roles in the food system, with many working for or managing established agribusinesses. Apprentices, who are still in the planning stages of their agribusinesses, have other agribusiness formation topics that must be covered before food safety becomes relevant, which could explain apprentices' lack of memorable experiences in the food safety learning objective.

Table R-11. Count of Non-Apprentice Workshop Attenders' Roles in the Food System

Food System Role	Count
Farm laborer	5
Farm manager	12
Community gardener	3
Volunteer	6
Food distributor	3
Food processor	2
Home gardener	13
Farmer's market manager	3
Agriculture researcher	5
Agriculture educator	9
Non-profit organization	7
Student	1
Policymaker	2
Marketer	1
Miscellaneous farm service (tilling, consulting)	2
n = Total mentions across all answers	

In addition to the learning objectives, most of the non-apprentice respondents regarded networking as an important workshop takeaway. Eighteen out of 23 non-apprentice workshop attenders said that they developed networks through workshop participation. Information sharing, business development, equipment sharing, and plant sourcing were the given reasons for networking at the workshops. Twenty-nine apprentices indicated that they also formed networks through the program, but when describing meaningful workshop experiences consider skills and knowledge more important than networking. Apprentices value information and resource sharing along with non-apprentice participants, but additionally use their networks for employment and emotional/mental support. More than half of apprentices were able to determine whether farming was feasible as a career through their relationships with host farm mentors.

Table R-12. In which part(s) of the program did apprentices create networks?

Networks formed during…	Count	%
Host farm work	26	90
Workshop participation	23	79
One-on-one mentoring	19	66
ListServ subscription	13	45
Note: % is of total respondents who formed networks (N=29)		

Host farm work networking provides an interesting glimpse into the connectedness between coworkers. In the question regarding meaningful host farm apprenticeship experiences, coworkers were mentioned 12 times, showing that learning in an employment context might not be solely independent. This network-building shows the willingness of potential farmers and

existing farmers to collaborate. Growing Growers should continue encouraging apprentices to view networks with established farmers as a resource for farming knowledge and form these networks with non-apprentice workshop participants.

- Does spending more time on the apprentice's host farm result in greater changes in workshop scores for any learning objective?
- Does spending more time on the apprentice's host farm result in having a higher likelihood of perceiving having the necessary skills?

Tables R-13 and R-14 analyze the relationship between time working on a host farm and workshop score change, using proportional comparison between hours/week groupings. By determining potential correlations between hours per week and workshop score improvement**,** conclusions can be drawn about the relative usefulness of working longer workweeks in the program, and whether more exposure to mentors' knowledge of farming practices and a place for contextual application of knowledge gained through other means increased the learning potential for each learning objective.

Table R-13. Correlation between Hours/Week and Workshop Score Change - Insect Management

	ΔScore					
Hours/Week	0	1	2	3	4	Total
1-20	2	7	5	1	0	15
21-40	0	5	8	0	2	15
>40	0	1	4	2	0	7
Total	2	13	17	3	2	37

Cochran-Mantel-Haenszel test

Nonzero Correlation p = 0.0296

Spearman's Correlation Coefficient

$\rho = 0.3901$

Table R-14. Correlation between Hours/Week and Workshop Score Change - Small Farm Equipment

	ΔScore				
Hours/Week	0	1	2	3	Total
1-20	1	9	2	0	12
21-40	1	4	4	4	13
>40	0	3	4	2	9
Total	2	16	10	6	34

Cochran-Mantel-Haenszel Test

Nonzero Correlation p = 0.0247

Spearman's Correlation Coefficient

$\rho = 0.4121$

There were two learning objectives with statistically higher changes in workshop scores, which indicates that more hours per week increases workshop effectiveness for these two learning objectives. The 12 other learning objectives had no statistical evidence that working longer hours increased the effectiveness of workshops.

Determinant – Are apprentices sufficiently educated in sustainable agriculture principles?

Table R-15. Do you feel that at the conclusion of your apprenticeship, you were equipped with the necessary skills to start your own agribusiness?

	n	%
Yes	21	58
No	15	42

- Are previously experienced apprentices more likely to believe they have the necessary skills to start their own agribusinesses?

