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Ways of Knowing, Sharing, and Translating Agricultural Knowledge and Perspectives: Alternative Epistemologies across Non-formal and Informal Settings

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Abstract

The mainstream agricultural literacy movement has been mostly focused on school-based learning through formal curricula and standardized non-formal models (e.g., FFA, 4-H). The purpose of the current study is to qualitatively explore through a grounded theory approach, the development, sharing, and translation of diverse forms of agricultural knowledge and perspectives among adult learners within informal and non-formal learning settings. Data collected through interviews with and naturalistic observation of agricultural practitioners with diverse personal and professional backgrounds are used to guide the development of a holistic agricultural epistemology framework. Based on this framework, we argue the scope of the agricultural literacy movement should be expanded to better account for more diverse sets of learners (e.g., adults), worldviews (e.g., local food production and consumption), and curricular models and settings (e.g., informal and non-formal).

Keywords: agricultural literacy, agricultural epistemology, non-formal learning, informal learning

Introduction

Agricultural literacy has been of interest in America dating as far back of the 19th century with the passing of the Morrill Act of 1862. In the contemporary era, Mayer and Mayer (1974) first noted deficiencies in the amount of agricultural-based knowledge possessed by high school and college students. The agricultural literacy movement was formally positioned within public education in 1981 when the United States Department of Agriculture's (USDA) initiated the Agriculture in the Classroom (AITC) program. The 1988 release of a National Research Council (NRC) report further crystalized agricultural literacy as a principal priority of the agricultural education field. Subsequently, a rich body of agricultural literacy research has been developed (e.g., Cannon, Broyles, Seibel, & Anderson, 2009; Colbath & Morish, 2010; Frick, Kahler, & Miller, 1991; Kovar & Ball, 2013; Meischen & Trexler, 2003; Powell, Agnew, & Trexler, 2008). To date, however, both research and practice have focused almost entirely on the infusion of agricultural concepts and principles into formal and non-formal k-12 curricula. This narrow focus has overshadowed the need to support adult agricultural literacy development at the collegiate level and within non-formal learning environments (e.g., Extension) and informal community settings (Kovar & Ball, 2013). Adults influence agricultural production and consumption through their

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purchasing and voting power. Without a reliable knowledge base to work from, these same adults are likely to make consumer decisions and vote on agriculturally oriented legislation based on incomplete and/or inaccurate information gleaned from the media and other biased outlets.

In this study, we responded to the paucity of attention directed at adult agricultural literacy by exploring emergent patterns and themes of agricultural information and knowledge dissemination to and between adult learners within non-formal and informal learning settings. Through the insights gained, recommendations for practice and future research with the aim of broadening the scope of impact of adult agricultural literacy activities, initiatives, and programs that are positioned within non-formal and informal learning settings are proposed.

Background

In response to the 1988 NRC agricultural education report, Frick, et al. (1991) articulated what has become the foundational definition of agricultural literacy in America. These authors broadly defined agricultural literacy "as possessing the knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (Frick, et al., 1991, p. 52). A subsequent report issued by the National Council on Agricultural Education (NCAE) in 2000 expanded the scope of the agricultural literacy agenda to include direct emphasis on the development of conversational competencies and age appropriate curricula (Meischen & Trexler, 2003; Powell, Agnew, & Trexler, 2008).

The expanded understanding of agricultural literacy prompted by the 2000 NCAE report has remained predominantly anchored in the K-12 public education context (Kovar & Ball, 2013). Significant initiatives, such as the USDA's AITC program, reflect the dominant view held by agriculture educators that the development of an agriculturally literate citizenry is dependent upon agricultural content being embedded within school-based curricula (Pense, Leising, Portillo, & Igo, 2005). The effort to introduce elementary and secondary students to agricultural content extends beyond formal classroom activities to include science fairs and summer programs, as well as student participation in organizations such as the FFA and 4-H (Blackburn, 1999; Boleman & Burrell, 2003; Cannon, et al., 2009). Furthermore, non-government organizations such as the Farm Bureau and Project Food, Land, & People have also been active in exposing elementary and high school students to agricultural topics.

A relatively limited amount of instructional and scholarly attention has been directed at the agricultural literacy development of post-secondary students and, more generally, adult learners. The general lack of attention to agricultural literacy at the post-secondary level is surprising considering college students have overall been shown to know very little about agriculture (Colbath & Morrish, 2010). In regards to adult learners, Kovar and Ball (2013) stated, "the major issue with targeting young audiences is to do so potentially excludes older audiences capable of directly impacting complex issues and policy decisions" (p. 174). Non-formal learning opportunities offered at the community level, such as Extension-led programs and activities, do provide adults with opportunities to develop their agricultural knowledge base both as learners and peer educators (Grudens-Schuck, Cramer, Exner, & Shour, 2003; Ota, DiCario, Burts, Laird, & Gioe, 2006). Research also indicates adults prefer gaining agricultural knowledge through non-formal and informal learning methods and activities (Cartmell, Orr, & Keleman, 2006). Unfortunately, such activities and initiatives are rarely framed in the context of agricultural literacy.