Table R-16. Comparing Apprentices' Previous Experience Against Perceived Skill Gain

	Have Needed Skills?			
Previous Experience?	No	Yes	Total	
No	6	15	21	Fisher's Exact Test
Yes	9	6	15	Table Probability p=.0488
Total	15	21	36	Two-sided p = .0895

By comparing previous experience against perceived skill development, coordinators can know whether previous experience has any impact on perceived skill development. According to the Fisher Exact test, there is statistical evidence that inexperienced apprentices are more likely to believe they have the necessary skills at the end of their participation than experienced apprentices. One potential explanation for this result could be that experienced apprentices have a better understanding of the standards needed to run an agribusiness thanks to their history with the industry. However, there is no data to say this with certainty. More evaluation focusing on how apprentices perceive their progress in skill development is recommended.

Table R-17. Correlation between Apprentices' Hours/Week and Overall Skill Development

	Hours/Week				
Have Needed Skills?	1-20	21-40	>40	Total	Cochran-Mantel-Haenszel Test
No	6	4	5	15	*Nonzero Correlation p = 0.4304*
Yes	10	7	4	21	
Total	16	11	9	36	

According to the Cochran-Mantel-Haenszel test, there is no statistical correlation between workweek length and developing all the necessary skills for starting an agribusiness. Coupled with the lack of correlation between workweek length and workshop score change in 12 of the 14 learning objectives, this implies that the existence of a location to contextually apply newly learned knowledge is more important than the time spent at this location. Coordinators can work with apprentices and host farmers to determine a schedule that fits the needs of all parties without compromising potential skill development.

Outcomes – Are apprentices entering commercial food production? Why or why not?

One indicator of Growing Growers' success at educating apprentices is the creation of agribusinesses based upon knowledge gained in the program. A lack of agribusiness formation indicates that there is at least one learning objective that Growing Growers can better teach apprentices in order to increase the likelihood of food production.

Table R-18. Which of the following applies to you post-Growing Growers? (Apprentices)

	n	%
I currently own my own agribusiness.	7	19%
In the past, I owned my own agribusiness, but am no longer in business.	6	17%
I have worked for wages for the host farm from my apprenticeship.	13	36%
I have worked for wages for other agribusinesses.	14	39%
I have volunteered with the host farm from my apprenticeship.	4	11%
I have volunteered with other agribusinesses.	10	28%
I did not and do not work in the agriculture industry.	8	22%
Note: % is of total apprentice respondents to question (N=36). Sum will not equal 100%		

Table R-19. Do you plan to start your own agribusiness in the next five years?

Response	n	%
Definitely yes	5	17
Probably yes	5	17
Probably not	18	60
Definitely not	2	6

Two-thirds of apprentices that had not already owned their own agribusiness post-Growing Growers said that they would likely not start their own agribusiness in the next five years. When giving their reason(s), 13/20 said that business management barriers were actively preventing them from starting their own agribusinesses. This includes both capital and land acquisition but tended towards land. Although the fact that two-thirds of apprentices are unlikely to start agribusinesses is initially discouraging considering the program's desired outcome, coordinators can view this data as apprentices understanding the standards needed to start and sustain an agribusiness, and determining that they are not currently able to create sustainable businesses.

Q.) What is the biggest barrier to starting an agribusiness?

Like the previous question, 34/36 respondents mentioned capital, land acquisition and/or unviable markets as the biggest barrier to starting an agribusiness. This indicates a general unease towards the financial aspect of farming, despite the educational opportunities provided by the program. **All mentions of land in this question only mentioned purchase and no other form of acquisition.**

Recommendations for Future Program Cycles

1. Because 34/36 apprentices mentioned business start-up as the biggest barrier to starting an agribusiness, implement a business-planning project into Growing Growers.
    a. Center the project around the kind of business each apprentice wants to own, to increase the project's utility for each individual.
    b. The project should investigate land acquisition and financing in order to collect financial resources that can be given to future cohorts. Connect apprentices to external financial resources upon the conclusion of their apprenticeship that they can use if they desire to start their own agribusinesses.
    c. When teaching the Business Management workshop, emphasize the process of starting up a new farm, with heavy focus on alternatives to purchasing land (leasing/renting/landless agribusiness).