Research published outside of the agricultural education literature also provides some indication that adults develop a level of agricultural literacy through informal knowledge exchanges that occur in settings such as farmers' markets, community supported agriculture (CSA) distribution sites, and community gardens (Cox, et al., 2008; Hinrichs, Gillespie, & Feenstra, 2004; Lyson, 2005; Sharp, Imerman, & Peters, 2002). However, informal exchanges and observations

have not been fully considered nor thoroughly studied as mechanisms for developing and enhancing the agricultural literacy of learners (adult or otherwise).

Purpose

Kovar and Ball (2013) recommended that scholars and practitioners broaden the scope of agricultural literacy activities and initiatives to better account for adult learners. The current study is responsive to this recommendation. Specifically, the purpose of the current study is to explore how the personal and professional backgrounds and perspectives of agricultural practitioners (i.e., Extension professionals, local food growers, farmers' market and CSA organizers) influence the dissemination of agricultural knowledge to adults within non-formal and informal learning settings. The following research question guided our exploration: What experiences and perspectives shape the acquisition, sharing, and exchange of agricultural information and knowledge by adults within non-formal and informal learning settings?

Conceptual Framework

Our exploration of adult agricultural literacy development and enhancement is focused on non-formal and informal learning settings (Eshach, 2007; Etling, 1993; Malcolm, Hodkinson, & Colley, 2003). The backgrounds, goals, and motivations of learners, as well as instructional philosophies, curricular designs, and delivery methods are among the factors that characterize and differentiate non-formal and informal learning settings (see Figure 1).

Primary Characteristics of Setting	**Non-formal Learning Setting**	**Informal Learning Setting**
Examples of Setting	Extension programs and activities	Farmers' markets, agritourism
Source of Learner Motivation	Voluntary, learners are intrinsically motivated	Voluntary, learners are intrinsically motivated
Learning Objective Development	Pre-designed, but with the flexibility to respond to learner input	Learner directed
Assessment Methods	Instructor and learner evaluation through authentic models	Learner evaluation

Figure 1. Learning Setting Examples and Primary Characteristics

Pre-designed lesson plans that are not bound by rigid, sequentially based curricula characterize non-formal learning settings (Etling, 1993). Learners engage in learning voluntarily and are thus understood to be intrinsically motivated. Assessment occurs through student self-evaluation and instructor application of authentic models that are not tied to formal grades, degrees, or certificates (Andersson & Andersson, 2005). The objectives that guide learning within non-formal settings are often developed by instructors, but with the input of learners. This co-creation of learning objectives is an indication of the responsiveness of non-formal education to the needs and demands of learners, as well as other stakeholder groups such as communities, industry, and government who seek to provide their constituents and employees with personal and professional development opportunities (Eraut, 2000).

Informal learning settings are ubiquitous and thus not limited by space, profession, time, or other environmental or social parameters. The unstructured learning that takes place in informal settings is learner-directed and occurs through day-to-day interactions, observations, and

experiences that can be either routine or unique (Etling, 1993; Hinrichs, et al., 2004). Informal learning can be coincidental and spontaneous, or intentional as in the case of adult learners who are seeking specific knowledge and skills relevant to their particular interests and goals.

Methods

The purpose of the current study is to explore how the various food production and consumption experiences and perspectives of agricultural practitioners influence how such actors non-formally and/or informally acquire, share, and exchange agricultural information and knowledge within their communities. Drawing upon the methodological principles of grounded theory design (Yin 2003), we developed a single case, or bounded-system, through which to inductively explore the non-formal and informal development and exchange of agricultural knowledge and perspectives within the Southern Arizona regional food system. Given the emergent nature of grounded theory research (Glaser, 1998), we pose the following question to guide our exploration: What experiences and perspectives shape the acquisition, sharing, and exchange of agricultural information and knowledge by adults within non-formal and informal learning settings?

This case was set in a regional food system that spanned the counties of Cochise, Pima, and Santa Cruz, Arizona. This region of Arizona is home to one of longest surviving civilizations in North America, which includes a history of over 4,100 years of continuous food production and consumption. Based on figures reported through the 2010 U.S. Census, the combined population across the three counties totals 1,157,766 residents. The Tucson metroplex is the largest urban center in the region with a population of 520,116 as indicated by the 2010 U.S. Census. Tucson is also the location of The University of Arizona, which is the State's land grant institution (and thus includes Arizona's only College of Agriculture and Life Sciences). The region celebrates a deep agricultural tradition that includes a rich history of ranching and cotton production. Southern Arizona is also home to pecan and fruit orchards, as well as a growing number of vineyards. Local agricultural enterprise is also a vibrant aspect of the Southern Arizona economy as evidenced by the region sustaining no less than ten farmers' markets, several CSA shares, and a host of you-pick operations.

The current study relied upon a purposive sampling strategy, which allows qualitative researchers to first identify and then engage participants with backgrounds and perspectives relevant to the phenomenon being studied in rich, in-depth exploratory discussions, interactions, and observations (Patton, 2001). We applied two purposive sampling strategies: maximum variation and chain sampling.