2. Provide or identify an incubator farm for apprentices to apply business management principles. Incubator farms provide land access (sometimes equipment as well) at a price point that apprentices would be able to afford. This incubator farm could be the result of a city partnership, such as the Common Ground Incubator Farm in Lawrence, or a potential new farm at the Olathe Horticulture Center, where land is available for conversion. (Strongly encourage Lawrence area apprentices to test commercial production principles at Common Ground.)

3. Remove the fruit production learning objective from the plant propagation & production planning workshop and move it to a newly created specialty products core workshop. This will provide the opportunity for more emphasis on fruit production, while also allowing for specialty topics such as dairy products, beekeeping & honey, and cut flowers/ornamentals. This creates the potential for increased diversity of potential future agribusinesses.

4. None of the apprentices who listed skills/behaviors/apprenticeship experiences mentioned food safety. Because of GAP/FSMA standards, a formal educator (either a workshop leader or host farm mentor) should give apprentices specific projects related to analyzing food safety practices.

5. Production planning, small farm equipment, and insect management require both a formal educator and contextual application. It is therefore important when planning workshops on these topics to give each learner an opportunity to solve a personal problem they face using their newly gained knowledge. These learning objectives would benefit most from direct translation to their environment outside of their apprenticeship.

6. Insect management and small farm equipment benefit the most from increased time on the host farm. All host farm mentors should emphasize these learning objectives in their instruction.

7. Create a new workshop on the physical/emotional/psychological tolls of farming and self-care.

Appendix – Learning Objectives

Learning Objective	Description
1. Soil conservation	Able to manage soil through cover cropping, rotation, tillage, compost, and amendments
2. Insect Management	Able to identify common pests and understand concepts of IPM, biological control, and pesticide use.
3. Disease Management	Able to identify common crop diseases, their causes, and methods of control.
4. Weed Management	Able to identify common weeds and their methods of control.
5. Irrigation	Able to set up and maintain irrigation systems for purpose on a small farm.
6. Production Planning	Able to set up effective schedules for seasonal crop production.
7. Small Farm Equipment	Able to use basic farm tools and machines, and understand their sourcing, safety, maintenance, and repair.
8. Plant Propagation	Able to source plants, and to propagate seeds, transplants, and cuttings.
9. Postharvest Handling	Able to time harvests and understand washing, sorting, cooling, storing, and packing.
10. Business Management	Able to develop a business plan, identify financing options, complete bookkeeping, budgeting, taxes, and insurance for farm activities.
11. Marketing	Able to identify potential marketing strategies for the business, and how to best sell produce to consumers.
12. Food Safety	Able to maintain minimum GAP/FSMA standards for crops, and to develop a food safety plan.
13. Season Extension	Able to use production structures, (high tunnels, hoop houses, greenhouses, etc.) to extend crop growing seasons
14. Fruit Production	Able to grow temperate crops suitable for our region.

Conclusion

Apprenticeship has the ability to positively affect recruitment of beginning farmers by providing enhanced training opportunities in multiple learning environments. The mixed learning environment nature of partnered apprenticeship programs such as Growing Growers allows for enhanced training that could not be gained through workshop attendance or apprenticeship individually.

Business management continues to pose a barrier to apprentices pursuing food production, which confirms the findings of previous research. Any program with the goal of recruiting people into food production must emphasize business in addition to farm operations and connect participants to resources they can confidently use in their business pursuits. Research focusing specifically on business management learning is recommended.

A holistic curriculum that teaches multiple topics particularly benefits from this model of farmer training. Results from this study show that apprentices prefer learning at least two sustainable agriculture objectives for each learning environment. The presence of a place to apply learning appears to mean more for participant learning than does the amount of time they spend at these locations. This increases the accessibility of apprenticeship programs to those who cannot commit to full-time farm work, while still teaching part-time apprentices important farming principles. These findings will help mold future educational opportunities to the benefit of the learner.

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Appendix – Survey Questions

Choose the option that best describes your involvement in Growing Growers.