Maximum variation sampling involves researchers purposefully selecting participants that represent a wide range of experiences and perspectives relevant to the phenomenon that is being explored (Creswell, 2002). We built a sample composed of agricultural practitioners with diverse personal and professional backgrounds in order to reveal variations in the types of information and knowledge specific to food production and consumption that is being shared and exchanged both non-formally and informally within the Southern Arizona regional food system. We limited our understanding of "agricultural practitioners" to actors who in some professional way contribute to the production and consumption of food, but are not engaged in formal agricultural education. Such practitioners include non-formal agricultural educators (e.g., Extension specialists), local food movement leaders, and growers who directly interact with their customers. By purposefully achieving variation within the sample, our ability to illuminate and illustrate the assorted non-formal and informal methods by which agricultural information and knowledge is shared and exchanged was enhanced.

The maximum level of variation in a sample is not a concrete threshold. We determined having achieved an acceptable level of variation in the perspectives and experiences included in our sample by reaching a point of data saturation. Data saturation is recognized when the addition

of participants to a sample stops generating new insights on the phenomenon being studied (Glaser & Strauss, 1967). In order to develop our sample to the point of such saturation, we relied on chain (or snowball) sampling. Chain sampling is the process through which additional participants with relevant expertise are recruited into a study based on the recommendations of existing participants (Ritchie, Lewis, & Elam, 2003).

Our sample was composed of 18 participants. Seven of these participants were employed by organizations (i.e., a native seed bank, community food bank, Cooperative Extension) with missions that align with the development and enhancement of the Southern Arizona regional food system. These seven participants were experienced in the delivery of agricultural content to adult learners through non-formal outreach and education activities and programs sponsored by their organizations. The remaining eleven participants worked in the Southern Arizona regional food economy as growers, organizers, and/or promoters of local agricultural enterprise. This sub-set of informants included three organizers of local farmers' markets, one manager of a CSA share, five small-scale farmers who sell their products through farmers' markets, you-pick farms, and/or CSA shares, one editor of a publication dedicated solely to Southern Arizona food production and consumption, and one self-described community-supported baker. Each informant has been assigned a pseudonym to protect his or her anonymity.

Data were collected primarily through individual interviews using a semi-structured protocol aimed at generating insights relevant to our guiding question (Creswell, 2007; Merriam, 2009; Miles & Huberman, 1994). More specifically, the protocol was designed to reveal general themes specific to the agricultural backgrounds, agricultural knowledge bases and perspectives, and approaches to translating agricultural knowledge and information of each participant. Summaries of interviews were individually shared with the participants with the request for feedback and clarification in order to enhance the trustworthiness of the data (Creswell & Miller, 2000). Naturalistic observations of participants during informal information exchanges in public venues (e.g., farmers' markets, CSA pick-ups) were also made and recorded as field notes over a three-month period of time (Angrosino, 2007). Garnering data through multiple collection strategies enhanced the trustworthiness of the analysis and allowed us to explore the processes associated with adult agricultural literacy from multiple vantage points (Berg & Lane, 2014).

Analysis was conducted via standard grounded theory approaches including open, axial, and selective coding phases. During the open coding phase, we coded each transcript individually, line by line to identify in vivo codes (Strauss & Corbin, 1990). In the axial coding phase, we conducted a peer debrief in order to identify and confront any individual bias, achieve consensus, and thereby further build overall trustworthiness in the analysis. We next collapsed our individual codes around a central category. The category that emerged from the data during the axial phase was the particulars of: (1) the way in which the participants came to know or become literate about agriculture themselves, (2) the specific epistemology of the participants about agriculture, and (3) the way in which the participants then translates or believes knowledge about agriculture should be translated to others. In the selective coding phase, we re-analyzed data according to the aforementioned central category. We again engaged in a peer debrief of the selective codes and developed through mutual consensus the final model that guided the findings.

The findings generated through qualitative research are not generalizable (Creswell, 2007, Patton, 2001). Accordingly, the intended outcome of the current study is limited to the generation of new insights on how the non-formal and informal sharing and exchange of agricultural information and knowledge, at least in part, influence adult agricultural literacy. From this limitation comes the opportunity to develop propositions regarding how agricultural information and knowledge is developed, shared, and exchanged both non-formally and informally, and how such factors influence adult agricultural literacy. In turn, these propositions can be subsequently tested through future qualitative and quantitative research. Similarly, the overall case represents a relatively small sample of participants. However, sample size is of secondary importance to the

ability to reach data saturation in qualitative case study research (Crouch & McKenzie, 2006). Data saturation was reached in this study.

Findings

We present the findings of this study in three sections. These sections blend together to reflect the complexities and variations in the conditions and factors that shape and influence the non-formal and informal sharing and exchange of agricultural knowledge and perspective within the Southern Arizona regional food system. These sections are: (1) the way in which the participants came to know or become literate about agriculture themselves, (2) the specific epistemology of the participant about agriculture, and (3) the way in which the participants then translates or believes knowledge about agriculture should be translated to others.

The Roots of Agricultural Knowledge and Perspective

The participants in our study came to know and understand agriculture through four sources of knowledge and perspective. These sources included: *collegiate education (agricultural and non-agricultural disciplines), familial backgrounds, cultural and immersion experiences,* and *experimentation*.

By and large, the sample as a whole was well educated in the traditional sense as indicated by all, but one of the participants having earned at least a baccalaureate degree. Twelve of the participants had either completed or were in the process of completing a graduate degree. The disciplinary fields in which the practitioners were trained were very diverse (e.g., dendrochronology, Latin American studies, outdoor education, psychology, sociology, wildlife ecology).

Six of the practitioners included in our sample had technical training in an agricultural field (i.e., agricultural economics, agricultural education, nutritional sciences, plant sciences) at the post-secondary level. These participants often anchored their agricultural knowledge and perspectives in scientific and technological principles and practices. For example, Joe, who has over 30 years of experience working in the Cooperative Extension and was overseeing a county Master Garden program when our study was conducted, consistently referred to the importance of his scientific training and knowledge base when describing his work. He stated,

> I did a master's degree at the University of Arizona in plant protection, which gave me weeds, and insects, and diseases, and abiotic factors, and all of the issues that deal with diagnosing plant problems. I have a graduate degree in biology. Interesting, from the College of Science. That gave me a broad background in ecology and herpetology, and all of those basic sciences there… we [county Cooperative Extension unit] do horticulture, but we also do a lot of diagnostics, and I spend a lot of time teaching about insects, and weeds, and diseases, abiotic, and all of that stuff.

In the case of Molly, an Extension Agent who is a lead in the statewide training of k-12 teachers (i.e., adult learners) in the use of "Ag in the Classroom" curriculum, pursuing a graduate degree in agricultural economics spawned her passion for agricultural literacy. She stated,

> One of the [undergraduate] classes I had to take was an economics class and I took it within the College of Ag and absolutely loved it, and went and said, can I get a degree in something like this? Here the little city girl. Oh, we have this degree called Ag Economics. We'd love to have you, we don't have many women, this would be a great place for us to put you… My parents after that kept saying, why agricultural economics, can you get a job? I said we all need to eat, we all need to work, I'm going to have a job the rest of my life, and I have. I've never been an economist.

The formal learning experiences described by Joe and Molly provide greater context for how formal agricultural training can lead to the development of a scientific and/or technical foundation for those practitioners who engage in non-formal and/or informal agricultural information sharing and knowledge exchange.

The pursuit of post-secondary training outside of the agricultural disciplines were also shown to influence the development of the knowledge base and perspective from which many practitioners approach their agricultural work. Specifically, 11 of our participants have baccalaureate or advanced degrees in non-agricultural disciplines (i.e., anthropology, art, business, education, geology, geography, Latin American studies, philosophy, and public health sociology). Through their collegiate training, these participants often came to know agriculture from a perspective of consumption over production with particular emphasis on issues of food insecurity and injustice, as well as sustainable growing practices. For example, Lucy, a manager of a Cooperative Extension-run community kitchen with the mission of increasing the consumption of fresh produce within a low income community that is considered to be a "food desert" (see Whelan, Wrigley, Warm, & Cannings, 2002), described how her undergraduate degree in Latin American studies and graduate degree in public health, converge to inform her work with inner-city families who are of mostly Hispanic and Native American decent. She remarked,

> Obviously, in working with the program, I found that it was a really great fit for my personality and interests in urban food justice, and so I got hired on as a staff member and went through my Masters in Public Health.

Another example of this finding is reflected in the story of Michelle, who developed a now lifelong commitment to learning about and advocating for the sustainable use of indigenous and heirloom crops (e.g., cholla cactus buds, Sonoran wheat). Her work history includes authoring cookbooks, managing a blog, and facilitating independent workshops all aimed at the promotion of growing and cooking with ingredients indigenous to the Sonoran desert. Michelle indicated her undergraduate and graduate training in the fields of geology and ethnobotany sparked her passion for sustainable agricultural practices that are reliant on native plants.

Beyond college and university classrooms and laboratories, the practitioners we spoke with commonly talked about how they developed an agricultural awareness and understanding through experiences and observations, which often started with their upbringing. For example, Cliff, an organic farmer who supplies produce to a CSA share, as well as to a host of local restaurateurs, indicated his knowledge and passion for agriculture is reflective of a multi-generational family interest in small-scale food production. He stated, "He [father] banged it into my head. My grandfather worked on the [Mississippi River] dredge boats, but then he also grew… tomatoes and peppers and made cha-cha [spicy chutney]." Interestingly, Cliff also learned about agriculture from his father, a Louisiana high school agriculture teacher and hobby farm operator, by observing him in a formal classroom setting as a young child and then later as his student. He stated, "There's a lot of things that I learned in watching him… the Ag class changed from year to year from like 7 years old until I was in his Ag class." Similarly, James, another participant who in partnership with his wife own and operate a 20 acre organic garden and on-site produce stand, talked of how he learned to garden organically by in his words "apprenticing under my father." These and other participant stories revealed the important role of family in shaping the agricultural knowledge bases and perspectives of practitioners.