- Growing Growers apprentice
- Host farmer ONLY
- Workshop participant ONLY
- Host farmer AND workshop participant
- None of the above* [Ends survey]

Apprentice Block

What year(s) did you apprentice through Growing Growers? Check all that apply.

- 2004-2018

Which of the following applied to you professionally before your participation in Growing Growers? Mark all that apply.

- I had worked for an agribusiness for wages.
- I had owned my own agribusiness.
- I had volunteered for an agribusiness.
- None of the above.

(Question was recoded to represent previous experience of any type, or no previous experience.)

Did you complete all the requirements of the apprenticeship program (field work, workshops, farm tours, one-on-one training)?

- Yes
- No (Please briefly explain why.)

How satisfied were you with your Growing Growers experience?

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Very dissatisfied

Did your Growing Growers experience meet your expectations?

- Yes
- Somewhat (Please briefly explain why.)
- No (Please briefly explain why.)

What was the name of your host farm?

- [Text entry]

Where was your host farm located?

- [Text entry]

How did you choose your host farm?
[Text entry]

How many hours per week did you apprentice on your host farm?
1-10 hours
11-20 hours
21-30 hours
31-40 hours
More than 40 hours
(Recoded to group 1-20 hours, 21-40 hours, and >40 hours.)

How many months total did you apprentice on your host farm(s)?
Less than 1 month
Partial growing season (1-3 months)
Full growing season (4 months)
More than 1 growing season (>4 months)

How did the mentor relationship with your host farmer(s) improve your understanding and knowledge of farming?
[Text entry]

How did the mentor relationship shape your view of farming as a career?
[Text entry]

Which core workshops did you attend? Select all that apply.
Plant Propagation & Production Planning
Building and Managing Healthy Soils
Small Farm Equipment & Drip Irrigation
Postharvest Handling & Food Safety
Insect, Disease, & Weed Management
Farm Business Management

[For each workshop selected by the respondent]
The learning objectives of the 'X' workshop are listed below. For each objective please rate your knowledge on a scale of 1-5 before and after attending this workshop. If needed, roll over each objective for a detailed description.

Scale
1 – I would need significant help successfully managing this part of the farm.
2 – I would need some help successfully managing this part of the farm.
3 – I could manage this part of the farm on my own, but would not feel comfortable doing so.
4 – I could comfortably manage this part of the farm on my own.
5 – I could manage this part of the farm on my own and teach others to do the same.
[Text entry for each learning objective's score before and after workshop attendance]

Were there any workshop topics you would have like to have seen offered, but weren't?

[Text entry]

How have you used the knowledge and experience you gained from attending the Growing Growers workshops into your business and/or goals?

[Text entry]

The Growing Growers program offers more workshops than those required for the Apprenticeship Program. Did you attend any of these additional workshops outside those required for the Apprenticeship Program?

Yes/no

[If yes] How many additional workshops did you attend?

1-3
4-6
7-9
10 or more

[DESCRIPTIVE TEXT]

These next two questions will ask about the skills and behaviors developed through workshop attendance. A skill is the ability to complete a task using your knowledge effectively and readily in executing the task. Behavior is how you act in response to a situation. For example, a skill would be knowing how to take soil samples for nutrient tests and interpreting test results, and a behavior would be altering fertilizer applications based upon your test results.

Name 2 skills you developed as a result of your participation in the workshops.

[Text entry]

Name 3 behaviors you changed as a result of your participation in the workshops.

[Text entry]

[Page break]

Describe your three most memorable learning experiences **from your host farm <u>apprenticeship</u>**.

[Text entry]

Growing Growers uses three learning environments for training – the classroom, one-on-one mentoring with a host farmer, and field work (on-the-job, independent learning). For each of the learning objectives listed below, which learning environment worked best for training you?

[One dropdown selection for each learning objective, 14 total]
Classroom/workshop
One-on-one mentoring with host farmer
On-the-job, independent learning

Do you feel that at the conclusion of your Growing Growers participation, you were equipped with the skills needed to start your own agribusiness?

Yes/no

After your program participation, did you pursue any additional training or education?

Yes/no

[If yes] What extra training/education did you pursue?

[If yes] Briefly explain why you pursued extra education/training.