Cultural and immersion experiences also sometimes contributed to the agricultural knowledge base of practitioners, as well as shaped their perspectives on food production and consumption. For instance, George, the manager of a community farm run by the local food bank, described the impact a trip he took to Italy had on his cultural view of food consumption and production, as well as on his overall concern over food insecurity in the following way: "I went back to my family's home country of Italy and realized just how prevalent food culture was there and that there really aren't a lot of hungry people in Italy." Another participant, Heather, who works

in the same community kitchen as Lucy, described the experiential origins of her agricultural and food knowledge and perspective when stating,

> I had a very diverse time in the 8 years following college to finding this job. I taught English in Mexico, I did AmeriCorps here, I lived in New Zealand for a year and worked on organic farms, I worked as a cook in a restaurant, and I also taught middle school language arts. When I got very tired of that - and it was bad - in that moment I found the Garden Kitchen. It was a perfect fit of teaching, because I came into it and was able to help them really develop their lesson plans, and from a teaching experience, and then with cooking experience and gardening experience.

Lastly, experimentation was also revealed as a source of some of the practitioners' agricultural knowledge and perspective. In describing how he has learned to grow produce organically in the arid soils of the Southwest, Cliff exclaimed, "I experiment like crazy." Charles, a co-owner and operator of a local hydroponic greenhouse, described in more detail how he learns through experimentation through the following remarks:

> I'm still learning. I mean I'm sitting here thinking to myself. I'm like, Man, I just changed one chemical in my fertilizer compound because another chemical was really, really, really next to impossible, hard to get. We've added acid to help drop the pH but possibly by adding too much acid and this other chemical, I now have unhealthy plants at home because my pH is in the floor. That was something that I've never had to deal with before. It's these learning processes that are just painful to deal with. We'll pull through.

James described a similar approach to learning to deal with the growing conditions at his organic you-pick garden when stating, "It's an experiment that never stops with the soil and their fertilizer needs. It is a trial and error learning experience."

Variations in the Knowledge Known

The agricultural epistemologies, or ways of knowing, held by our participants grew from the preceding roots of knowledge and perspective. We do not argue that each participant in our study developed their agricultural knowledge base and perspective, as well as accompanying understandings and beliefs from a single source or experience. More generally, the sources and influences that shaped the agricultural epistemologies of the participants were a blend of academic and technical training, cultural and familial backgrounds, and personal experiences. We now describe the three main agricultural epistemologies that emerged from our data: *scientific/technical, social justice and/or environmental conservation,* and *cultural and heritage*.

In some cases, participants understood agriculture through a mostly scientific/technical lens. For example, Joe, the Extension agent of over three decades with an advanced degree in plant protection, was quick to identify the scientific and technical aspects of agriculture that he believed are required to make a person a knowledgeable gardener. He stated,

> The agent pretty much determines what the curriculum is going to be. But there are some basic courses, basic concepts. We talk about biology, we talk about soils, we talk about entomology and plant pathology, and those kinds of basic types of things… I focus a lot on diagnostics.

Molly, the Extension Agent with an agricultural economics degree who oversees "Ag in the Classroom" programs, also viewed agricultural awareness and understanding through a scientific/technical lens. She revealed this lens in part when describing her view on the value of including agricultural principles and concepts in k-12 curricula. She stated,

> This is a really cool way for kids to start looking at careers in agriculture... There are researchers that are looking at the best way to grow things and they can do little tiny experiments on okay, if I plant the seed this way what happens as opposed to

> planting it this way, so just to help them come up with different ideas of what they can do in their garden. If none of them get certified it's not really going to break my heart because I had 400 adults in front of me and we talked about this is what big ag does.

Molly's comments illustrate her scientific and technical orientation, as well as reveal an underlying tension between those participants such as her and Joe who are grounded in a conventional view of agriculture as an industry and those with a counter-movement view that pushes back against the corporatization of agricultural production and consumption.

The agricultural epistemologies of those participants with a counter-movement or activist position were anchored squarely in the belief that local food production and consumption is a matter of social justice and/or environmental conservation. Consider, for example, the perceptions of Justin, the managing editor of a community-based, local food magazine, on how global food production negatively impacts small-scale farmers and consumers. He stated, "The point is that the economy has started to change the food to meet the needs of the economy rather than meeting the needs of the people, who are the consumers." Justin's understanding of the economic implications of industrial-scale agriculture on local food production and consumption was further captured through his description of the current agricultural economy that, in his view, is "a system that doesn't really work and so the government subsidizes those [industrial-scale] farms and so that's another unfair advantage that the large farms have over the small farms is that they get subsidized." Through his frustrations over large-scale enterprise, Justin firmly adopted a view guided by the belief that local food production and consumption is an economically feasible and just alternative to industrial agriculture. A similar understanding of the economic downsides of industrial agriculture framed the perceptions of Peter, the organizer of a CSA share. He stated, "I'm familiar with farmers markets, and I think they're great, but when I came across the concept of CSA, I thought that was even greater… especially for farmer. The small organic farmer is really an individual that generally struggles." In general, economic philosophy and social and environmental justice platforms regularly mixed with agricultural knowledge to shape the epistemologies of activist and activist-like participants.

Debbie, a hobby farmer who sells goat milk products at farmers' markets, also had strong perceptions of the benefits of alternative local agricultural models over the industrial mainstream. Her commitment to local agriculture was rooted in the understanding that the consumption of all-natural products is essential to a healthy lifestyle, which is a position that extends from her belief that drinking raw goat milk helped treat her son's learning disability. She had no trust that truly all-natural products can be purchased from mainstream suppliers. In describing her own production of hair conditioner, she stated, "It was a really nice conditioner and your hair felt great, but it had no compatibility. Everything that you can get that gives compatibility is chemical, it's processed. It's junk." Ultimately, Debbie identified an all-natural product that adequately improved her conditioner, which she now sells at the markets.

Rosanne, a farmers' market organizer, also indicated a belief similar to Debbie's that conventional agriculture is putting the health of consumers at risk. She firmly stated,

> The local [food] movement is coming together, I think, for a huge need… The reason why is people are getting sick… is because of the food they're eating. People are starting to realize that. We see at the farmers markets a lot of people who have been sick, have been ill with major illnesses like cancer or chronic illnesses, that the doctors don't have anything to give them.

Rosanne has come to believe all-natural, unprocessed foods are critical to both health prevention and medicinal treatment approaches.

In other cases, perceptions of the value of local agricultural production and consumption were guided by the belief that agriculture is vital to the culture, heritage, and overall identity of a community. Jon, a self-described "community-supported baker" who was leading a movement to

grow the local grain economy through the production of Sonoran wheat, which is considered a heritage grain within Southern Arizona, stated,

> It's not a fad bread… I want to give this community something where bread lives on beyond what I'm doing… I think what I'm trying to do is create a movement. A food movement that's based on what we're talking about, a community-supported approach where the baker or the [grower or producer] at the focus is giving back in a way where they can gain strength over time and create value for their community.

Jane, the outreach director of a local seed bank, described the primary focus of her work as engaging farmers and consumers directly in efforts to bring greater biodiversity to the local food system and environment more generally. However, she indicated much of her work contributes to what she called a "local heritage wheat movement." Recall the important connection George, the farm manager at a community food bank, made between agricultural production, food consumption, and culture when traveling in Italy. He further underscored the perceived connections between culture and local food production and consumption when stating, "What I certainly realized back home was that the United States lacks the importance of food because we don't have thousands of years of ingrained food culture here." To George, a strong local food culture is a vital input to the efforts to successfully combat hunger.

Variations in the Translation of Knowledge and Perspective

Seven participants in our study, which included those working for Extension or with community organizations with an outreach function, were as part of their professional roles responsible for conveying agricultural information to adult audiences through non-formal learning models (e.g., workshops, seminars, field trips). The remaining 11 participants, who included growers, organizers, or promoters of local agricultural enterprises, also indicated some level of commitment to informally sharing their knowledge and perceived wisdom with the individuals they interact with as part of their practices aimed food production and consumption. From the data emerged three categorical themes that guided such informal and non-formal agricultural literacy activities: *advocacy, engagement, and empowerment*.

Advocacy took one of two directions, which was largely based on whether a practitioner was oriented toward conventional or alternative agriculture models. Practitioners affiliated with Extension were primary advocates for conventional agriculture. For example, Chrystal, an Extension agent with a graduate degree in agricultural education, described the importance of agricultural literacy efforts in the following way:

> I feel like in today's society, a lot of people do not understand agriculture… I think [agriculture] literacy is so important… teaching people the importance on how we grow our food and that we really are doing in safe practices and doing the best we can to keep our food safe.

Chrystal identified the target audience of her agricultural literacy efforts as being entire families with a particular emphasis on parents due to their role in deciding what types of food to purchase for themselves and their families. She went on to state,

> You always need to show both sides, let them make their own opinion about it, but then also fix that public image, just let them know that they [large-scale agriculture companies] really aren't scary or they're not demons who's going to kill their children by harming them.

Molly also assumed an obligation for advocating for conventional/industrial means of agricultural production when saying,

> They [general public] don't know agriculture, they just have heard these stories, and I tell you the city girl that I am, I respect every one of those [industrial-scale] farmers out there. Are there bad seeds? Yes, there are bad seeds… but the majority

> of them [industrial-scale farmers] are there to give you a healthy food source and I want them [general public] to understand that.

In general, the comments made by Chrystal and Molly, as well as Joe and one other Extension professional included in our sample, exposed an advocacy role that supported conventional agriculture and countered popular images portrayed by both the media and activist groups.

Conversely, participants who favored alternatives to industrial agriculture championed the benefits and overall value of local and/or organic food production and consumption. In some cases, Rosanne, the farmers' market organizer described her advocacy for local food through the informal sharing of information, whether scientifically back or not, by saying, "Part of my drumbeat from ten years ago to today was, look where your food comes from, look how far it travels. You wonder why you're sick." In other cases, advocacy for local food production and consumption was underpinned by an economic concern. For example, Peter, the CSA director, regularly expresses his concern over the financial struggles faced by "small-scale farmers who don't get subsidies like big farms do" when delivering guest lecturers in an undergraduate agricultural economics course at The University of Arizona. Whether driven by an activist and/or economic logic, practitioners with positions that favor alternative agriculture advocated for their viewpoints through informal (and to a less extent non-formal) learning channels that reached audiences ranging from college students to adults who are customers of farmers' market, CSAs, and/or you-picks.