[Page break]

Which of the following applies to you post-Growing Growers? Check all that apply.

I currently own my own agribusiness.

In the past, I owned my own agribusiness, but am no longer in business.

I have worked for wages for the host farm from my apprenticeship.

I have worked for wages for other agribusinesses.

I have volunteered with the host farm from my apprenticeship.

I have volunteered for other agribusinesses.

I did not and do not work in the agriculture industry.

[If respondent has not owned their own agribusiness] Do you plan to start your own agribusiness in the next 5 years?

Definitely yes

Probably yes

Probably not

Definitely not

[If respondent has not owned their own agribusiness] Why or why not?

[Page break]

What is the biggest barrier to starting an agribusiness?

Did you build professional networks through your participation in the program that can serve your business and/or career goals?

Yes/no

[If yes] In what part(s) of the program did you build networks? Choose all that apply.

One-on-one mentoring

Host farm work

Workshop attendance

ListServ subscription

[If yes] How to you plan to use these networks to advance your business/goals?

[Text entry]

Did you begin to teach others about agriculture and/or business after your participation in Growing Growers?

Yes/no

[If yes] In what capacity?

[Text entry]

Host Farm Block

What is the name of your farm?

[Text entry]

Where is it located? (City, State)

[Text entry]

How many years has your farm been in operation?

[Text entry]

What agriculture products did your farm produce and sell **in its most recent year of production?** Check all that apply.

Fresh vegetables
Fresh fruit
Herbs
Nuts
Mushrooms
Meats (Beef, poultry, pork)
Transplants
Cut flowers
Dairy/cheese
Grains
Honey
Eggs
Other (please specify)

Where did you sell your products **in your most recent year of production?** Check all that apply.

Grocery stores
Farmer's markets
Food hubs
Restaurants
Roadside stands
CSA subscriptions (Community supported agriculture)
Online sales
U-pick
Other (please specify)

Which years have you mentored Growing Growers apprentices? Check all that apply.
2004-2018

How many apprentices have you mentored across all years as a host farm?
[Text entry]

How satisfied were you with your Host Farmer experience?
Very satisfied
Satisfied
Neither satisfied nor dissatisfied
Dissatisfied
Very dissatisfied

Did your experience meet your expectations?
Yes
Somewhat (please specify)
No (please specify)

If approached in the future to serve as a host farm, would you accept or decline?
Accept/decline

Did you build networks through your affiliation with Growing Growers that could serve your business/career goals?
Yes/no
[If yes] How do you plan to use these networks to advance your business/career goals?
[Text entry]

Workshop Participant Block

How many workshops have you attended?
1-3
4-6
7-9
10 or more

Thinking back on your participation in the Growing Growers workshop(s), what did you take away from the experience? This could include new knowledge, skills, behaviors, and/or habits.
[Text entry]

How have you incorporated your knowledge and experience gained from the workshop(s) into your business and/or goals?
[Text entry]

Did you build networks through tour affiliation with Growing Growers that could serve your business/career goals?

Yes/no

[If yes] How do you plan to use these networks to advance your business/career goals?

[Text entry]

Besides being a consumer, do you **currently** participate in the food system in some capacity? Check all that apply.

Farm laborer
Farm manager
Community gardener
Volunteer
Food distributor
Food processor
Home gardener
Farmers' market manager
Agriculture researcher
Agriculture education
Non-profit organization
Chef
Student
Policymaker
Other (please specify)

Do you believe that your participation in the food system is directly linked to your participation in the Growing Growers workshops?

Definitely yes
Probably yes
Probably not
Definitely not

Demographics Block (Shown to every respondent)

What is your age?

[Text entry]

What is your gender?

Male
Female
Other
Prefer not to answer

What is the highest level of education you have completed? Mark one.

Some high school
High school diploma/GED
Some college
Vocational/technical/Associate's degree

Bachelor's degree
Some post-graduate studies
Post-graduate degree (Master's/Doctorate)

What is your ethnicity?
Hispanic or Latino
Not Hispanic or Latino
Prefer not to answer

What is your race? Mark all that apply.
American Indian or Alaskan Native
Asian
African American
Native Hawaiian or other Pacific Islander
White
Other