Overall, the participants in our study came to view engagement in agricultural practices as an effective approach to generating a stronger awareness of agricultural issues and models among target audiences. For example, Lucy, the manager of the Extension-run community kitchen described the importance of conveying nutritional information through hands-on demonstrations. She stated,

> I think it's really important that they [practitioners] make that connection of what it is that they're asking patients to do when you [practitioner] have a diabetic in front of you and you tell them they need to eat less starchy vegetables. Do they know what that is, do they know how to prepare them, all those kinds of things?

Jane, the outreach director of a local seed bank, also indicated the importance of directly involving learners in seed harvesting and planting in order to generate stronger awareness and sustained interest in biodiversity issues. She stated, "we're differentiating our educational programming to target… different audiences… we want to take them [seeds] out of the seed bank, make sure they're living amongst people [learners], growing them, eating them." Julie, the director of an Extension-based community garden designed to provide learners of all ages with the opportunity to learn to garden, as well as Molly, the "Ag in the Classroom" representative, also stressed the value of engagement in agricultural principles and practices through experiential learning. In short, the inclusion of hands-on activities in non-formal learning activities was a common strategy for engaging learners of all ages and developing their understanding of particular aspects of agriculture.

Learning through engagement also occurred through informal exchanges at farmers' markets, CSAs, and you-picks. For example, Danielle, a co-owner of an organic you-pick garden stated,

> They [customers] come and they're like, 'Oh, I would love to pick something.' They don't really know how to pick it, they don't know anything about it. They've never seen an asparagus plant or whatever… we will walk around and show them how to dig the carrots or whatever.

She went on to describe how teaching customers to pick their own produce provides an opportunity to describe "what goes into that perfect little tomato; it's been bred, and bred, and bred, and bred, and sprayed; and hung from a string in the greenhouse and pampered, but mostly bred." In doing so, Danielle believes she is able to help customers understand why aesthetically appealing produce may not be the best produce.

James, another you-pick owner mentioned earlier in the paper, also identified sharing information with his customers as an essential aspect of his small-scale business. He stated, "I'd

say I'm an educator… I give people tours of the garden when they come in to buy produce and show them, 'This is an okra plant… the asparagus." However, unlike Danielle, James's instructional goal is to engage his customers in hopes they will become gardeners themselves. He described his outreach motive in the following way: "I hope more people will start backyard gardening… I think that would be a good thing for our country if we get more backyard gardening going on like we used to have." James's commitment to sharing his gardening expertise with his customers through interactive touring reflects the commonly held view that hands-on learning, whether non-formal or informal, is an effective method of engaging learners, including adults, in agricultural literacy.

Lastly, the sharing of agricultural information was sometimes viewed as a route toward empowering individuals with the knowledge and skills needed to live a healthy lifestyle. This sentiment was expressed in similar ways across the participant sample; although what constituted the basis of healthy choices and lifestyle varied. Participants often extended the notion of engagement to also encompass empowerment with particular emphasis being placed on consumer decision-making. Local agriculture advocates overall argued that consumers are empowered to make wiser purchasing decisions when they have the chance to engage in dialogue with and generally learn from the farmers who are growing and harvesting their food. Rosanne, the farmers' market organizer captured this belief when stating,

> It's all about connections and sustainability. If I buy from you, that means that I know where my food comes ... I trust you to buy my food from you. I get to talk to you. What do you use? What kind of feed do you use those chickens? What are you feeding those chickens? That kind of stuff.

Conventional farming advocates also contended agricultural literacy empowers consumers, especially parents, to make informed decisions when purchasing food. However, unlike the local food advocates, the conventionalists positioned their views in the context of preventing consumers from making misguided choices based on what they argued to be incomplete messages delivered through the media and by activist groups.

Discussion and Conclusion

From the data, a framework composed of the themes and categories specific to the participants' agricultural knowledge and perspectives, as well as the ways in which they acquired, refined, translated, and shared such knowledge and perspectives, was developed (see Figure 2).

The spectrum capturing the scope and scale of the participants' agricultural knowledge, perspectives, and translational activities ranged from an intimate and individualized level to a broader family, group or community emphasis, through a widespread state, national, and sometimes even global emphasis.

The type of structure that shaped how the participants developed and translated agricultural knowledge and perspectives also varied. In some cases, agricultural knowledge and perspectives were developed and translated in intimate/individualized manners shaped by heritage, as well as historical and/or artisanal traditions. In other cases, interpersonal and community engagement involving trial and error, just-in-time learning, and conversational exchange shaped the development and translation of agricultural knowledge and perspectives. Lastly, more formalized short courses (e.g., day or week long curricula) and other pre-determined programs anchored within organizations with stated missions specific to agricultural literacy served as vehicles for conveying agricultural knowledge and perspectives.

Epistemological Category	**Contextual Application**		
Scope and Scale	**Individual**	**Local/Community**	**State/Global**
	Encompasses individuals as artists, artisans, hobbyists, and others operationalizing knowledge for personal growth and development	Small business owners, farmer's markets and other community-based activities in both rural and urban settings	Larger or more profit-driven entrepreneurs, statewide, national, and global education programs targeting large audiences
Structure	**Folklore and Heritage (Informal)**	**Experience and Experimentation (Informal)**	**Planned and Structured (Non-Formal)**
	Folklore, history, engaging in and passing traditions, connecting to and maintaining native landscapes and heirloom seeds	Learning by doing, just in time teaching, learning through trial and error, informal conversations and community groups	Structured curriculum, pre-determined and articulated learning outcomes, short courses, adult and youth education programs
Nature of Knowledge	**Cultural and Generational**	**Pragmatism and Community**	**Conventional Practices**
	Knowledge about agriculture as a keeping of traditions and history, passing to generations, told through folklore, and connecting to the senses	Knowledge about agriculture as pragmatic, grounded in science and socially constructed based upon individual and community needs, acquired through engagement and learning by doing	Knowledge about agriculture as business, production, and scientific applications of how to increase productivity, business efficiencies, and/or economic sustainability
Outcomes	**Individual Engagement**	**Empowerment**	**Activism and Advocacy**
	Individual engagement, personal development, aesthetic or historical connection to food	Empowering others, teaching others to be self-sustaining, enhancing food security and social equity	Conveying and promoting a pre-developed agenda ("Agvocacy", alternative agricultural activism)

Figure 2. Agricultural Knowledge, Perspective, and Translation in the Informal and Non-Formal Contexts

The nature of the agricultural knowledge and perspectives also varied along the spectrum. On one end, agricultural knowledge and perspectives were seen as being anchored in folklore and artisanal traditions, and intimately passed through oral histories and cultural activities. In the middle

of the spectrum, agricultural knowledge and perspectives sometimes emerged pragmatically out of individual and/or community needs. Such knowledge and perspectives were either grounded in science or socially constructed according to individual or collective worldviews (e.g., active opposition to GMO crops). In this context, learning occurred within authentic settings and through watching and engaging in demonstrations, or by conversing and problem solving over the challenges and opportunities that influence food production and consumption. At the other end of the spectrum, participants viewed agriculture through business and scientific/technical lenses and as such understood education and outreach as levers for enhancing agricultural enterprise and promoting research and development. Concurrently, participants operating within this space worked to enhance consumer and producer knowledge of and perspectives toward conventional agricultural principles and industrial models.

Finally, patterns of how participants contextualized the desired outcomes (i.e., "end goals") of sharing and translating agricultural knowledge and perspectives also emerged from the data. Some participants viewed themselves as keepers of the art and traditions of food production, passing their knowledge to future generations and connecting personally with others and to their own individual development through the agricultural knowledge they conveyed. Others were more pragmatic by viewing the exchange of agricultural knowledge and perspectives as a way to empower others to eat better, be more self-reliant, and make more informed consumer decisions. And for some participants, the end goal for sharing and translating agricultural knowledge and perspectives was to advocate for change through the promotion of specific agendas. In this regard, while some participants were educating as activists and champions of agendas tied to movements such as vegetarianism, and organic and sustainable agriculture, others were "agvocating" for an agenda anchored in conventional agricultural approaches involving large-scale farming models depicted as the solutions to feeding a growing world population.

By understanding alternative paradigms of food production and consumption and the underlying agricultural epistemologies, agricultural educators and leaders can access new channels for reaching diverse stakeholder groups (e.g., college students, urban professionals, lower income community members) with wide-ranging perspectives, positions, and traditions. Such understanding promotes tolerance and the productive dissemination and exchange of knowledge and skills across unconventional learning environments that include both non-formal and informal settings. This inclusive approach to knowledge exchange and skill development represents a promising alternative to the dominant paradigm that guides agricultural knowledge dissemination in primarily formal k-12 settings and conventional non-formal environments (e.g., Extension, FFA, 4-H), which in some ways fuel defensive agenda setting and contentious, counter-productive debate. Indeed, informal and non-formal agricultural literacy activities that are anchored in cultural and familial heritage, artisanal traditions, community identity, experimentation, and so on are occurring and will undoubtedly continue to do so. Alternative agricultural literacy efforts should not be viewed as a threat to or counter-movement against mainstream models. Instead, we recommend agricultural educators and leaders utilize the framework developed in this study as a guide to integrating a more holistic understanding of agricultural paradigms and epistemologies into outreach, education, and leadership programming.

Finally, our study has illuminated new opportunities for agricultural literacy research. For instance, both qualitative and quantitative studies that track agricultural literacy development as a lifelong learning process rather than one confined to the school-based experience are warranted. Also, research that focuses on the efficacy of non-formal curricula that balances conventional agricultural knowledge with that which is anchored in community and cultural heritage and traditions, as well as alternative lifestyles, is encouraged. Moreover, the outcomes of informal learning that occurs within settings such as those associated with agritourism and local food enterprise should also be studied.

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